

Early Detection of Severe or Emerging Respiratory Infections through Severe Respiratory Illness (SRI) surveillance

SARS Post Outbreak Period/SRI Alert Period

1.0 Background:

On 14 August 2003, the World Health Organization (WHO) developed guidelines for Alert, verification and public health management of Severe Acute Respiratory Syndrome (SARS) in the SARS post-outbreak period (see <http://www.who.int/csr/sars/postoutbreak/en/>). On 10 and 11 September 2003, Health Canada hosted an international meeting of experts to discuss enhanced surveillance and case definitions. At the meeting it was agreed that individual countries, particularly developed countries, need to adapt the WHO SARS Alert recommendations based on their own risk assessment, resource requirements and experience.

Since October 2003 (and possibly earlier), outbreaks of avian influenza affecting poultry in several Asian countries, involving human cases in Vietnam and Thailand, have underscored the importance of increased vigilance for any severe respiratory illness (SRI) of potential public health importance. The recommendations and guidelines for enhanced SRI surveillance in this document were developed in response to SARS yet aimed at being flexible enough to include other severe respiratory illnesses, including severe influenza-like illness (severe ILI), see definitions in section 4.1.

While the future of SARS is uncertain, the lessons learned from both SARS and previous outbreaks of influenza A (H5N1) involving humans, have underscored the importance of preparatory planning and surveillance infrastructure for the detection and monitoring of emerging respiratory infections. Based on Canada's experience, the Pandemic Influenza Surveillance Working Group terms of reference have been revised to include SARS and other emerging respiratory infections. The new surveillance working group, renamed the Respiratory Infection Surveillance Committee (RISC) has been tasked with this role. To this end, RISC is recommending surveillance for sporadic cases of SRI, including severe influenza-like-illness (severe ILI), in all acute care facilities, in addition to surveillance of nosocomial clusters of SRI in selected (sentinel) acute care facilities. These recommendations are consistent with the WHO recommendations for SARS cited above but adapted to the Canadian setting and expanded to include other emerging respiratory illnesses of public health importance.

The following document is intended for public health purposes and details the goals, objectives, methods and reporting of enhanced surveillance for SRI through a system of alerts. These recommendations have been developed through a consensus process with Provinces and Territories through RISC. Hospitals should refer to their Province/Territory for specific surveillance protocols within their jurisdiction.

While a jurisdiction may choose, based on its own risk assessment and experience, to increase the sensitivity of monitoring (i.e. by increasing time frames, increasing the geographic extent of a perceived zone of re-emergence risk or decreasing the minimum number of individuals defining a cluster), for the purposes of national reporting, the minimum standards defining a nationally reportable alert are laid out in sections 4.0, 4.1 and 4.2.

2.0 Goal:

To prevent large-scale epidemics and outbreaks of respiratory infections associated with increased morbidity and mortality, through the establishment of ongoing surveillance for severe or emerging respiratory infections and rapid implementation of prevention and control measures.

3.0 Objectives:

- To detect, in a timely manner, unusually severe morbidity and mortality caused by both unknown and known respiratory pathogens (e.g. influenza, SARS-associated coronavirus [SARS-CoV]) that have the potential for large-scale epidemics or pandemics.
- To provide an early warning or rapidly detect possible new cases of SARS or other emerging respiratory infections from potential zones of emergence/re-emergence for SARS or novel influenza viruses. For SARS-CoV, the zone of re-emergence includes China, including mainland China, Taiwan Province and Hong Kong Special Administrative Region.
- To provide an early warning mechanism in order that available control measures may be implemented at the appropriate time to minimize transmission.
- To ensure appropriate systems are in place to detect clusters of SARS cases as recommended by the World Health Organization (i.e., SARS Alert system).

4.0 Methods:

During the period of heightened vigilance for SARS or other emerging respiratory infections, including severe ILI, it is proposed that each jurisdiction implement, at a minimum, surveillance for persons hospitalized with SRI, including SARS-like illness, severe ILI or other emerging respiratory illness NYD, who have one or more exposures as specified in the definition (see section 4.1). In addition, it is recommended that sentinel hospital-based surveillance for nosocomial clusters of SRI linked to a health care unit be conducted at a minimum in selected (sentinel) hospitals as specified in section 4.2. However, the scope and implementation of these surveillance activities should be determined by the Province and Territory (P/T). Some jurisdictions may choose to expand nosocomial cluster surveillance to additional hospitals, based on risk assessment and resource availability.

