



Severe Acute Respiratory Syndrome (SARS)

Interim Guidelines for Health Care Professionals

August 30th 2005

Note: * This guidance will be reviewed and revised accordingly in the event of a recurrence of a global outbreak of SARS or an outbreak of SARS in Ireland. Some of this guidance is adapted from CDC (USA), World Health Organisation (WHO), Health Protection Agency (HPA) (UK) and Health Canada Guidance.

Table of Contents

Chapter 1	3
Introduction	
Chapter 2	7
Surveillance and Public Health Management of SARS	
Chapter 3	16
Clinical Management of SARS	
Chapter 4	27
SARS Infection Control Guidance for Hospitals	
Chapter 5	38
Laboratory Diagnosis of SARS: Updated Guidance	
Chapter 6	46
References	
Annex A	48
72-Hour Assessment of Contacts of SARS Cases	
Annex B	50
Assessment for Home Isolation	
Annex C: Recommendations for Care Providers of SARS patients or Contacts of SARS patients in the Home Setting	51
Annex D	53
Clinical Case Description of SARS (Updated August 14 th 2003)	
Annex E	55
WHO Hospital Discharge and follow-up policy for patients who have been diagnosed with Severe Acute Respiratory Syndrome (SARS)	
Annex F	57
Summary of probable SARS cases with onset of illness from 1 November 2002 to 31 July 2003 (revised 26 September 2003)	
Annex G	59
Summary table of areas that experienced local transmission of SARS during the outbreak period from 1 November 2002 to 31 July 2003	

Chapter 1

1. INTRODUCTION

Severe Acute Respiratory Syndrome (SARS) was first recognised as a global threat in March 2003. Between March and July 2003, over 8,000 probable cases of SARS were reported in approximately 30 countries. It is likely that SARS originated in the Guangdong Province in China in November 2002. SARS is caused by a novel coronavirus known as SARS-CoV and preliminary animal studies have isolated the SARS-CoV virus in wild animals native to the Guangdong Province and other parts of China.

The outbreak was successfully contained within five months and on July 5th 2003, the World Health Organisation (WHO) announced that the last human chain of transmission of SARS had been broken. While much has been learned about SARS including its causation (SARS-CoV), we still have limited knowledge about the epidemiology and ecology of SARS coronavirus infection and its potential to re-emerge has not been ruled out. In view of this, in the post outbreak period, it is imperative that all countries remain alert for the recurrence of SARS and increase their capacity to detect and respond to SARS should resurgence occur.

The WHO case definitions during the outbreak period relied heavily on epidemiological criteria such as locations of SARS outbreaks to increase the specificity of syndromic clinical criteria for atypical pneumonia or respiratory distress syndrome (RDS). However, epidemiological links to cases of SARS and areas reporting recent local transmission are no longer of use in helping to define incident cases. Furthermore, the non-specific clinical features of SARS, the lack of a current rapid diagnostic test that can reliably detect SARS-CoV in the first few days of illness and the seasonal occurrence of other respiratory diseases, including influenza, may confound any surveillance for SARS and demand a level of quality and intensity which few health care systems worldwide can sustain. Even with the most sophisticated surveillance systems, the first case of SARS in the post-outbreak period may escape early detection.

This document provides interim case definitions and guidance for the reporting and management of SARS in Ireland for two situations: (1) When there is no SARS transmission (person-to-person) globally and (2) when there is SARS transmission (person-to-person) globally. *It is notable that public health guidance and case definitions will need to be reviewed and updated if SARS re-emerges anywhere in the world.*

SARS 2004

Four cases (3 confirmed and one probable) of SARS in Guangdong, China were reported by WHO between 16 December 2003 and 31 January 2004^(1,2,3,4). All four have now recovered and to date none of their known contacts have developed a SARS-like illness.

At present, the source of infection in these most recent SARS cases is unknown. The Ministry of Health in China in collaboration with the WHO China Country Office is conducting an epidemiological investigation into possible sources of transmission and has carried out contact tracing and other public health measures.⁽¹⁾

1.1 Principles and Assumptions in relation to SARS

The current recommendations are based on the following principles/assumptions:

- The incubation period is 2 to 10 days.
- Presentation is of a non-respiratory prodromal illness with symptoms including malaise, headache or myalgia concurrent with or followed by sudden onset of high fever. The prodrome lasts 2 to 7 days. Diarrhoea has also been reported during the febrile prodrome.
- The lower respiratory phase begins within 3-7 days after onset of prodrome and peaks in the 2nd week.
- Nearly all laboratory confirmed cases of SARS have x-ray evidence of pneumonia by day 7 of illness i.e. from the onset of prodrome.
- History of exposure to SARS is usually present.
- Transmission occurs through close contact with a symptomatic person. Transmission of SARS is predominantly by droplet spread, unlike other respiratory illnesses such as influenza, which are predominantly airborne infections.
- Close contact means having cared for, lived with or had face to face (within one metre) contact with, or direct contact with respiratory secretions and/or body fluids of a person with SARS.
- Close contacts of a probable case are considered to have a higher risk of transmission compared to those with a history of travel to a WHO SARS designated area.
- One of the conclusions from the SARS outbreak was that healthcare workers are at special risk.
- Infants and children accounted for only a small percentage of cases in the 2003 outbreaks and had much milder disease with better outcomes than adults.
- The cases that are the most ill are the most infectious and infectiousness appears to increase in the second week of the illness.
- There may be transmission during the prodromal period (i.e. when early symptoms, including fever, are present).
- There is no evidence of transmission prior to onset of fever.
- There is no evidence that patients transmit infection 10 days after the fever has resolved.
- Transmission from an asymptomatic person is very unlikely.
- Current infection control measures, including the use of N 95/European EN149:2001 FFP2 masks are effective

- Information on masks is available on the SARS website (<http://www.ndsc.ie/DiseaseTopicsA-Z/SevereAcuteRespiratorySyndrome/>) and can be used by public health as necessary when educating cases and their contacts.
- People on active daily surveillance (i.e. not on home quarantine or home isolation), do not have to remain in their homes and can go to work etc. during the active daily surveillance period.
- The period of communicability is up to 10 days following resolution of fever
- SARS is less infectious but more virulent than most acute respiratory infections e.g. influenza
- Typical symptoms of SARS-CoV disease may not always be present in the elderly and those with underlying chronic disease such as renal failure. Therefore the diagnosis of SARS should be considered for almost any change in health status when such patients have associated epidemiological risk factors.
- The overall case fatality is approximately 9.6% but is higher in older age groups (50% if aged over 65 years)

The recommendations in this document are provided as a guide to public health authorities managing SARS cases and potentially infected contacts. Stringent recommendations or public health actions may be required in specific situations (e.g. outbreak management). It is recognised that expert judgment, including consideration of clinical presentation and exposure history, will be necessary in order to tailor these recommendations to specific individuals or groups of individuals.

1.2 Clarification of Terminology

Quarantine - refers to restriction of the activities of **well** persons who have been exposed to a case during its period of communicability.

Isolation - refers to separation, for the period of communicability, of **ill** i.e. symptomatic persons from others in such places and under such conditions so as to prevent or limit the direct or indirect transmission of the infectious agent.

Incubation period - refers to the time interval between infection (i.e. introduction of the infectious agent into the susceptible host) and the onset of first symptoms of illness known to be caused by the infectious agent.

References :

1. World Health Organisation: New case of laboratory-confirmed SARS in Guangdong, China - update 5. http://www.who.int/csr/don/2004_01_31/en/
2. World Health Organisation: Laboratory confirmation of a SARS case in southern China - update 2. http://www.who.int/csr/don/2004_01_05/en/

3. World Health Organisation: Update 4: Review of probable and laboratory-confirmed SARS cases in southern China. http://www.who.int/csr/don/2004_01_27/en/
4. World Health Organisation: WHO SARS International Reference and Verification Laboratory Network: Policy and Procedures in the Inter-Epidemic Period. <http://www.who.int/csr/sars/guidelines/en/WHOSARSReferenceLab.pdf>

Chapter 2

2. SURVEILLANCE AND PUBLIC HEALTH MANAGEMENT OF SARS

Surveillance is the foundation of SARS preparedness plans and its key components include:

1. Early identification and tracking of cases
2. Timely reporting as SARS transmission anywhere in the world has global implications
3. Identification, evaluation and monitoring of contacts for potential spread of disease
4. Real-time data analysis
5. Dissemination of updated information to assist in detection and containment of disease

SARS activity is typically healthcare facility/hospital and community based and the level of SARS transmission in the community determines the risk of exposure. In the outbreaks in 2003, 20% of SARS cases occurred in healthcare workers (HCWs). There are two levels of activity

- Absence of known SARS transmission (person-to-person) worldwide or the Post Outbreak Period
- Presence of SARS transmission (person-to-person) worldwide

For surveillance guidance please see HPSC Updated Guidelines for Global Surveillance of SARS August 2005 available at <http://www.ndsc.ie/DiseaseTopicsA-Z/SevereAcuteRespiratorySyndrome/HealthcareProfessionals/>

PUBLIC HEALTH MANAGEMENT DURING A SARS OUTBREAK

2.1 Contact Tracing and Management of Close Contacts of SARS Cases (In the presence of SARS transmission (person-to-person) globally)

The management of contacts will vary depending on whether the case is a suspect, probable or confirmed SARS case. However, the principles in relation to the management of contacts of SARS cases are the same in the presence or absence of SARS transmission (person-to-person) globally.

2.1.1 Asymptomatic Contact of a Person Under Investigation (PUI)

- 1) They should be given information on SARS available at <http://www.ndsc.ie/DiseaseTopicsA-Z/SevereAcuteRespiratorySyndrome/>.
- 2) Follow up only if source of exposure progresses from PUI to suspect, probable or confirmed case

2.1.2 Asymptomatic Contacts of Suspect Cases should be traced and managed as follows:

- a) They should be given information on SARS available at <http://www.ndsc.ie/DiseaseTopicsA-Z/SevereAcuteRespiratorySyndrome/>
- b) The public health team should provide information and instructions regarding self-monitoring of temperature and presence of symptoms for 10 days.
- c) They may or may have their activities restricted, that is be placed on home isolation depending on their exposure of concern. This will be decided following a risk assessment of the contact.
- d) Public health should inform the contact's GP that a patient of theirs is under surveillance for SARS
- e) If source case progresses to meet the "probable" or "confirmed" case definition then manage as contact of probable/confirmed case (See 2.1.3 and 2.1.5)
- f) A close contact that develops symptoms of SARS within ten days of contact with a suspect case should phone their GP and seek medical advice. The GP should inform the Director of Public Health (Medical Officer of Health). The contact should then be managed as a symptomatic contact which is outlined in Section 2.1.4
- g) If the person's symptoms progress to meet the case definition of a suspect or probable case of SARS, they should be reviewed at home by the GP (see GP interim guidance at <http://www.ndsc.ie/DiseaseTopicsA-Z/SevereAcuteRespiratorySyndrome/>) and referred to hospital if deemed appropriate by GP with prior arrangement.
- h) If the contact is mildly unwell, they should be managed at home by their GP. While at home, the patient should keep contact with others to a minimum until their symptoms have resolved and they have been afebrile for 48 hours. GPs should contact the patient regularly during the course of the patient's illness.

2.1.3 Asymptomatic Contact of Probable Case should be traced and managed as follows:

- a) A list of close contacts should be generated, recording the date on which they last had contact with the case.

- b) They may or may have their activities restricted, that is be placed on home isolation depending on their exposure of concern. This will be decided following a risk assessment of the contact.
- c) On day one, i.e. the day case is notified, the public health team should telephone the contact to assess their health. They should provide information and instructions regarding self-monitoring of temperature and for presence of symptoms for 10 days and provide them with information on SARS.
- d) Public health should inform the contact's GP that a patient of theirs is under surveillance for SARS.
- e) The contact should be re-assessed after 72 hours by the local public health team to review progress (See Annex A-72 Hours assessment algorithm). This assessment will include fever monitoring and respiratory symptom surveillance.
- f) On day 10 following last contact with the case, the public health team should telephone the contact to assess their health.
- g) If source case progresses to meet the “confirmed” case definition then manage as contact of confirmed case (See 2.1.5)
- h) A close contact who develops symptoms of SARS within ten days of contact with a probable case should phone their GP and seek medical advice. The GP should inform Director of Public Health (MoH). The contact should be managed as a symptomatic contact, which is outlined in Section 2.1.4.
- i) If the person's symptoms progress to meet the case definition of a suspect or probable case of SARS, they should be reviewed at home by the GP (see GP interim guidance at <http://www.ndsc.ie/DiseaseTopicsA-Z/SevereAcuteRespiratorySyndrome/>) and referred to hospital if deemed appropriate by GP with prior arrangement.
- j) If the contact is mildly unwell, they should be managed at home by their GP. While at home, the patient should keep contact with others to a minimum until their symptoms have resolved and they have been afebrile for 48 hours. GPs should contact the patient regularly during the course of the patient's illness.

2.1.4 Management of Symptomatic Contacts of Suspect and Probable Cases

- a) Contacts who develop symptoms of SARS i.e. fever $\geq 38^{\circ}\text{C}$ and lower respiratory symptoms should initially be assessed at home by their GP rather than in the practice setting. The GP should follow Interim Guidance for General Practitioners on the Investigation and Management of Severe Acute Respiratory Syndrome (SARS) Cases at <http://www.ndsc.ie/DiseaseTopicsA-Z/SevereAcuteRespiratorySyndrome/>.
- b) The person will not be allowed to undertake their normal daily activities and facilities for isolation will need to be considered.
- c) If clinically appropriate, a decision to manage the patient with home isolation should be made in conjunction with the patient's general practitioner and the local public health department. See Annex B: Assessment for Home Isolation.

- d) If the home setting is deemed unsuitable for isolation of the symptomatic contact, a designated alternative health facility should be used.
- e) If contacts progress to meet the case definition for suspect, preliminary positive, probable or confirmed SARS as outlined in HPSC Updated Guidelines for the Global Surveillance of SARS available at <http://www.ndsc.ie/DiseaseTopicsA-Z/SevereAcuteRespiratorySyndrome/HealthcareProfessionals/> they should be referred to hospital by GP with prior arrangement.
- f) If the contact is mildly unwell (e.g. fever, chills, myalgia or headache) without symptoms of lower respiratory tract illness (cough or difficulty breathing) they should be managed at home by their GP. While at home, the patient should keep contact with others to a minimum i.e. as in home isolation until their symptoms have resolved and they have been afebrile without antipyretic medication for 48 hours. Information should be supplied about good infection control practices.
- g) They should be reassessed by GP in 72 hours. If the contact develops lower respiratory symptoms and progresses to meet the case definition of a suspect, probable or confirmed case, they should be referred to hospital and assessed with chest x-ray etc.

2.1.5 Contacts (asymptomatic and symptomatic) of a Confirmed Case should be traced and managed as follows:

- a) Voluntary home quarantine is recommended for a close contact of a confirmed case of SARS.
- b) If the home setting is deemed unsuitable for isolation of the symptomatic contact, a designated alternative health facility should be used.
- c) Such close contact should stay indoors and keep contact with other people to a minimum for a period of ten days from the time of last contact with the case.
- d) Public health should provide information and instructions regarding self-monitoring of temperature and for presence of symptoms for 10 days.
- e) Public health should inform the contact's GP that a patient of theirs is under surveillance for SARS
- f) In addition, the local public health team should telephone the contact daily during the ten day incubation period to assess their health. The most consistent first symptom that is likely to appear is fever.
- g) A close contact who develops symptoms of SARS within ten days of contact with a confirmed case should phone their GP and seek medical advice. The GP should inform Director of Public Health (MoH).
- h) If contacts progress to meet the case definition for suspect, preliminary positive, probable or confirmed SARS as outlined in HPSC Updated Guidelines for the Global Surveillance of SARS available at <http://www.ndsc.ie/DiseaseTopicsA-Z/SevereAcuteRespiratorySyndrome/HealthcareProfessionals/>, they should be referred to hospital by GP with prior arrangement.

See Components of Active Daily Surveillance in Section 2.2

2.1.6 Contacts in Healthcare Settings

Contacts of suspect, probable or confirmed cases within the health care setting should be managed in the following way:

- 1) A risk assessment should be undertaken in relation to the index patient.
- 2) Set up an outbreak control team consisting of Consultant Virologist/Microbiologist, Infectious Disease Consultant, Public Health Specialist, Infection Control Nurse, Hospital Management, Occupational Health Physician and other relevant staff.
- 3) Inpatient contacts should be isolated or cohorted away from unexposed patients and transmission-based precautions instituted. Contacts should be placed on fever and symptom surveillance.
- 4) Staff with unprotected exposure to a suspect, probable or confirmed case should be placed on active fever surveillance, and should either be cohorted to care for exposed patients (as above) or placed on home quarantine depending on local circumstances. They should be given information on SARS.

2.2. Components of Active Daily Surveillance

In this document active daily surveillance refers to the public health action of contacting a person on a daily basis for the purpose of conducting a targeted assessment. Both symptomatic and asymptomatic contacts of probable, suspect and confirmed cases may be placed on active daily surveillance as part of their public health management.

- 1) Public Health must ensure that the individual is contacted at least once daily either by telephone or in person.
- 2) If they are not responding to telephone calls, public health personnel should visit the location where the person is believed to be residing or working etc. in order to conduct the required assessment.

Asymptomatic Contacts of Suspect, Preliminary Positive, Probable and Confirmed Cases

Asymptomatic contacts may or may not have their activities restricted, that is being placed on home quarantine in addition to the active daily surveillance. This would depend on their exposure of concern. Those people who are not on home quarantine should be instructed to remain in the community and refrain from travelling for the duration of the active surveillance.

Symptomatic Contacts

Symptomatic contacts should be placed on active daily surveillance in addition to home isolation if they were cared for in the home setting.

Probable and Confirmed cases who are recovering may need to be on active daily surveillance and home isolation after discharge from hospital if at the time of discharge it has been less than 10 days since their resolution of fever.

The following table summarises the components of active daily surveillance applicable to each of the four different categories of individuals. Descriptions of each component are provided below the table. **All people on active daily surveillance should be instructed to measure and record their temperature twice daily (at least 4 hours after any medications that might lower fever).**

Category of individual	<i>Component of Active Daily Surveillance</i>				
	Symptom screen	Compliance assessment	Symptom monitoring	Household members	Laboratory result check
Asymptomatic, Contacts of Suspect and Probable Cases	Yes	Not applicable	Yes	Not applicable	Not applicable
Asymptomatic contacts of Confirmed Cases	Yes	Yes	Yes	Not applicable	Not applicable
Symptomatic Contacts of Suspect, Probable and Confirmed Cases	Not applicable	Yes	Yes	Yes	Yes
Discharged case on home isolation	Yes	Yes	Yes	Yes	Yes

2.2.1 Symptom screen (query for symptom onset in previously well persons)

The following questions should be asked when undertaking a symptom screen of a contact of a suspect, probable or confirmed SARS case:

1. Any indication of fever over 38 degrees Celsius? (Temperature should be measured twice daily at least 4 hours after any medications that might lower fever, e.g. aspirin, paracetamol or ibuprofen)
2. Any prodromal symptoms? (i.e. malaise, chills, rigors or headache)
3. Any respiratory symptoms? (i.e., cough, shortness of breath or difficulty breathing)

2.2.2 Symptom monitoring (query for deterioration or improvement in ill persons)

When monitoring symptoms in a contact the following questions should be asked:

1. What was your temperature today? (Temperature should be measured twice daily at least 4 hours after any medications (anti-pyretics) that might lower fever, e.g. paracetamol or ibuprofen)
2. Any changes in the presence and nature of their cough?
3. Any changes in their other respiratory symptoms? (e.g. is shortness of breath or difficulty breathing persistent or only present under specific circumstances)
4. Other specific questions that would elicit whether the symptoms are getting worse or improving.

2.2.3 Compliance assessment

To assess compliance with instructions re daily active surveillance and restriction of activities, the following questions should be asked:

1. Are they staying at home?
2. Are there any immediate/impending compliance issues? (e.g. need to go out for groceries, running out of masks, child care arrangements are not sustainable)
3. Are they not accepting visitors?
4. For those on home isolation:
 - a. Are they wearing the masks consistently and appropriately (See Section 4.3.6).
 - b. Are they being compliant with the other infection control recommendations made in Chapter 4

2.2.4 Household members of symptomatic individuals should be aware of symptoms of SARS and a symptom screen undertaken to detect if they are developing any symptoms of SARS or the SARS prodrome.

2.2.5 Laboratory result check

Recommendations for laboratory testing have placed limits on the number and type of people for which specimens should be collected. **However, the public health doctor should be aware of any outstanding laboratory investigations for the isolated individual that may identify another cause of the symptoms. Consistent with the suspect and probable case definitions, if another cause of illness is identified, the**

individual will no longer meet the case definition and therefore will be discharged from home isolation.

2.3: Recommendations for Care Providers of SARS patients or Contacts of SARS patients in the Home Setting

The person who is sick should stay isolated at home following the directions of personnel from public health until public health provides instruction that this is no longer necessary.

See Annex C for guidance for care providers of SARS patients or contacts of SARS patients in the home setting

2.4 Reporting of SARS

2.4.1 National Reporting

- 1) The clinician should inform the Director of Public Health in his region of the occurrence of a possible case or cluster of SARS.
- 2) The Director of Public Health should inform the Health Protection Surveillance Centre (HPSC).
- 3) The Director of Public Health using the standard reporting form will initiate follow-up of cases.
- 4) On receipt of an initial report of a possible case or cluster of SARS, the SARS team at HPSC should log the call and add it on to the national SARS database.
- 5) Cases will be reclassified or (discarded) as laboratory findings become available.
- 6) **The National SARS expert group will be convened if a laboratory confirmed case of SARS is notified** in order to discuss an appropriate course of action to prevent further transmission and protect public health.

2.5 Situation regarding travel

As of June 24th 2003, Ireland in line with the WHO has removed all restrictions on travel to areas of the world previously affected by SARS. Also, from July 5th 2003, WHO announced that the last human chain of transmission of SARS has been broken.

We are now in a post-outbreak period and Ireland is remaining vigilant for the possible recurrence of SARS. WHO is continuing to monitor the global situation and if necessary i.e. SARS re-emerges; travel advice will be issued accordingly.

In the event that WHO are notified of a new area of local transmission of SARS, the following measures will be re-introduced.

1. Persons will be screened for possible SARS at the point of departure from the new area of local transmission. Such screening involves answering two or three questions and may include a temperature check.

2. Travellers with one or more symptoms of SARS and who have a history of exposure or who have fever or who appear acutely ill should be assessed by medical personnel and may be advised to postpone their trip until they have recovered.
3. It is recommended that persons arriving from areas with recent local transmission should be aware of the main symptoms of SARS i.e. high fever ($\geq 38^{\circ}$ Celsius, $\geq 100.4^{\circ}$ Fahrenheit), and one or more respiratory symptoms including dry cough, shortness of breath or breathing difficulties and should seek medical advice, initially by telephone, if they develop symptoms in the 10 days after leaving the outbreak area.
4. Contacts of probable cases should not undertake travel until 10 days after the last contact assuming they themselves remain well. If despite the advice above, a contact of a probable case travels to another country, the person should be placed in voluntary isolation and kept under active surveillance by the health authorities in the country of arrival.
5. Well persons who are not contacts of probable cases require no special measures and should be free to carry out normal activities.
6. Advice regarding the follow-up of airline passengers and crew will also be issued at this time.

Chapter 3

Clinical Management of SARS

3.1 Diagnosis of SARS

3.1.1 No documented SARS Transmission (Person-to-Person) in the World

Making a diagnosis of SARS sufficiently early in the disease to implement effective infection control and public health measures will prove a challenge that requires all HCWs to always incorporate risk-based infection control measures in care provision. All HCWs should be encouraged to consider the possibility of SARS in a patient under their care. If there are features suggestive of SARS then any concerns should be raised promptly and should trigger risk-based infection control measures as simple infection control measures can dramatically reduce the transmission of SARS-CoV. The non-specific nature of the presentation of SARS could lead to concern being raised in a vast number of patients who will ultimately prove to have another diagnosis. In practice, concern about the possibility of SARS may often be expressed at the stage where atypical pneumonia is suspected.

For clinicians the process of diagnosis from initial concern to confirmation or exclusion of a SARS diagnosis is usually an incremental one using information gathered from various sources which include: clinical history and examination, radiological haematology, microbiology, virology and biochemistry investigations. Early recognition will depend on the effective combination of clinical and epidemiological features.

See Annex D for Clinical Case Description of SARS. Clinically there are currently no specific clinical or laboratory test which can distinguish with certainty SARS from other respiratory illnesses at the time of presentation.

New case definitions have been developed for post outbreak surveillance of SARS i.e. when there is no documented SARS transmission (person-to-person) worldwide. They are outlined in Chapter 2 and include (a) possible case; (b) probable case; (c) confirmed case and (d) discarded case.

*Corresponding case definitions for the situation where there is evidence of SARS transmission (person-to-person) worldwide are outlined in Section 2.5 and include (a) Person Under Investigation (PUI), (b) suspect case, (c) probable case and (d) confirmed case. They are similar to those used by Health Canada and the World Health Organisation (WHO) during the SARS outbreak. **NOTE: Case definitions are subject to revision as further information becomes available.***

3.2 Management of Cases

The clinical management of patients with SARS will be based on the following situations:

- 1) Evaluation when there is *no documented SARS transmission (person-to-person) anywhere in the world* and
- 2) Evaluation following *documentation of SARS transmission (person-to-person) anywhere in the world.*

3.2.1 Evaluation of Patients When there is no documented SARS transmission (person-to-person) worldwide.

The likelihood of SARS approaches zero unless in the presence of the following:

- 1) Suggestive clinical presentation (i.e. severe unexplained pneumonia) **AND**
- 2) Epidemiological features suggesting the possibility of exposure to SARS-CoV i.e. travel to potential zones of re-emergence for SARS **OR** clustering of pneumonia cases **OR** healthcare association.