It is advisable that jurisdictions considered “Nodal Areas” (see below), based on previous experience with SARS or ongoing receipt of a large number of persons from potential zones of emergence/re-emergence of SARS consider implementing additional surveillance for Acute Respiratory Distress Syndrome not yet diagnosed (ARDS-NYD) and other enhanced surveillance and/or special studies as identified by the WHO (<http://www.who.int/csr/sars/postoutbreak/en/>).

Potential zones of emergence/re-emergence

Currently, based on expert opinion, China (including mainland China, Taiwan Province and Hong Kong Special Administrative Region), is considered to be the zone for potential re-emergence of SARS-CoV. It is also considered highly likely that novel influenza viruses may arise from this zone.

Upon detection of any emerging or re-emerging pathogens internationally, including novel influenza viruses (e.g. H5N1), the “potential zones of emergence/re-emergence” will be reviewed and updated as necessary. For the latest listing of implicated countries refer to Table 1: “Areas in the zone of emergence/re-emergence for SARS and avian influenza (H5N1)” at <http://www.hc-sc.gc.ca/pphb-dgspsp/h5n1/index.html>.

Nodal areas

Currently, based on expert opinion, a nodal area is an area which previously experienced sustained local transmission of SARS or receives large numbers of persons from the potential zone of re-emergence of SARS-CoV. In Canada, this would include the Greater Toronto Area and Vancouver.

Likewise, jurisdictions may choose to apply the concept of “nodal areas” to other emerging respiratory infections in order to prioritize additional enhanced surveillance activities (e.g. ARDS-NYD surveillance) to areas within Canada that receive large numbers of persons from potential zones of emergence of other emerging respiratory infections of pandemic potential (including novel influenza viruses). Refer to

Table 1: “Areas in the zone of emergence/re-emergence for SARS and avian influenza (H5N1)” at <http://www.hc-sc.gc.ca/pphb-dqspsp/h5n1/index.html>] for an up-to-date list of currently affected areas.

SRI Alert

The SRI Alert is an operational definition developed by the WHO and modified by RISC to ensure that individuals meeting specific criteria are identified in a systematic way to allow for implementation of appropriate infection control and public health measures until SARS or another emerging pathogen, including a novel influenza virus, has been ruled out as a cause. All “SRI Alerts” should be reported to Health Canada.

SRI Alerts include:

- I. Persons with a potential epidemiologic link who are hospitalized with SRI, including SARS-like illness, severe ILI or other emerging respiratory illness-NYD (see section 4.1)
- II. Clusters of severe respiratory illness (SRI) within a health care unit¹ in an acute care facility (see section 4.2)
- III. Any person who has laboratory evidence of SARS-CoV infection (see *The Canadian Public Health Laboratory Network (CPHLN) Recommendations on Laboratory Evidence of SARS CoV Infection* available at www.sars.gc.ca (POST-OUTBREAK PERIOD).
- IV. Any person who has a laboratory confirmed influenza A (H5N1) or other novel influenza virus infection.

4.1 Surveillance for Persons with a Potential Epidemiologic Link who are Hospitalized with SRI

It is recommended that all P/Ts implement, at a minimum, hospital-based surveillance for sporadic cases of SRI, including SARS-like illness and **severe ILI**², meeting the following case definition.

A person **admitted to hospital** with:

Respiratory symptoms, i.e.:

- Fever (over 38 degrees Celsius) **AND** Cough or breathing difficulty

AND Radiographic evidence consistent with SRI, i.e.:

- Radiographic evidence of infiltrates consistent with pneumonia or respiratory distress syndrome (RDS).
- **Severe ILI**² may also include complications such as encephalitis or other severe and life threatening complications

AND No alternate diagnosis within the first 72 hours³ **of hospitalization, i.e.:**

¹ The definition of the health care unit in which the cluster occurs will depend on the local situation. Unit size may range from an entire health care facility if small, to a single department or ward of a large tertiary hospital. A jurisdiction may choose, based on its own risk assessment and experience, to increase the minimum period for defining a cluster beyond 10 days.

² **Influenza-like illness (ILI) definition** for the general population (FluWatch national case definition) includes: Acute onset of respiratory illness with fever and cough and with one or more of the following - sore throat, arthralgia, myalgia, or prostration which could be due to influenza virus. In children under 5, gastrointestinal symptoms may also be present. In patients under 5 or 65 and older, fever may not be prominent. In addition to the symptoms of ILI noted above, **severe ILI** may also include complications such as pneumonia, Acute Respiratory Distress Syndrome (ARDS), encephalitis or other severe and life threatening complications.