SARS should only be considered in patients who:

1. Are hospitalised for pneumonia of unknown aetiology
AND
2. Have evidence of one of the following
 - i. Recent travel to a potential zone for re-emergence of SARS or close contact with ill persons with a history of travel to such areas
 - ii. Employment as a healthcare worker with recent direct contact with a patient suspected to have SARS or under investigation for SARS
3. Recent exposure to other persons with unexplained severe pneumonia.

Patients who are defined as possible, probable and confirmed cases of SARS will require hospitalisation

If a patient is hospitalised for unexplained pneumonia and has at least one of the exposure factors outlined above, the clinician should:

- 1) Institute infection control precautions immediately and nurse separately from other patients
- 2) Notify the local public health department
- 3) Local public health department to notify HPSC
- 4) Consult the infectious disease consultant and clinical microbiologist
- 5) Treat for the common causes of community-acquired pneumonia
- 6) Perform a diagnostic workup including:
 - a. FBC with differential
 - b. Pulse oximetry
 - c. Blood cultures
 - d. Sputum gram stain and culture
 - e. Testing for viral respiratory pathogens i.e. RSV, influenza A, B

- f. Urinary antigen testing: legionella and pneumococcal
- g. Other tests: CPK, transaminase levels, LDH, apt, C-reactive protein

7) If no alternative diagnosis within 72 hours, consider need for SARS testing in consultation with local public health specialist, consultant microbiologist/virologist, infectious disease physician and HPSC.

3.2.2 Evaluation of Patients When There is documented SARS transmission (person-to-person) in the World

The risk of exposure to SARS Co-V varies based on presence of epidemiological links to settings in which current SARS transmission has been documented.

No Exposure to Settings with Current SARS Transmission

If the person has no exposure to settings with current SARS transmission, they are deemed very low risk.

However, there is a higher threshold for suspicion if they fit the following criteria:

- 1) Been hospitalised for pneumonia AND
- 2) Travelled to a previously SARS-affected area (domestic or foreign), had recent exposure to persons with unexplained pneumonia or are employed as a healthcare worker with recent direct contact with a suspect, probable or confirmed case of SARS.

Persons Under Investigation

- 1. In this situation, persons who are defined as Persons Under Investigation (PUI) may require hospital admission or may be managed at home.
- 2. In relation to PUIs, the decision regarding hospital versus home care will be made by Public Health in consultation with attending and consulting physicians, including an infectious disease consultant.
- 3. The decision will be based on the severity of symptoms, details of exposure to a symptomatic suspect or probable case or exposure to a confirmed case and the feasibility of home isolation. PUIs will require daily monitoring of fever and respiratory symptoms for 10 days.
- 4. They should be re-assessed at 72 hours by the public health team as per 72-hour assessment algorithm (Annex A).
- 5. Most PUIs for SARS requiring hospital admission can be managed at local or regional levels.

Exposure to Settings with Documented SARS Activity

Exposure to settings with documented SARS transmission are deemed a significant risk and the threshold for clinical suspicion of SARS is lowered e.g. persons with fever **OR** respiratory illness should be considered.

SARS should be considered among patients with both:

Early clinical features compatible with SARS i.e. either fever **OR** respiratory symptoms
AND

Evidence suggesting potential exposure to SARS-CoV

- 1) Exposure to areas currently affected by SARS (foreign or domestic)
- OR**
- 2) Close contacts with a SARS case.

Any patient with either fever **OR** respiratory symptoms (PUI) should be asked about:

1. Recent exposure to a person suspected of having SARS in the 10 days prior to the onset of symptoms
2. Recent exposure to a SARS-affected area **or** close contact with ill persons with exposure to such areas (foreign or domestic) in the 10 days prior to the onset of symptoms

In patients undergoing hospital assessment, who have either fever, **OR** respiratory symptoms **AND** at least one risk factor for exposure to SARS-CoV (Suspect Case): the clinician should:

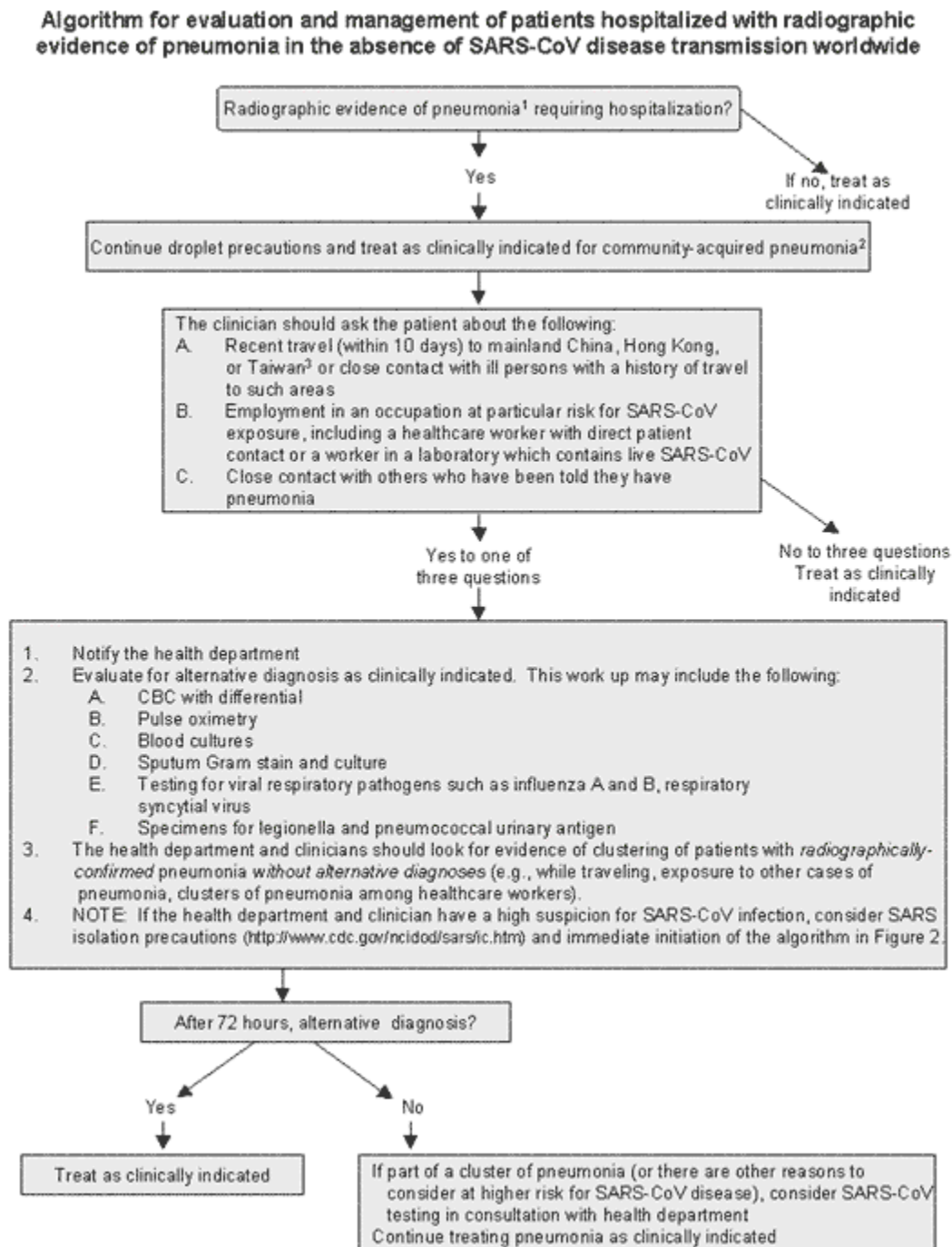
Institute SARS isolation procedures infection control precautions immediately

1. Notify the local public health department
2. Local public health department to notify HPSC
3. Consult the infectious disease consultant and clinical microbiologist
4. Perform a diagnostic workup including:
 - a. Chest X-ray \pm CT of chest
 - b. FBC with differential
 - c. Pulse oximetry
 - d. Blood cultures
 - e. Sputum gram stain and culture
 - f. Testing for viral respiratory pathogens i.e. RSV, influenza A, B
 - g. If pneumonia Urinary antigen testing: Legionella and pneumococcal
 - h. Other tests: CPK, transaminase levels, LDH, apt, C-reactive protein

If the results of the following investigations indicate that the patient does not meet the case definition for a probable or confirmed case i.e. is a PUI or suspect case, then consideration may be given to home isolation using the criteria outlined in Annex B.

Figures 1 and 2 outlining the clinical management of patients when SARS transmission is absent and present in the world is adapted from CDC, Atlanta “Clinical Guidance on the Identification and Evaluation of Possible SARS-CoV Disease among Persons Presenting with Community-Acquired Illness”. Further information is available at <http://www.cdc.gov/ncidod/sars/word/clinicalguidance.doc>

Figure 1. Algorithm for evaluation and management of patients requiring hospitalisation for radio graphically confirmed pneumonia, in the absence of SARS-CoV disease transmission worldwide



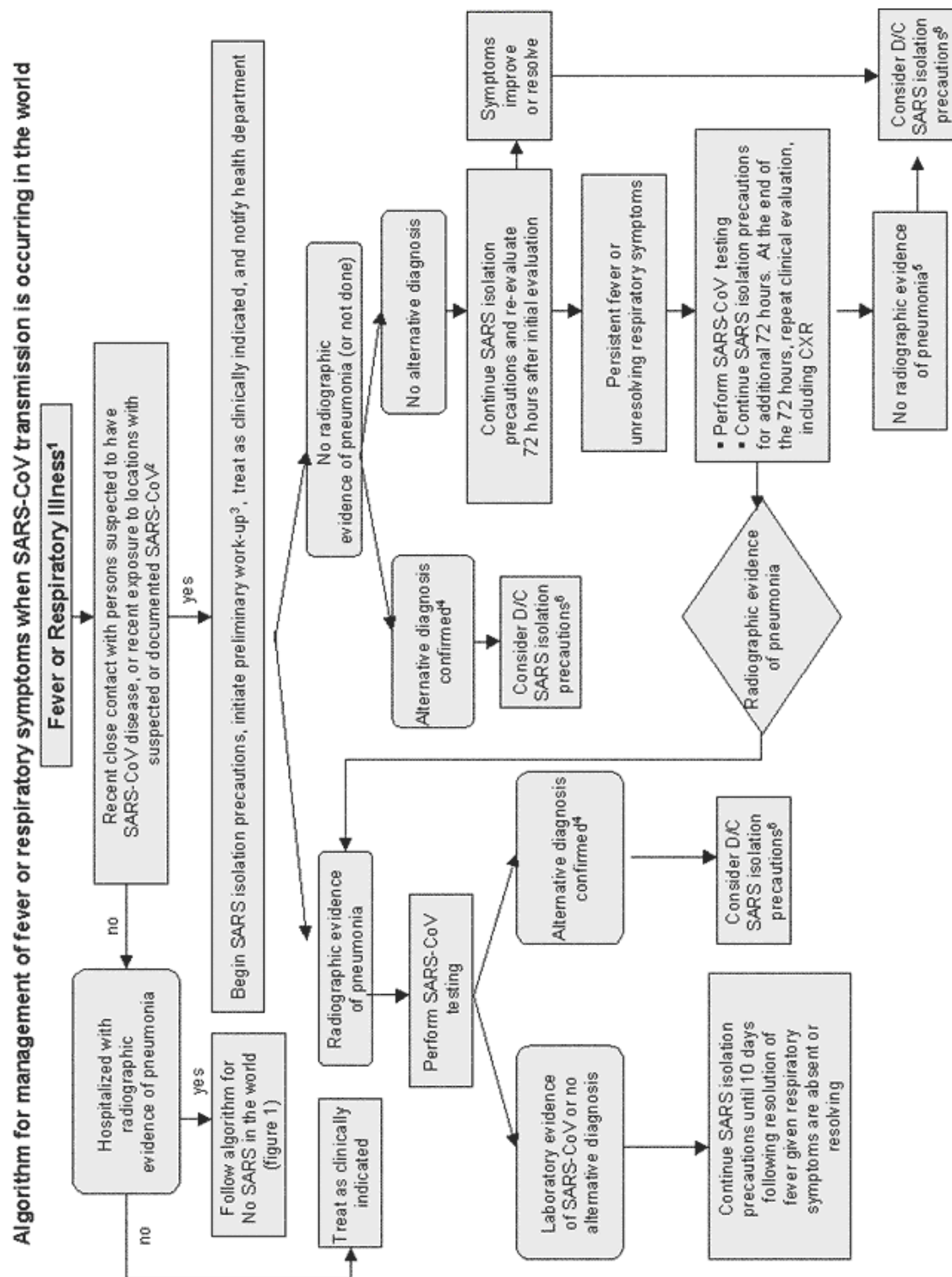
FOOTNOTES FOR FIGURE 1

¹ Or Acute Respiratory Distress Syndrome (ARDS) of unknown etiology

² Guidance for the management of community-acquired pneumonia is available from the Infectious Diseases Society of America (IDSA) and can be found at www.journals.uchicago.edu/IDSA/guidelines/.

³ The 2003 SARS-CoV outbreak likely originated in mainland China, and neighboring areas such as Taiwan and Hong Kong are thought to be at higher risk due to the high volume of travelers from mainland China. Although less likely, SARS-CoV may also reappear from other previously affected areas. Therefore, clinicians should obtain a complete travel history. If clinicians have concerns about the possibility of SARS-CoV disease in a patient with a history of travel to other previously affected areas (e.g., while traveling abroad, had close contact with another person with pneumonia of unknown etiology or spent time in a hospital in which patients with acute respiratory disease were treated), they should contact the health department.

Figure 2: Algorithm for management of fever or respiratory symptoms when SARS-CoV transmission is occurring in the world



FOOTNOTES FOR FIGURE 2:

¹ **Clinical description of SARS-CoV disease and approach to treatment:**

Clinical judgment should be used to determine when symptoms trigger initiation of the algorithm in Figure 2. The earliest symptoms of SARS-CoV disease usually include fever, chills, rigors, myalgia, and headache. In some patients, myalgia and headache may precede the onset of fever by 12-24 hours. Diarrhea may also be an early manifestation. Respiratory symptoms often do not appear until 2-7 days after the onset of illness, and most often include shortness of breath and/or dry cough.

Although not diagnostic, the following laboratory abnormalities have been seen in some patients with laboratory-confirmed SARS-CoV disease:

- Lymphopenia with normal or low white blood cell count
- Elevated hepatic transaminases
- Elevated creatine phosphokinase
- Elevated lactate dehydrogenase
- Elevated C-reactive protein
- Prolonged activated partial thromboplastin time

As of 1 December 2003, no specific treatment recommendations can be made for management of SARS-CoV disease. Empiric therapy for community-acquired pneumonia should include treatment for organisms associated with any community-acquired pneumonia of unclear etiology, including agents with activity against both typical and atypical respiratory pathogens. Treatment choices may be influenced by both the severity of and the circumstances surrounding the illness. Infectious disease consultation is recommended. The Infectious Diseases Society of America has guidelines for the management of community-acquired pneumonia (www.journals.uchicago.edu/IDSA/guidelines/).

² **Exposure history for SARS-CoV, once SARS-CoV transmission is documented in the world:**

In settings of no or limited local secondary transmission of SARS-CoV, patients are considered exposed to SARS if, within 10 days of symptom onset, the patient has:

- Close contact with someone suspected of having SARS-CoV disease, *OR*
- A history of foreign travel (or close contact with an ill person with a history of travel) to a location with documented or suspected SARS-CoV, *OR*
- Exposure to a domestic location with documented or suspected SARS-CoV (including a laboratory that contains live SARS-CoV), or close contact with an ill person with such an exposure history.

In settings with more extensive transmission, all patients with fever or respiratory symptoms should be evaluated for possible SARS-CoV disease, since the ability to determine epidemiological links will be lost.

For up-to-date information on where recent SARS-CoV transmission is suspected or documented, see the CDC and WHO websites: www.cdc.gov/ncidod/sars and www.who.int.

³ **Clinical work-up:** Clinicians should work up patients as clinically indicated. Depending on symptoms and exposure history, initial diagnostic testing for patients with suspected SARS-CoV disease may include:

- Complete blood count (CBC) with differential
- Chest radiograph
- Pulse oximetry
- Blood cultures
- Sputum Gram's stain and culture
- Testing for viral respiratory pathogens, notably influenza A and B and respiratory syncytial virus
- Legionella and pneumococcal urinary antigen testing if radiographic evidence of pneumonia (adults only)

An acute serum sample and other available clinical specimens (respiratory, blood, and stool) should be saved for additional testing until a specific diagnosis is made.

SARS-CoV testing may be considered as part of the initial work-up if there is a high level of suspicion for SARS-CoV disease based on exposure history. For additional details on specialized laboratory testing options available through the health department and the Laboratory Response Network (LRN), see CDC's SARS website (www.cdc.gov/ncidod/sars/).

⁴ **Alternative diagnosis:**

An alternative diagnosis should be based only on laboratory tests with high positive-predictive value (e.g., blood culture, viral culture, Legionella urinary antigen, pleural fluid culture, transthoracic aspirate). In some settings, PCR testing for bacterial and viral pathogens can also be used to help establish alternative diagnoses. The presence of an alternative diagnosis does not necessarily rule out co-infection with SARS-CoV.

⁵ **Radiographic testing:**

Chest CT may show evidence of an infiltrate before a chest radiograph (CXR). Therefore, a chest CT should be considered in patients with a strong epidemiological link to a known case of SARS-CoV disease and a negative CXR 6 days after onset of symptoms. Alternatively, the patient should remain in SARS isolation, and the CXR should be repeated on day 9 after symptom onset.

⁶ **Discontinuation of SARS isolation precautions:**

SARS isolation precautions should be discontinued only after consultation with the local public health authorities and the evaluating clinician. Factors that might be considered include the strength of the epidemiological exposure to SARS-CoV, the nature of contact with others in the residential or work setting, the strength of evidence for an alternative

diagnosis, and evidence for clustering of pneumonia among close contacts. Isolation precautions should be discontinued on the basis of an alternative diagnosis only when the following criteria are met:

- Absence of strong epidemiological link to known cases of SARS-CoV disease
- Alternative diagnosis confirmed using a test with a high positive-predictive value
- Clinical manifestations entirely explained by the alternative diagnosis
- No evidence of clustering of pneumonia cases among close contacts (unless >1 case in the cluster is confirmed to have the same alternative diagnosis)
- All cases of presumed SARS-CoV disease identified in the surrounding community can be epidemiologically linked to known cases or locations in which transmission is known to have occurred.

Therapy for Suspect, Preliminary Positive, Probable and Confirmed Cases

***Note:** In SARS, numerous antimicrobial therapies have been tried with no clear effect. Ribavirin with or without use of steroids has been used in an increasing number of patients. But, in the absence of clinical indicators, its effectiveness has not been proven. Intravenous ribavirin is not licensed in Ireland. The Irish Medicines Boards has contacted the manufactures, ICN Pharma, who has agreed to provide the drug on a named patient basis if required. If such therapy is being considered it should only be administered under expert guidance. A limited supply of intravenous ribavirin is being sourced and will be held at the Pharmacy Department in St James's Hospital, Dublin 8. Access to this supply will also be on a named patient basis. If urgent access to this supply is required the requesting hospital should contact St James's Hospital at senior management level. A senior manager will be available out of hours at St James's Hospital.*

Chapter 4

SARS Infection Control Guidance for Hospitals

4: Key Principles

- Transmission of SARS is predominantly via direct contact or droplet spread and requires close contact with a symptomatic person.
- ***Airborne transmission of SARS is possible, particularly during cough-inducing or respiratory aerosol-generating procedures***
- ***Hand hygiene is the single most important measure for preventing SARS transmission***
- ***A combination of contact, droplet and airborne precautions is effective in preventing the transmission of SARS. These consist of:***
 - Patient isolation, preferably in a negative pressure isolation room
 - Hand hygiene
 - Droplet and contact precautions (gloves, gown, eye protection)
 - Airborne precautions (well-fitted N95, or equivalent standard, mask/respirator)
- The above precautions can only be effective if properly applied, with particular attention to correct donning, fitting and removal of protective clothing and equipment
- Effective infection control requires local expertise and protocols, which should be informed by these guidelines.

4.1: Administrative Planning and Controls

- All hospitals should carry out a risk assessment, in conjunction with regional health authorities where necessary, to determine the likelihood of being directly or indirectly involved in the care of patients with suspect or probable SARS, in the event that the condition reappears.
- Hospitals that may be directly or indirectly involved in the care of patients with suspect or probable SARS should convene a preparedness committee to consider all aspects of SARS infection control
- The preparedness committee should prepare an action plan for the hospital. The action plan should consider the following areas such as:
 - Triage and initial management of suspect/probable SARS cases
 - Access to isolation facilities, personal protective equipment, hand hygiene etc.
 - Roles and responsibilities of key hospital staff

- Environmental hygiene and waste management
 - Decontamination of reusable patient care devices
 - Patient transport, within and outside of institution
 - Staff training in infection control
 - Staff, patient and visitor education
- Consideration should be given to designating specific staff to care for patients with suspect or probable SARS
- The occupational health/employee health service should keep a record of all staff who have close contact with patients with suspect or probable SARS
- If a suspect/probable SARS case is admitted to the hospital and outbreak control team (OCT) should be convened. The membership of the OCT should be predetermined and contact numbers available at the hospital switchboard. Membership may include the following:
 - Consultant responsible for patient's care
 - Consultant clinical microbiologist
 - Consultant infectious disease physician
 - Infection control nurse
 - Specialist in public health medicine
 - Occupational health physician
 - Accident and emergency consultant
 - Senior nurse manager
 - Hospital chief executive, or senior manager
 - Environmental services manager
 - Press/communications officer

4.2: Patient Triage

- Triage staff should assess any patient with a fever over 38°C and one or more respiratory symptoms.
 - The patient should be given a surgical mask to wear and interviewed immediately to determine their travel history, contact with a person diagnosed with SARS, or contact with a hospital that was closed because of SARS.
 - If the person meets the definition for a suspect/probable case of SARS, the individual should be moved to a separate assessment area, preferably a room with negative pressure in relation to surrounding areas.
 - If a negative pressure room is not available, the patient should be in a single room with the door closed.
- Triage staff should wear an N 95 mask/respirator or equivalent, as well as eye protection (goggles or face shield) when assessing a patient suspected of having SARS.
- The mask/respirator must be disposed as clinical waste after removal. HCWs in contact with a suspect or probable SARS case should not reuse the mask/respirator. In some circumstances respirators (masks) may be reused if they have **not** been used in the presence of a patient with suspect or probable SARS but only according to local protocols and with the agreement of the local infection

control team

- If an N95 mask/respirator or equivalent is not immediately available, a surgical mask should be worn as it will provide some protection
- Patients under investigation for SARS should wear a surgical mask until SARS is excluded or until they are admitted to their room.
- Patients under investigation for SARS should be isolated separately from patients with a diagnosis of SARS.
- Triage staff should immediately inform the local infection control team, hospital administration and public health department that a patient is under investigation for SARS, as detailed in the hospital's SARS action plan.
- A consultation with an infectious disease specialist or clinical microbiologist is strongly recommended.
- Persons accompanying a patient should be given a surgical mask. If the decision is made that this is a suspect or probable SARS case that will be admitted, the visitor should be given an N95 mask/respirator or equivalent and instructed regarding fit.
- **Accompanying persons must be clinically evaluated for symptoms consistent with SARS**
 - Accompanying persons should be considered to be Persons Under Investigation (PUI) until clinically evaluated.
 - Accompanying persons should remain in the same area as the patient, though not necessarily in the same room, until they are documented as being asymptomatic

4.3: Specific Precautions

NB: In order to prevent self-contamination, health care providers should be instructed (and monitored if necessary) in the proper method for donning and removing personal protective equipment.

4.3.1. Hand hygiene

Hand hygiene is the most important measure in preventing the spread of infection.

- Hand hygiene should be performed:
 - Before contact with a patient
 - After any direct contact with a patient, before contact with the next patient
 - After contact with body fluids, secretions and excretions
 - After contact with items known or considered likely to be contaminated with respiratory secretions (e.g. oxygen tubing, masks, used tissues)
 - Immediately after removing gloves and other protective equipment.
- Waterless, alcohol-based antiseptic hand rinses are effective for hand hygiene and should be readily available.
- If there is **no** visible soiling of hands, hands can be washed/decontaminated using antiseptic soap and water **or** using a waterless, alcohol-based antiseptic hand rinse.

- If there is visible soiling, hands should be washed with antiseptic soap and water. If soap and water are unavailable, cleanse hands first with detergent-containing towelettes to remove visible soil.
- Health care workers should **not** wash/decontaminate hands in patient washrooms.
- Patients should be instructed in proper hand hygiene.