³ Laboratory investigation, including laboratory testing for influenza and other respiratory pathogens should be started immediately upon presentation (i.e. do not wait 72 hours to initiate testing). Testing for SARS-CoV should not be initiated within the first 72 hours (see SARS-CoV Laboratory Investigation Protocol for the SARS Post-Outbreak Period). Also requires immediate infection control and public health action, see the appropriate guidelines.

Results of preliminary clinical and/or laboratory investigations, **within the first 72 hours³** of hospitalization, cannot ascertain a diagnosis (i.e. SARS or other emerging respiratory pathogen cannot be ruled out). See [SARS-CoV Laboratory Investigation Protocol for the SARS Post-Outbreak Period](#) and [The Canadian Public Health Laboratory Network \(CPHLN\) Recommendations on Laboratory Evidence of SARS CoV Infection](#) available at www.sars.gc.ca (POST-OUTBREAK PERIOD).

AND one or more of the following exposures/conditions, i.e.:

- Residence, recent travel or visit to a **potential zone of emergence/re-emergence** of SARS or novel influenza viruses [refer to Table 1: “Areas in the zone of emergence/re-emergence for SARS and avian influenza (H5N1)” at <http://www.hc-sc.gc.ca/pphb-dgspsp/h5n1/index.html>] **OR** close contact (including health care providers) of a symptomatic⁴ person who has been to a potential zone of emergence/re-emergence within the 10 days prior to onset of symptoms.
- The admitted person is a laboratory worker handling live SARS-CoV

OR

A deceased person with:

A history of respiratory symptoms, i.e.:

- history of unexplained acute respiratory illness (including fever, and cough or difficulty breathing) resulting in death

AND Autopsy performed with findings consistent with SRI, i.e.:

- autopsy findings consistent with the pathology of RDS without an identifiable cause

AND one or more of the following exposures/conditions, i.e.:

- Residence, recent travel or visit to a **potential zone of emergence/re-emergence** of SARS or novel influenza viruses [refer to Table 1: “Areas in the zone of emergence/re-emergence for SARS and avian influenza (H5N1)” at <http://www.hc-sc.gc.ca/pphb-dgspsp/h5n1/index.html>] **OR** close contact (including health care providers) of a symptomatic³ person who has been to a potential zone of emergence/re-emergence within the 10 days prior to onset of symptoms.
- The deceased person is a laboratory worker handling live SARS-CoV

EXCLUSION CRITERIA

- A person should be excluded if an alternate diagnosis can **fully** explain their illness.

4.2 Surveillance for Clusters of Severe Respiratory Illness (SRI) within a Health Care Unit¹ in an Acute Care Facility

It is recommended that Canadian provinces and territories implement sentinel surveillance through the Canadian Nosocomial Infection Surveillance Program (CNISP) for clusters (described below) of SRI within a health care unit and investigation of these clusters for SARS and influenza, including the CPHLN recommended laboratory testing for SARS-CoV, influenza and other respiratory pathogens (See [SARS-CoV Laboratory Investigation Protocol for the SARS Post-Outbreak Period](#) available at www.sars.gc.ca (POST-OUTBREAK PERIOD)).

The most likely setting to detect the re-emergence of SARS or other severe emerging respiratory infections, in Canada is in acute care facilities where persons who have a SRI generally present. It is very unlikely that cases will be first identified in a long term care (LTC) facility as LTC facilities are, for the most part, closed settings with a somewhat stable population that has relatively little contact with the general population.

⁴ Symptoms consistent with SARS include, at a minimum, fever and cough or breathing difficulty. A jurisdiction may choose to include, based on its own risk assessment and experience, only contacts of severely ill (i.e. persons with radiographic evidence consistent with SARS) returned travellers.

For the purposes of surveillance a cluster is considered to be **hospital acquired illness** in **2 or more health care workers** or **3 or more persons** (health care workers and/or other hospital staff and/or patients and/or visitors) **within a health care unit**¹ with onset of illness in the same 10-day period⁵ and with:

Respiratory symptoms, i.e.:

- Fever (over 38 degrees Celsius) **AND** Cough or breathing difficulty

AND Admitted to hospital

AND Radiographic evidence OR Autopsy finding consistent with SRI, i.e.:

- Radiographic evidence of infiltrates consistent with pneumonia or respiratory distress syndrome (RDS), **OR**
- Autopsy findings consistent with the pathology of RDS without an identifiable cause.