4.3.2. Respiratory protection

- A mask designed for respiratory protection that complies with recognised standards (e.g. EN149 or N95) is termed a respirator. Respirators in common use are non-powered.
- Respirators (masks) should meet or exceed the US NIOSH N95 or European EN149:2001 FFP2 standards. Other respirators (masks) may meet the filtration and fit requirements, but their use must be approved by the local infection control team.
- Health care workers should wear a mask/respirator meeting the N 95 or equivalent standard during all patient contact
- Masks/respirators should be closely fitted to the face to prevent leakage around the edges and be fit checked. Masks/respirators should be fit checked for adequate seal each time that they are used. To fit check a mask, the wearer takes a series of quick forceful inspirations and expirations to determine if the mask seals tightly to the face. The mask should partially collapse during a forceful inspiration and expand during a forceful expiration. The wearer should not feel any air escaping around the edge of the mask during expiration.
- Where possible institutions should carry out formal fit testing of N 95 (or equivalent standard) masks/respirators for health care workers who may be involved in the care of patients with suspect or probable SARS. Fit testing should be carried out according to the mask/respirator manufacturer's instructions.
- Some N95 (or equivalent standard) masks/respirators include expiration valves. Such masks/respirators **must not** be worn by suspect or probable SARS patients, because the expiratory valve could disseminate the virus into the environment.
- A mask/respirator that has been exposed to a case of probable SARS is considered contaminated and must be discarded. Appropriate hand hygiene should be followed during disposal of the mask (see section 4.3.1).
- A mask/respirator should be removed carefully using the straps and without touching the front of the mask, so as not to contaminate the health care worker.
- **Re-use of masks/respirators is not recommended.**
- Respirators/masks must be removed or changed:
 - Immediately on leaving the room of a SARS patient, or a room where a number of SARS patients are being cohorted
 - If the mask/respirator becomes soiled or wet
 - If breathing while wearing the mask/respirator becomes difficult
 - If a tight seal between the mask/respirator and the wearer's face cannot be maintained
 - After four hours of continuous use.
- If an N 95 (or equivalent standard) mask/respirator is not immediately available, a

surgical mask should be worn as it provides some protection against droplets. A surgical mask will capture large wet particles near the nose and mouth of the wearer, thus preventing the spread from the wearer to others. However, the surgical mask does not provide adequate respiratory protection to the wearer (HCW) if the infection is airborne.

4.3.3. Eye protection

- Eye protection (goggles or full face shield) should be disposable and designated for single use only.
- A combined mask/respirator with eye protection (i.e. eye protection is attached to the mask/respirator) may be used but the mask/respirator component must meet or exceed the standards listed in section 4.3.2
- Eye protection should be worn:
 - When providing direct patient care
 - During cough producing and aerosol-generating procedures
 - Where there is a potential for splattering or spraying of blood or other body substances.
- Eye protection should protect the eyes from splashes in all directions.
- Eye protection should fit securely and comfortably
- Prescription eyeglasses **do not** provide adequate protection from droplets.
- Do not touch the eye protection during patient care (i.e. with contaminated gloves/hands)
- Goggles and face shields should be removed with care, without touching the front of the goggles/face shield.

4.3.4. Gloves

- Gloves are an additional measure, not as a substitute for hand hygiene.
- Clean, non-sterile medical quality gloves of adequate size to wearer must be worn for all patient contact.
- Gloves should be put on before entering the patient's room.
- Gloves must be changed immediately after any patient care procedures, such as respiratory suctioning, toileting etc.
 - Remove gloves, using a technique that avoids touching the outside surfaces of the gloves with bare hands, immediately after performing such procedures
 - Wash/decontaminate hands (see section 4.3.1)
 - Put on a fresh pair of gloves before continuing with patient care activities
- Gloves must be removed and hands washed prior to leaving the patient's room.
- Gloves must not be reused or washed.

4.3.5. Gowns

- All health care workers entering the room of a suspect or probable SARS patient must wear long sleeved disposable fluid-repellent gowns.
- Gowns must be correctly donned, including closing all fastenings
- Gowns must be removed before leaving the patient's room.

- If the patient is in an isolation room with an attached ante-room the gown, along with other personal protective attire, should be removed in the ante-room.

4.3.6: Donning and removal of protective clothing and equipment

All hospitals must ensure that staff who may be involved in the care of patients with suspect or probable SARS have been instructed in the correct use, including correct techniques for donning and removal, of personal protective clothing and equipment.

- Gown, gloves, mask/respirator and eye protection must be put on **before** entering the patient's room
- Check that straps of mask/respirator are positioned correctly, according to manufacturer's instructions, to ensure mask/respirator fits snugly over face.
- Fit check mask/respirator (see section 4.3.2 and 4.3.3 above) **before** entering patient's room
- Remove personal protective attire **before** leaving patient's room
 - If the patient is in an isolation room that has an ante-room personal protective attire should be removed in the ante-room **with both doors closed** immediately after leaving the isolation room.
 - If the patient is undergoing an aerosol-generating procedure and is not in an isolation room with an ante-room gloves and gown should be removed **before** leaving the patient's room, followed by hand washing and removal of eye protection and mask **immediately after** leaving the patient's room (see section 4.3.2 and 4.3.3)
- Do not touch mask/respirator, eye protection or any part of face with gloved hands
- Remove gloves and gown first
 - Use a technique that minimises the risk of touching the outside surfaces of the gown or gloves
 - Order of removal (i.e. gown or gloves first) will depend on the type of gown being used and should follow local protocols. In most instances removing gloves first will minimise the risk of contamination.
- **Wash/decontaminate hands BEFORE removing mask/respirator and eye protection**
 - Do not touch mask/respirator, eye protection or any part of face with bare hands that have not been cleaned
- Remove eye protection **before** removing mask/respirator
- Carefully remove mask/respirator to minimise the risk of generating aerosols, using a method that avoids touching the front surface of the mask/respirator, as the front surface is the area most likely to be contaminated.
 - The mask/respirator may be removed by one of the following two methods:
 - Slip fingers under straps at back of head and lift straps over top of head to remove mask/respirator.
 - Holding one corner of the mask/respirator carefully break the straps on one side, at the point where they are attached to the mask/respirator.

- The choice of method for removing a mask/respirator will depend on local protocols, training and the brand of mask/respirator in local use.
- Dispose of gloves, gown and mask/respirator as clinical waste (yellow bag)
- Wash hands again **after** leaving the patient's room, once all protective attire is removed.

Summary of order of removal of protective attire/equipment

- **Remove gloves***
- **Remove gown***
- **Wash/decontaminate hands**
- **Remove eye protection**
- **Remove mask/respirator**
- **Wash/decontaminate hands again**

*Order may vary according to local protocol

4.4: Patient Accommodation

- The following two preferences for patient accommodation are ranked in descending order of preference:
 1. Rooms with negative pressure in relation to surrounding areas with a minimum of 6-12 air exchanges per hour. The air should be discharged outside of the building and away from intake ducts, or through a high efficiency filter if recirculated.
 2. Single patient rooms with en suite toilet, hand washing and bathing facilities.
- The patient's door must be kept closed whether or not patient is in the room.
- The room should ideally have an ante-room that separates it from surrounding areas of the hospital.
- The isolation room should not open directly onto another patient care area
- Each hospital should carry out a risk assessment to determine the suitability of rooms for isolation.
- The patient's room should have a telephone, television etc.
- Facilities for disposal of used protective attire and other clinical waste must be available within the patient's room
- Hand washing facilities, such as provision of alcohol-based hand rub, must be available within the patient's room and immediately outside the door to the room

4.5: Cough producing and aerosol-generating procedures

Potential aerosol-generating procedures include aerosolised/nebulised medication treatments, diagnostic sputum induction, bronchoscopy, airway suctioning, and endotracheal intubation.

- A risk assessment should be performed prior to these procedures to determine the need for administrative controls, environmental controls, and personal protective equipment.
- The stimulation of coughing and aerosol-generating procedures on patients with

suspect or probable SARS should be limited to those deemed medically necessary.

- All aerosol-generating procedures must be performed using airborne and contact precautions, and should be in an **isolation room with negative pressure** relative to the surrounding area
 - Where possible the isolation room should have an **ante-room** between the isolation room and the general ward/hospital area
- All persons in the room must wear a **correctly fitted N95 (or equivalent standard) mask/respirator**.
- **Eye protection (e.g. goggles or full face shields), mask/respirator, gowns and gloves must be worn by all persons in the room.**
- Eye protection, (e.g. goggles or full face shields) should protect the eyes from splashes from all directions.
- If the isolation room has an ante-room all personal protective clothing and equipment should be donned and removed in the ante-room **with both doors closed**
- If there is **no** ante-room staff should remove personal protective clothing and equipment in the following order:
 - Remove gloves and gown **immediately before** leaving patient's room
 - Wash/decontaminate hands **immediately before** leaving patient's room (after removing gloves and gown)
 - Remove eye protection and mask **immediately after** leaving patient's room
 - Wash/decontaminate hands again
- At this time there is no evidence to support the need for enhanced respiratory personal protective equipment (PPE) such as the powered air purified respirator system (PAPRS) during high risk procedures involving airway interventions including endotracheal intubation and extubation. Additionally, enhanced PPE, and the increased complexity involved in the removal and disposal/cleaning/decontamination of this equipment, may increase the potential risk of self-contamination.
- Predetermined administrative controls (e.g. keeping the number of people in the room to a minimum during high risk procedures, ensuring that there is adequate equipment in the room) and environmental controls (e.g. staff performing the procedure should ensure that contaminated equipment and surfaces are discarded or cleaned/disinfected before leaving the room) must be established and followed.
- Re-usable respiratory equipment must be appropriately decontaminated after use, according to the manufacturer's recommendations and local protocols (see section 4.3)

4.6: Patient Transport within the Facility

- Ideally, patients should be confined to their rooms and patient movement outside of the room should be avoided as much as possible. All procedures (including blood collection) should be performed in the patient's room whenever possible.
- Patients should be out of their rooms for essential procedures only. If this is necessary, the transport route should avoid well-populated areas if possible and a

- dedicated patient lift (elevator), with no other patients on it, should be used.
- Patients should wear a surgical mask while out of their rooms. If patients cannot tolerate a surgical mask they should not leave their rooms except under extraordinary circumstances.
- If unable to keep mask on an infant, an incubator can be used for infant transportation.
- Personnel in the area to which patient is to be transported should receive prior notification and be aware of precautions to follow.

4.7: Patient Transfer between Institutions

- Patients with SARS should not be transferred to other health-care facilities unless medically necessary.
- It is not recommended that patients with SARS be transferred solely for the purpose of accommodation in a negative pressure room
- If transfer is medically necessary, all necessary precautions should be taken to protect the health care worker and other individuals including:
 - Transport route should be the shortest route to exit the facility, avoiding exposure of individuals not involved in the transport.
 - A dedicated patient lift (elevator), with no other individuals on it, should be used.
 - **During the transport, all HCWs should wear an N95 mask/respirator or equivalent, eye protection, gown, and gloves.**
 - It is not necessary for the driver or front seat passenger to wear an N95 mask or other personal protection equipment during patient transfer, so long as the front cab of the ambulance is physically closed off from the patient area.
 - The patient should wear a surgical mask during the transfer. If the patient cannot tolerate a mask, a towel should be placed over his/her nose and mouth.

4.8: Patient Care Equipment

- Reusable non-critical patient care items, such as stethoscopes, sphygmomanometers, thermometers etc., must be designated for use only on an individual patient isolated with suspect or probable SARS.
 - Such dedicated patient care items must be kept in the patient's room.
 - Following patient discharge such items may be used in the care of other patients, but only after appropriate cleaning and decontamination.
- Disposable equipment should be used whenever possible.
- Equipment that is visibly soiled must be cleaned promptly with soap and water, detergents or enzymatic agents.
- Equipment must be cleaned and disinfected prior to being used with other patients, in accordance with local protocols. The reprocessing method required for a specific item depends on the item's intended use, the risk of infection to the

- patient, and the amount of soiling.
- Reusable respiratory equipment should undergo high-level disinfection as a minimum, or sterilisation between uses, following the manufacturer's recommendations and local infection control protocols.
- The local infection control team, in conjunction with the central sterile supplies department, should carry out a risk assessment of disposable versus reusable patient care equipment and decontamination protocols for reusable respiratory equipment.

4.9: Environmental Control

- Frequent cleaning of environmental surfaces and non-critical patient care items using hospital grade disinfectant with virucidal label claim is recommended.
 - Frequently touched surfaces require frequent cleaning.
 - A chlorine releasing bleach solution, equal to 1000 ppm available chlorine, is a suitable choice for environmental cleaning.
- Sufficient quantity of disinfectant in the correct concentration applied with a clean cloth are components of an effective cleaning process. Comply with contact time on label and workplace safety requirements.
- Personnel involved in cleaning and disinfection activities should wear appropriate personal protective equipment: N95 mask/respirator or equivalents, eye protection (goggles or face shield), disposable gown and disposable gloves.
- Personnel who are assigned this responsibility should be trained and supervised in cleaning and disinfection methods.
- Soiled linen: Routine practices are sufficient.
 - Linen should be transported from the patient's room in leak-resistant, closed alginate laundry bags.
- Waste: Routine practices should be applied to handling clinical waste and should comply with the Department of Health and Children/Infection Control Nurses Association guidelines on segregation and packaging of healthcare risk and non-risk waste.
 - Healthcare risk waste should be disposed of in appropriately labelled yellow waste bags
 - Healthcare risk waste bags must be sealed **before** being removed from the patient's room.
 - Double bagging of waste is not required.
 - Routine precautions for disposal of sharps should be followed.

4.10: Visitors to the room of a Suspected or Probable SARS Patient

- Patient visits should not be permitted; exceptions may be made on compassionate grounds after prior discussion with infection control personnel.
- Visitors should be instructed on appropriate infection control precautions (i.e., hand hygiene, long sleeved gowns, gloves, N95 mask/respirator or equivalent) prior to entering the room.

- If an N95 mask/respirator or equivalent is not immediately available, a surgical mask should be worn as it may provide some protection.

4.11: Patient and Family Education

- Patients and family members should understand the nature of their illness and the reason for the precautions being used in order to minimize the risk of transmission of SARS to family and friends during their hospital stay and upon their return to the community.

4.12: Postmortem

- Last offices should be carried out in line with local procedure and specific religious practices
 - Personal protective equipment, as detailed in section 4.3, should be worn when carrying out last offices
- The remains of a person who has died from SARS must be placed in a sealed, impermeable body bag prior to transfer to the mortuary
 - The body bag may be opened to allow viewing of the deceased
 - Relatives and other mourners should be discouraged from superficial contact with the deceased, such as touching or kissing the face
 - Relatives and other mourners who wish to view the deceased must wear personal protective equipment, as detailed in section 4.3
- Mortuary staff must be informed of the infection risk prior to transfer of the body
- Personal protective equipment, as detailed in section 4.3, should be worn by mortuary staff when handling the remains of a person who has died from SARS
- Autopsies should only be performed in an autopsy suite which is at negative air pressure relative to surrounding areas and a minimum of 12 air exchanges per hour
 - Autopsy personnel should wear an N 95, N 100 or powered air-purifying respirator
 - Protective garments should include a surgical scrub suit, cap, waterproof gown, eye protection, boots or shoe coverings and double gloving with interspersed cut-proof gloves
 - Precautions to avoid percutaneous injury should be taken
 - Reusable autopsy equipment should be decontaminated according to local standard protocols
- Surfaces should be decontaminated as per section 4.9 above
- Healthcare risk waste should be handled and disposed of as per section 4.9 above

Chapter 5

Laboratory Diagnosis of SARS: Updated Guidance

5. General Principles

Absence of SARS Transmission (Person-to-Person) Worldwide

Laboratory Investigations for SARS-CoV when there is no documented SARS transmission (person-to-person) in the world should be undertaken on all those who fit the case definitions for possible cases, health care worker clusters and other hospital clusters as outlined in Section 2.3. Possible cases will be reclassified as probable and confirmed cases depending on the outcome of the investigation.

Presence of SARS Transmission (Person-to-Person) Worldwide

In the event that there is documented SARS transmission (person-to-person) worldwide, laboratory investigations for SARS-CoV should only be carried out on persons meeting the case definition for suspect or probable SARS. That is, they should have a fever of $\geq 38^{\circ}\text{C}$, respiratory symptoms (cough or breathing difficulty) and travel to a SARS-affected area or contact with a known SARS case in the previous 10 days.

The laboratory testing (for both situations i.e. absence and presence of SARS transmission (person-to-person) worldwide) comprises two components:

1. Investigations to identify SARS coronavirus (SARS-CoV) and
2. Investigations to rule out other causes of respiratory infection.

For persons not meeting the case definitions, the pre-test probability of SARS is extremely small and a positive test result would most likely represent a false positive.

Procedures for Laboratory Investigations for SARS-CoV (Absence or Presence of SARS Transmission (Person-to-Person) Worldwide)

Laboratory investigations for SARS-CoV are carried out at the National Virus Reference Laboratory (NVRL) and may also be forwarded from there to international collaborating laboratories for further investigations.

Laboratory investigation of possible (no documented SARS transmission (person-to-person)) suspect or probable SARS cases (documented SARS transmission (person-to-person)) should be discussed with a Clinical Microbiologist or Infectious Disease Physician prior to obtaining specimens. Requests for laboratory testing of specimens for SARS-CoV at NVRL must be approved by a Consultant Microbiologist / Consultant

Respiratory Physician / Consultant in Infectious Diseases at the requesting hospital and should be discussed with NVRL staff prior to submitting specimens for testing.

Specimens must be clearly labelled, as being for SARS-CoV investigation. Accompanying details must include:

- Clear case definition (Dependent on presence or absence of SARS transmission (person-to-person) worldwide)
- Full clinical details and patient demographics
- Date of onset of illness

When there is evidence of SARS transmission (person-to-person) globally, a weekend out of hours (including Bank holidays) service for emergency testing of Suspect and Probable cases of SARS is available at NVRL between the hours of 9.00a.m. – 5.00p.m. The person on-call can be contacted on Airpage Relay. Tel: 01-2830800 NVRL Unit No 140898. When leaving a message please include a contact name, the name of the requesting hospital and a telephone number.

5.1 SARS-CoV Investigations

A successful laboratory diagnosis of SARS infection requires obtaining the correct type of specimen(s), based on the stage of the illness, using validated assay methods, and understanding the strengths and limitations of the diagnostic assays used. All laboratory results should be interpreted in the context of the clinical and epidemiologic findings.

5.1.1 Current Diagnostic Methods for SARS-CoV

Laboratory assays for SARS-CoV are based on either the detection of the virus or virus products, or detection of an antibody response to viral infection. Isolation in Vero E6 cells and electron microscopy played a critical role in the early identification of SARS-CoV, however, these methods are not suitable for routine diagnoses because they lack sensitivity and viral culture requires biosafety level III containment. Current detection methods for SARS-CoV include real-time reverse transcription polymerase chain reaction (RT-PCR) assay for detection of viral RNA and enzyme immunoassay (EIA) for detection of antibodies to SARS-CoV. Serology is the “gold-standard” for diagnosis of SARS-CoV infection. The SARS EIA uses a lysate of SARS-CoV infected Vero E6 cells as antigen. Serosurveys with the SARS EIA have demonstrated low or undetectable levels of antibody to the SARS-CoV in the general population. No cross-reactivity has been observed in validation studies with serum specimens containing antibodies to other human coronaviruses.

Currently, the best data about virus shedding in different body fluids has come from analysis of sequential samples from sick individuals in South East Asia. These data indicate that virus shedding is maximal between 6 and 10 days post illness onset in the respiratory tract. Stool samples have been shown to be positive in 60% by day 6 and 100% at day 13. Based on peak virus shedding data, it is important that samples are

repeated in hospitalised SARS cases to increase the likelihood of detection. As data has accumulated it has become evident that the serological response may not be detected in convalescent serum much before 28 days post illness onset.

5.1.2 Specimen Selection for RT-PCR

Detection of SARS-CoV infection by RT-PCR within the first few days following onset of symptoms has been problematic because of extremely low virus titers in respiratory specimens during the early stages of infection. To increase the rate of detection of SARS positive cases, it is recommended that more specimens and multiple specimen types be collected. Respiratory tract specimens are valuable, with lower respiratory tract specimens (e.g., sputum, bronchial alveolar lavage) preferred over upper respiratory tract specimens (e.g., washes, aspirates, swabs) when available. Stool may be the best specimen for detection of SARS-CoV beginning about one week after onset of illness and may continue to be positive for several weeks thereafter.

For the patient to be considered positive for SARS-CoV infection by RT-PCR, current recommendations specify that a positive result on one specimen should be confirmed in a reference laboratory and a second specimen, either from another site or collected at a different time, should also be confirmed positive.

5.1.3 Serology Testing

Detecting SARS-CoV antibodies is a less ambiguous approach to diagnosing SARS-CoV infection than is RT-PCR, but antibodies are often not detectable early in the course of illness or if the patient is immunosuppressed and unable to mount a good antibody response. Seroconversion from negative to positive from acute to convalescent serum specimens confirms recent infection. At the present time, when prior infection is exceedingly rare, a positive serology result is also considered indicative of acute infection with SARS-CoV in a patient with a SARS-like illness. Although many SARS patients develop antibodies to SARS-CoV within as few as 8 to 10 days, some patients do not test positive until more than 28 days after the onset of illness. For patients with a negative antibody test result, an additional serum specimen collected >28 days after onset should be tested. A negative antibody test after 28 days from onset of illness can be used to rule out SARS-CoV infection.

The following samples should be sent for SARS-CoV diagnosis on patients fulfilling the case definition for suspect or probable SARS:

Specimen Type	Time of Collection	Investigation Performed
Respiratory Specimens <ul style="list-style-type: none"> • Sputum (preferred specimen for RT-PCR) or other lower respiratory tract specimen (e.g. endotracheal aspirate) • Nasopharyngeal aspirate • Nasopharyngeal swab • Throat swab 	From onset of illness	RT-PCR
Serum samples (Acute and convalescent)	Convalescent serum should be taken more than 28 days post onset of illness.	Antibody assay performed at HPA Colindale, UK
Stool	12-20 days post onset of illness	RT-PCR and EM

5.1.4 Sampling procedures for respiratory tract specimens

a. Nasopharyngeal wash/aspirate

This is the specimen of choice for detection of respiratory viruses. Have the patient sit with head tilted slightly backward. Instill 1 – 1.5 ml of nonbacteriostatic saline into one nostril. Flush a plastic catheter or tubing with 2-3 ml of saline. Insert the tubing into the nostril parallel to the palate. Aspirate nasopharyngeal secretions. Repeat this procedure for the other nostril. Collect specimens in sterile vials. **Collection of a nasopharyngeal wash/aspirate may generate a respiratory aerosol: appropriate personal protective equipment must be worn by health care workers obtaining such specimens from persons under investigation for SARS.**

b. Nasopharyngeal swabs

Insert swab into nostril parallel to the palate and leave in place for a few seconds to absorb secretions. Swab both nostrils. Use only a sterile Dacron or rayon swab with a plastic shaft.

c. Throat swabs

Swab both posterior pharynx and tonsillar areas, avoiding tongue. Use only a sterile Dacron or rayon swab with a plastic shaft.

Tubes and vials containing body specimens should be properly sealed to avoid spillage, clearly labelled with a biohazard label, as well as with identity of sample and date of sampling.

5.1.5 Personal Protection Equipment

Personal protection equipment must be worn by the health care worker taking specimens from suspect or probable SARS patients: tight fitting mask of high filtering efficiency (e.g. N95), goggles, gloves and disposable gown. (Note: some have suggested the use of higher efficiency masks (N99/100), though the current evidence does not support this recommendation). Ensure that appropriate training in wearing of mask has been provided and that appropriate “fit testing” has been performed.

5.2 Interpretation of SARS-CoV laboratory investigations

Laboratory test result criteria for confirming or rejecting the diagnosis of SARS remain to be defined.

5.2.1. Molecular tests (RT-PCR)

Polymerase chain reaction (RT-PCR) can detect genetic material of the SARS-CoV in various specimens (blood, stool, respiratory secretions or body tissues). Two RT-PCR tests for investigation of SARS cases have been set up at NVRL: both are specific for SARS-CoV.

Existing RT-PCR tests are very specific but lack sensitivity. This means that negative tests cannot rule out the presence of the SARS virus in patients.

Positive RT-PCR results

Assuming the necessary quality control procedures in place, SARS-CoV RT-PCR is very specific and means that there is genetic material (RNA) of the SARS-CoV in the sample. This does not mean that there is live virus present, or that it is present in a quantity large enough to infect another person.

Negative RT-PCR results

This does not exclude SARS. SARS-CoV RT-PCR can be negative for the following reasons:

- The patient is not infected with the SARS coronavirus; the illness is due to another infectious agent (virus, bacterium, fungus) or a non-infectious cause.
- The test results are incorrect (“false-negative”). Current tests need to be further developed to improve sensitivity.
- Specimens were not collected at a time when the virus or its genetic material was present. The virus and its genetic material may be present for a brief period only, depending on the type of specimen tested.

5.2.2 Antibody tests

These tests detect antibodies produced in response to the SARS coronavirus infection. Different types of antibodies (IgM and IgG) appear and change in level during the course of infection. They can be undetectable at the early stage of infection. IgG usually remains detectable after resolution of the illness.

Positive antibody test results indicate a previous infection with SARS-CoV. Seroconversion from negative to positive or a four-fold rise in antibody titre from acute to convalescent serum indicates recent infection.

Negative antibody test results: No detection of antibody after 28 days from onset of illness seems to indicate that no infection with SARS-CoV took place.

5.3 Laboratory investigations for other causes of respiratory infection

Many patients fulfilling the case definition for suspect or probable SARS will have a respiratory tract infection other than SARS. In addition to SARS-CoV investigations it is important that other causes of infection are investigated.

5.3.1 Investigation for viral pathogens other than SAR- CoV

Investigation for other respiratory viruses (influenza, RSV, adenovirus etc.) can be carried out on serum and respiratory specimens sent for SARS-CoV investigations to NVRL. A Nasopharyngeal aspirate, Nasopharyngeal swab and/or viral throat swab, along with acute and convalescent serum samples, are suitable for investigation for viruses other than SARS-CoV. There is no requirement to send additional specimens for investigation of viruses other than SARS-CoV.

5.3.2 Investigation for bacterial pathogens

A broad diagnostic bacteriology screen should include typical and atypical causes of community-acquired pneumonia, especially chlamydia, mycoplasma and legionella. These investigations must be carried out under suitable laboratory biosafety conditions (see section 5. 4 below).

The following bacteriology investigations should be carried out on suspect or probable SARS cases:

- Blood cultures (if hospitalised)
- Routine culture of sputum, or other lower respiratory tract specimen, if available

- Acute and convalescent (>14 days post onset) serum samples for *Legionella pneumophila*, *Mycoplasma pneumoniae*, *Chlamydia pneumoniae*, *Coxiella burnetii* (Q fever)
- Culture of sputum, or other lower respiratory tract specimen, for *Legionella*
- Urinary antigen detection for *Legionella pneumophila*

If any of the above investigations are not carried out at the local laboratory specimens should be referred to a regional or reference laboratory where such tests are available. The regional or reference laboratory should be informed prior to sending the specimens, which should be clearly labelled as being from a suspect or probable SARS case.

5.4 Biosafety guidelines for handling of SARS specimens

The following biosafety guidelines are derived from WHO guidance, updated on 25th April 2003.

Routine bacteriology on specimens from suspect or probable SARS cases can be carried out under standard biosafety level 2 (BSL-2). However some additional precautions are recommended, particularly for laboratory procedures that may produce aerosols, and are detailed below.

Laboratory directors should carry out a local risk assessment to ensure such work can be safely carried out in their laboratory. Where this cannot be ensured specimens should be referred to a suitably equipped regional laboratory for primary diagnostic tests.

SARS specimens should be handled according to appropriate biosafety practices in order to avoid laboratory-related infections and spread of disease to close contacts. As the primary route of infection is thought to be via droplets, extreme caution must be exercised to eliminate the unguarded production of aerosols.

All laboratory work practices should be appropriate for work with viral agents, with particular emphasis on potential spread by droplets, air, and/or contaminated surfaces and objects. No procedure should be undertaken in which there is any doubt about the ability to adequately contain the specimen and prevent the uncontrolled release of the virus.

The following activities may be performed in biosafety level 2 (BSL-2) facilities with appropriate BSL-2 work practices:

- Routine diagnostic testing of serum and blood samples
- Manipulations involving known inactivated (lysed, fixed or otherwise treated) virus particles and/or incomplete, non-infectious portions of the viral genome
- Routine examination of mycotic and bacterial cultures.
- Final packaging of specimens for transport to diagnostic laboratories for additional testing. Specimens should already be in a sealed, decontaminated primary container

The following precautions are strongly recommended by WHO for work in BSL-2 laboratories with potential SARS specimens:

- Any procedure that may generate aerosols should be performed in a biological safety cabinet.
- Laboratory workers should wear protective equipment, including disposable gloves, solid-front or wrap-around gowns with cuffed sleeves, eye protection and a surgical mask, or full-face shield, according to the risk of aerosols and exposure when performing specific manipulations. When working at a biological safety cabinet, a full face shield is not necessary.
- Centrifugation of human specimens should be performed using sealed centrifuge rotors or sample cups. These rotors or cups should be unloaded in a biological safety cabinet.
- Procedures performed outside of a biological safety cabinet should be performed in a manner that minimizes the risk of exposure to an inadvertent release of the aetiological agent.
- Work surfaces and equipment should be decontaminated after specimens are processed. Standard decontamination agents that are effective against lipid-enveloped viruses should be sufficient.
- Biological waste should be treated using standard methods, which render viral particles inactive.

The following activities require BSL-3 facilities and BSL-3 work practices.

- Viral cell culture of the aetiologic agent.
- Manipulations involving growth or concentration of the aetiologic agent.

When a procedure or process cannot be conducted within a biological safety cabinet, then appropriate combinations of personal protective equipment (e.g., respirators, face shields) and physical containment devices (e.g., centrifuge safety cups or sealed rotors) **must** be used.

6. REFERENCES

CDC 2003: Guidelines and Recommendations; In the absence of SARS Co-V Transmission World wide: Guidance for Surveillance, Clinical and Laboratory Evaluation and Reporting. December 18th 2003. Website address: <http://www.cdc.gov>.

CDC 2003: Guidelines and Recommendations; Clinical Guidance on the Identification and Evaluation of Possible SARS-CoV Disease among Persons Presenting with Community-Acquired Illness. December 18th 2003. Website address: <http://www.cdc.gov>.

CDC 2003: Guidelines and Recommendations; Interim Domestic Guidance on Persons Who May Have Been Exposed to Patients with Suspected Severe Acute Respiratory Syndrome. August 18th 2003. Website address: <http://www.cdc.gov>.

CDC Webcast May 2003: Clinical Aspects of Severe Acute Respiratory Syndrome (SARS), 2003. Jerrigan JA CDC Atlanta.

CDC Webcast September 2003: SARS Surveillance in the United States: Past Lessons and Preparing for the Future. Van Beneden C, Respiratory Diseases Branch, CDC, Atlanta.

CDC Webcast September 2003: Severe Acute Respiratory Syndrome (SARS): What Every Clinician Should Know About Diagnosis and Management. Jerrigan JA CDC Atlanta.

CDC Webcast May 2003: SARS Infection Control. Chiarello L, CDC Atlanta.

CDC Webcast April 2003: Clinical Aspects of Severe Acute Respiratory Syndrome (SARS), 2003. Sung J, Department of Medicine & Therapeutics, Prince of Wales Hospital, The Chinese University of Hong Kong.

Health Canada December 2003. Public Health Management of SARS Cases and Contacts, Interim Guidance, Version 7.

World Health Organisation Geneva, 2003. Consensus Document on the Epidemiology of Severe Acute Respiratory Syndrome.

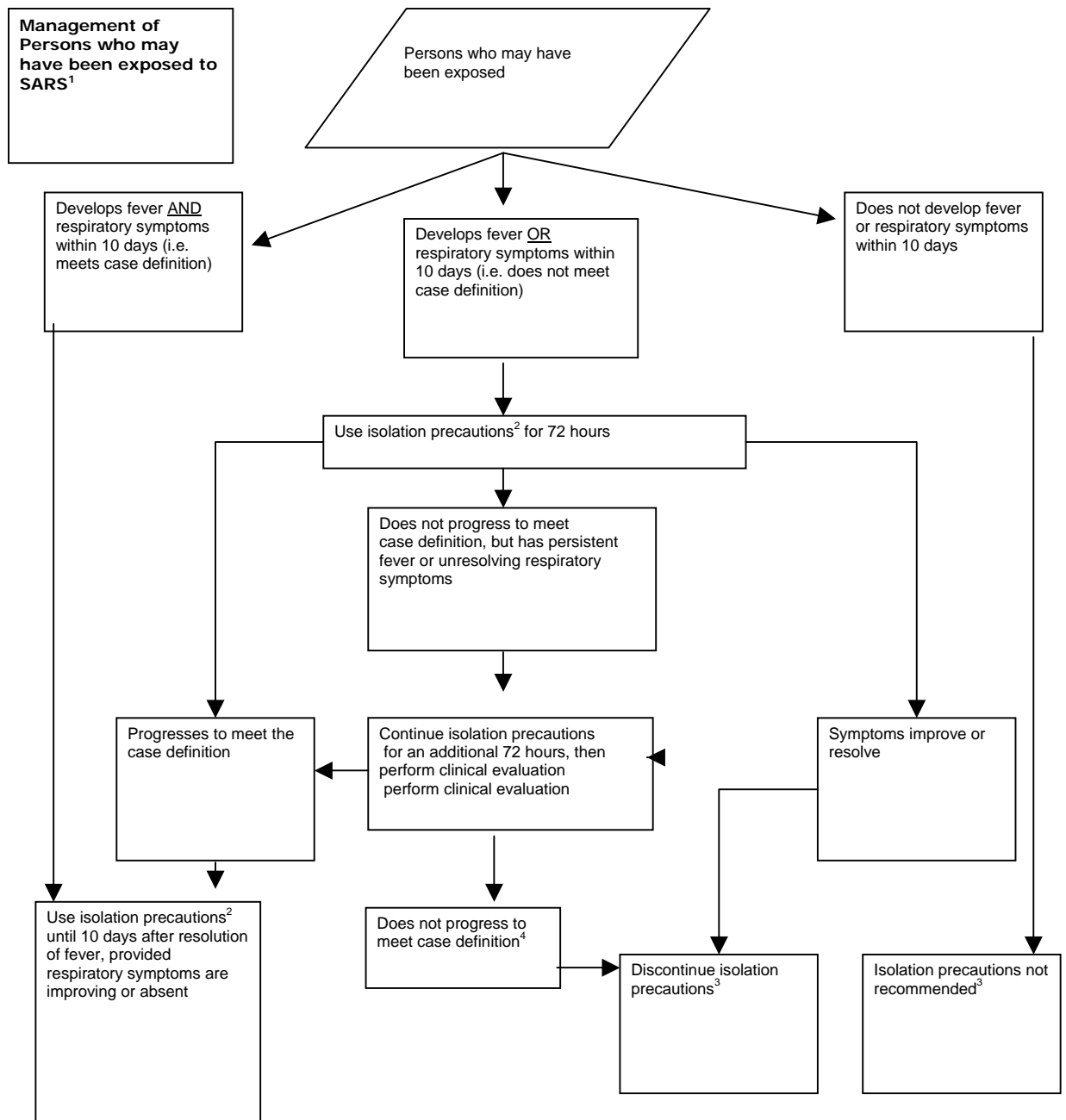
<http://www.who.int/csr/sars/postoutbreak/en>

World Health Organisation, Geneva 2003. Alert, Verification and public health management of SARS in the post-outbreak period.

<http://www.who.int/csr/sars/postoutbreak/en/>

SARS Guidelines HPA, Colindale, UK. <http://www.hpa.org.uk>

ANNEX A: 72 Hour Assessment of Contacts of SARS Cases



Footnotes for Annex A

1. Exposure includes travel from potential zones of re-emergence of SARS-CoV infection or close contact with persons who have SARS; close contact is defined as having cared for or lived with a person known to have SARS or having a high likelihood of direct contact with respiratory secretions and/or body fluids of a patient known to have SARS. Examples of close contact include kissing or embracing, sharing eating or drinking utensils, close conversation (>3 feet), physical examination, and any other direct physical contact between persons. Close contact does not include activities such as walking by a person or sitting across a waiting room or office for a brief period of time.
2. Isolation precautions include limiting patient's interactions with others outside the home (e.g. should not go to work, school, out of home day care, church or other public areas), and following infection control guidelines for the home and residential setting if not admitted to hospital for care.
3. Persons need not limit interactions outside the home (e.g. need not be excluded from work, school, out of home day care, church or other public areas).
4. Discontinuation of isolation precautions for patients who have not met the case definition 6 days following onset of symptoms but who have persistent fever or respiratory symptoms should be done only after consultation with local public health authorities and the evaluating clinician. Factors that might be considered include the nature of the potential exposure to SARS, nature of contact with others in the residential or work setting and evidence of an alternative.

Annex B: Assessment for Home Isolation

The regional Department of Public Health in conjunction with the local public health nurse and patient's general practitioner should assess the home situation before placing a suspect case in isolation in the home setting. The location and home situation must be one in which the Department of Public Health/Public Health Nurse/GP based on their assessment feels that good infection control measures can be ensured.

Requirements

1. Symptomatic person case must have a separate bedroom with a window that opens and a separate bathroom¹ from other household members
2. Presence of at least one competent trained² care provider in the household who
 - a. can commit to following public health directions
 - b. A telephone
 - c. Home must be located in a city/town with ready access to 24hour emergency medical service (GP /GP co-operative or hospital).

¹Where the exposure history is travel to a zone of re-emergence or area with a recent SARS outbreak or uncertain or/possible close contact with a SARS case, i.e. increased likelihood of having been exposed to SARS, the ill person should use a separate bathroom but the lack of a separate bathroom in the home should not preclude the use of the home as an isolation site. A risk assessment will be done by all relevant parties i.e. public health, clinicians, public health nurse.

² Training of the care provider and supplies including mask and if necessary a thermometer should be provided. Ideally each household should have only one care provider.

Annex C: Recommendations for Care Providers of SARS patients or Contacts of SARS patients in the Home Setting

Household members should notify local public health personnel immediately if they start to feel unwell and develop a cough or fever or any other respiratory symptoms.

Isolate the sick person:

If possible, only the person who is taking care of the sick person should stay with them. The sick person should stay in one room with the door closed and with the window open, if possible. Other members of the family should stay away from the sick person and not handle or share things such as dishes, books, toys, or anything that the sick person has used unless it has been washed thoroughly with soap and water or regular household cleaning product by the designated care provider. The sick person should use a separate bathroom and separate towels from the rest of the family. To protect them from getting the illness, parents should arrange for children in the household to stay with someone else while there is a sick person in the home. Discourage any visits from people who do not live in the house. If visitors come to the house, meet them outside and do not let them into the house.

Wear masks:

The person caring for the sick person should wear a surgical mask because we know that this infection is spread by close contact. The sick person should always wear a surgical mask if they leave their room or if another person is in the room with them, and anyone going in to the room should put on a surgical mask before entering. A supply of masks and instructions on how to use them will be provided.

Hand washing is important:

Individuals who are ill, caring for someone who is ill, or residing in the same household as an ill person, should wash their hands often using soap and warm water. The person who is ill should cover his/her mouth when coughing or sneezing and wash his/her hands immediately after. Hands should be washed immediately after providing care to the sick person. Waterless hand wash agents can also be used.

Keep things clean:

The sick person's bed sheets, towels and clothes can be washed with items from other household members, preferably in warm water. A washing machine may be used, however, the sick person's laundry should not be left sitting outside of their room, for example in a laundry room where other household members may be in contact with it. Used tissues should be put by the ill person directly into a rubbish bag which can be sealed in the sick person's room and taken directly outside by the care provider for collection with the regular rubbish. Surfaces and items inside the sick person's room should be cleaned with regular household cleansers. Items handled by the sick person, including cutlery and glasses should be cleaned by the care provider (or in a dishwasher) immediately upon removal from the sick person's room.

Care in the Home:

The sick person should follow the usual guidelines for taking care of themselves when ill: REST, drink plenty of fluids, and take paracetamol or ibuprofen for fever and pain.

Taking cough medicine, decongestants, and/or sore throat lozenges may be helpful to relieve symptoms. **The sick person's temperature should be taken at least twice a day with a thermometer and recorded. If the sick person is taking an anti-pyretic e.g. paracetamol the temperature should be recorded at least 4 hours after the last dose of these fever-reducing medicines.**

When to call for help:

Public Health personnel will make contact on a daily basis to check on the sick person's condition. Public health should inform the contact's GP that a patient of theirs is under surveillance for SARS. If the person's symptoms worsen, including increased shortness of breath or the person shows other signs of concern for example, extreme drowsiness or has not urinated (passed water) for 12 hours, contact should be made with the person's GP. Public Health personnel should also be informed.

Annex D: Clinical case description of SARS (Updated August 14th 2003)

Adapted from WHO Alert, Verification and public health management of SARS in the post outbreak period

Aetiology

Severe acute respiratory syndrome (SARS) is a disease caused by SARS coronavirus (SARS-CoV).

Epidemiology

Nosocomial transmission of SARS CoV has been a striking feature of the SARS outbreak. The majority of the cases are adults. Children are rarely affected.

The mean incubation period is 5 days with the range of 2-10 days although there are isolated reports of longer incubation periods. There have been no reports of transmission occurring before the onset of symptoms.

Natural history of the disease

Week 1 of illness

Patients initially develop influenza-like prodromal symptoms. Presenting symptoms include fever, malaise, myalgia, headache, and rigors. No individual symptom or cluster of symptoms has proven specific. Although history of fever is the most frequently reported symptom, it may be absent on initial measurement.

Week 2 of illness

Cough (initially dry), dyspnoea and diarrhoea may be present in the first week but more commonly reported in the second week of illness. Severe cases develop rapidly progressing respiratory distress and oxygen desaturation with about 20% requiring intensive care. Up to 70% of the patients develop diarrhoea which has been described as large volume and watery without blood or mucus. Transmission occurs mainly during the second week of illness.

Clinical outcomes

Based on an analysis of data from Canada, China, Hong Kong SAR, Singapore, Viet Nam and the United States the case fatality ratio (CFR) of SARS is estimated to range from 0% to more than 50% depending on the age group affected, with an overall CFR estimate of approximately 11% (see [Update 49 - SARS case fatality ratio, incubation period](#)). Higher mortality has also been associated with male sex and presence of co-morbidity in various studies.

Elderly and paediatric cases and SARS in pregnancy

Atypical presentations such as afebrile illness or concurrent bacterial sepsis/pneumonia have been highlighted as a particular problem in the elderly. Underlying chronic conditions and their more frequent use of health facilities have both contributed to initially unrecognised nosocomial transmission events.

SARS occurred less frequently and was observed to be a milder illness in the paediatric population.

Known cases of SARS in pregnancy have suggested an increase in foetal loss in early pregnancy and maternal mortality in later pregnancy.

Radiological findings

Early chest radiograph or CT changes are observed in most of the patients as early as days 3-4 of illness in spite of the absence of respiratory signs. These typically show patchy consolidation starting with a unilateral peripheral lesion which progress to multiple lesions or ground glass appearance. Some lesions follow a shifting pattern. Features during the later stages have sometimes included spontaneous pneumothorax, pneumomediastinum, sub-pleural fibrosis and/or cystic changes. Nearly all laboratory confirmed cases have x-ray evidence of pneumonia by day 7.

Haematological and biochemical findings

There are no haematological or biochemical parameters specific for SARS; however, studies have consistently highlighted the following:

Haematological findings

Lymphopaenia is common on presentation and progresses during the course of the illness. Sometimes thrombocytopaenia and prolonged APTT are observed.

Biochemical findings

LDH is frequently high and some reports have suggested association with poor prognosis. ALT, AST and CPK elevation are less frequently reported. Abnormal serum electrolytes have also been reported on presentation or during hospitalisation including hyponatraemia, hypokalaemia, hypomagnesaemia and hypocalcaemia.

Annex E

WHO hospital discharge and follow-up policy for patients who have been diagnosed with Severe Acute Respiratory Syndrome (SARS)

Revised 28 March 2003

This advice is updated regularly based on additional information

Convalescent Cases of SARS

We advise that the following criteria are considered prior to making a decision regarding discharge from hospital regarding a convalescent case:

Clinical symptoms/findings:

- Afebrile for 48 hours
- Resolving cough

Laboratory tests: if previously abnormal

- White cell count returning to normal
- Platelet count returning to normal
- Creatine phosphokinase returning to normal
- Liver function tests returning to normal
- Plasma sodium returning to normal
- C reactive protein returning to normal
- Oxygen saturation normal or returned to baseline if previously abnormal

Radiological findings:

- Improving chest x-ray changes

Follow-up for convalescent cases:

Discharged convalescent patients should monitor and record their temperature twice daily. If they have an elevated temperature of 38 degrees Celsius or above on two consecutive occasions they should report to the health care facility from which they were discharged.

Until more is known about the aetiological agent, and the potential for continued carriage (and hence the risk of continuing transmission) a precautionary approach is warranted. Therefore, following discharge from hospital, convalescent cases should remain at home for 7 days. During this period they should stay indoors, keeping contact with others to a minimum.

Follow up should be at one week at which time they should have a repeat chest x-ray, full blood count and any other blood tests that were previously abnormal. The patient should be followed up by

the health care facility from which they were discharged. Additionally, the clinician may decide that the patient needs to be followed up before one week.

At the one-week assessment, a decision should then be made on whether or not further confinement is required. Further confinement would be recommended in those who are immunosuppressed. Subsequent follow-ups are recommended until the chest x-ray and patient's health returns to normal.

As part of the follow-up, convalescent serology should be taken at 3 weeks after the date of disease onset and provided to the health care facility from which they were discharged.

Clear instructions should be given to convalescent cases to contact the institution from which they were discharged if their condition deteriorates and any further symptoms develop.

ANNEX F: Summary of probable SARS cases with onset of illness from 1 November 2002 to 31 July 2003 (revised 26 September 2003)

This summary table of probable SARS cases is also available in at http://www.who.int/csr/sars/country/table2003_09_23/en/print.html

Areas	Cumulative number of cases			Median age (range)	Number of deaths ^a	Case fatality ratio (%)	Number of imported cases (%)	Number of HCW affected (%)	Date onset first probable case	Date onset last probable case
	Female	Male	Total							
Australia	4	2	6	15 (1-45)	0	0	6 (100)	1 (16)	26-Feb-03	1-Apr-03
Canada	151	100	251	49 (1-98)	43	17	5 (2)	109 (43)	23-Feb-03	12-Jun03
China	2674	2607	5327 ^b	Pending	349	7	Not Applicable	1002 (19)	16-Nov-02	3-Jun-03
China, Hong Kong Special Administrative Region	977	778	1755	40 (0-100)	299	17	Not Applicable	386 (22)	15-Feb-03	31May03
China, Macao Special Administrative Region	0	1	1	28	0	0	1 (100)	0 (0)	5-May-03	5-May-03
China, Taiwan	218	128	346	42 (0-93)	37	11	21 (6)	68 (20)	25-Feb-03	15-Jun03
France	1	6	7	49 (26 - 56)	1	14	7 (100)	2 (29) ^c	21-Mar-03	3-May-03
Germany	4	5	9	44 (4-73)	0	0	9 (100)	1 (11)	9-Mar-03	6-May-03
India	0	3	3	25 (25-30)	0	0	3 (100)	0 (0)	25-Apr-03	6-May-03
Indonesia	0	2	2	56 (47-65)	0	0	2 (100)	0 (0)	6-Apr-03	17-Apr03
Italy	1	3	4	30.5 (25-54)	0	0	4 (100)	0 (0)	12-Mar-03	20-Apr03
Kuwait	1	0	1	50	0	0	1 (100)	0 (0)	9-Apr-03	9-Apr-03
Malaysia	1	4	5	30 (26-84)	2	40	5 (100)	0 (0)	14-Mar-03	22-Apr03

Mongolia	8	1	9	32 (17-63)	0	0	8 (89)	0 (0)	31-Mar-03	6-May-03
New Zealand	1	0	1	67	0	0	1 (100)	0 (0)	20-Apr-03	20-Apr03
Philippines	8	6	14	41 (29-73)	2	14	7 (50)	4 (29)	25-Feb-03	5-May-03
Republic of Ireland	0	1	1	56	0	0	1 (100)	0 (0)	27-Feb-03	27-Feb03
Republic of Korea	0	3	3	40 (20-80)	0	0	3 (100)	0 (0)	25-Apr-03	10May03
Romania	0	1	1	52	0	0	1 (100)	0 (0)	19-Mar-03	19-Mar03
Russian Federation	0	1	1	25	0	0	Not Available	0 (0)	5-May-03	5-May-03
Singapore	161	77	238	35 (1-90)	33	14	8 (3)	97 (41)	25-Feb-03	5-May-03
South Africa	0	1	1	62	1	100	1 (100)	0 (0)	3-Apr-03	3-Apr-03
Spain	0	1	1	33	0	0	1 (100)	0 (0)	26-Mar-03	26-Mar03
Sweden	3	2	5	43 (33-55)	0	0	5 (100)	0 (0)	28-Mar-03	23-Apr03
Switzerland	0	1	1	35	0	0	1 (100)	0 (0)	9-Mar-03	9-Mar-03
Thailand	5	4	9	42 (2-79)	2	22	9 (100)	1 (11) ^c	11-Mar-03	27-May03
United Kingdom	2	2	4	59 (28-74)	0	0	4 (100)	0 (0)	1-Mar-03	1-Apr-03
United States	14	15	29	33 (0-83)	0	0	28 (97) ^d	0 (0)	24-Feb-03	13-Jul03 ^e
Viet Nam	39	24	63	43 (20-76)	5	8	1 (2)	36 (57)	23-Feb-03	14-Apr03
Total			8098		774	9.6	143	1707 (21)		

a. Includes only cases whose death is attributed to SARS.

b. Case classification by sex is unknown for 46 cases.

c. Includes HCWs who acquired illness in other areas.

d. The transmission pattern is undetermined for one case.

e. Due to differences in case definitions, the United States has reported probable cases of SARS with onsets of illness after 5 July 2003. **Source: WHO website**

ANNEX G: Summary table of areas that experienced local transmission of SARS during the outbreak period from 1 November 2002 to 31 July 2003^{a,b,c}

21st November 03

Country	Area	From^d	To^e
Canada	Greater Toronto Area	23-Feb-03	2-Jul-03
Canada	New Westminster (within the Greater Vancouver Area)	28-Mar-03	5-May-03
China	Beijing	2-Mar-03	18-Jun-03
China	Guangdong	16-Nov-02 ^f	7-Jun-03
China	Hebei	19-Apr-03	10-Jun-03
China	Hong Kong Special Administrative Region	15-Feb-03	22-Jun-03
China	Hubei	17-Apr-03	26-May-03
China	Inner Mongolia	4-Mar-03	3-Jun-03
China	Jilin	1-Apr-03	29-May-03
China	Jiangsu	19-Apr-03	21-May-03
China	Shanxi	8-Mar-03	13-Jun-03
China	Shaanxi	12-Apr-03	29-May-03
China	Tianjin	16-Apr-03	28-May-03
China	Taiwan	25-Feb-03	5-Jul-03
Mongolia	Ulaanbaatar	5-Apr-03	9-May-03
Philippines	Manila	6-Apr-03	19-May-03
Singapore	Singapore	25-Feb-03	31-May-03
Vietnam	Hanoi	23-Feb-03	27-Apr-03

- a. Local transmission occurred when one or more reported probable cases of SARS most likely acquired their infection locally regardless of the setting in which this may have occurred.
- b. The United Kingdom (UK) had previously reported local transmission in London; the UK case associated with local transmission was discarded on 12 May 2003 as the clinical picture and laboratory findings were consistent with influenza.
- c. The United States of America had previously reported local transmission associated with two independent imported cases with dates of onsets of illness on 13 March and 16 March 2003. The source of infection is uncertain for one of the secondary cases whose onset of illness was 18 March and who had travelled with one of these two imported cases. The secondary case associated with other imported case has subsequently been discarded.
- d. The "from" date is the date of onset of the first imported case that most likely started a local chain of transmission.
- e. The "to" date is 20 days after the last reported locally acquired probable case died or was appropriately isolated. The period during which local transmission occurred includes the "from" and "to" dates.
- f. Indicates date of onset of first identified case in Guangdong

This summary table of probable SARS cases is also available at <http://www.who.int/>

Source: World Health Organisation