AND No alternate diagnosis within the first 72 hours³

- Results of preliminary clinical and/or laboratory investigations, within the first 72 hours³ of hospitalization, cannot ascertain a diagnosis (i.e. SARS or other emerging respiratory pathogen cannot be ruled out). See [SARS-CoV Laboratory Investigation Protocol for the SARS Post-Outbreak Period](#) available at www.sars.gc.ca (POST-OUTBREAK PERIOD).

4.3 Other enhanced surveillance and/or special studies: Continued Vigilance for ARDS-Not Yet Diagnosed

Provinces and Territories, particularly those that receive a large number of persons from the potential zone of emergence/re-emergence (i.e., SARS Nodal areas or areas affected by novel influenza viruses), may consider surveillance of ARDS of unknown cause and pursue investigation of these cases for SARS and influenza including the CPHLN recommended laboratory testing for SARS-CoV or other potential emerging respiratory pathogens (see [The Canadian Public Health Laboratory Network \(CPHLN\) Laboratory Testing for Patients with Severe Respiratory Illness \(SRI\) Not Yet Diagnosed \(NYD\)](#), Pilot / Sentinel Surveillance in Nodal areas, available at www.sars.gc.ca (POST-OUTBREAK PERIOD).

5.0 Proposed National Reporting⁶ of Outcomes of Surveillance for Severe or Emerging Respiratory Infections

It is proposed that all P/Ts report to CIDPC, Health Canada, the following:

- **Surveillance Systems:** the type and scope of surveillance systems that have been implemented for severe or emerging respiratory infections in the P/T (report any changes as necessary).
- **SRI hospitalizations:** All persons admitted to hospital and meeting the definition for SRI (including SARS-like illness, severe ILI or other emerging respiratory illness-NYD with a potential epidemiological link/risk factor).
- **SRI clusters:** all clusters of SRI in acute care facilities.

⁵ A jurisdiction may choose, based on its own risk assessment and experience, to increase the minimum period for defining a cluster beyond 10 days.

⁶ Real-time reporting will be introduced as a pilot, to be re-assessed once resource implications and optimal frequency of reporting are known.

- **SARS-CoV infections:** all persons who have laboratory evidence of SARS-CoV infection (see [The Canadian Public Health Laboratory Network \(CPHLN\) Recommendations on Laboratory Evidence of SARS CoV Infection](#) available at www.sars.gc.ca (POST-OUTBREAK PERIOD).
- **Confirmed and Probable SARS:** any person who meets the national definition for a confirmed or probable case of SARS (see [SARS National Case Definitions](#) available at www.sars.gc.ca , SARS section, i.e. OUTBREAK PERIOD), if and when SARS re-emerges.
- **Laboratory confirmed influenza A (H5N1) or other novel influenza virus infection.**

6.0 Limitations

6.1 Surveillance and Response in the SRI Alert Period

The purpose of this document is to outline minimum definitions for surveillance and to establish standards for national reporting of SRI in the *SRI Alert Period*.

6.2 Use of Surveillance Definitions

Surveillance definitions are public health tools designed for monitoring purposes. They set out certain criteria which once met, can lead to an event being reported to public health, or included in an outbreak analysis, *in a consistent manner*. Typically there are several categories of definitions for a health event. These may be based on clinical, diagnostic, laboratory and/or epidemiological criteria.

Definitions are chosen to represent a suitable balance between sensitivity (correctly identifying true events) and specificity (correctly excluding false events). The appropriate balance between these two characteristics may vary at different phases of an outbreak period or among jurisdictions, depending if they are affected by an outbreak.

Surveillance definitions are not designed to be used for clinical diagnosis or management of individuals/events. To meet these needs, clinical descriptions, diagnostic tools or algorithms, and guidelines for decision making are required. Individuals may meet a surveillance definition but not be judged, on clinical grounds, to have the disease, or vice versa. This is especially true if the disease is mild or atypical in its presentation. Due to the balance between sensitivity and specificity and the arbitrary nature of surveillance definitions, it is not possible to include all possible manifestations of a disease in a case definition. Surveillance definitions ensure that all jurisdictions count disease events in a systematic manner to enable comparison and analysis of trends

7.0 Limiting over testing for SARS, while ensuring appropriate testing where warranted

- Appropriate testing for routine respiratory pathogens should be reinforced
- SARS-CoV testing should be limited to the specific indications outlined in [SARS-CoV Laboratory Investigation Protocol for the SARS Post-Outbreak Period](#) available at www.sars.gc.ca (POST-OUTBREAK PERIOD).
- SARS/SRI alerts 4.1/4.2 should trigger clinicians to “Think, Tell and Test”, ONLY WHEN APPROPRIATE.
 - **Think** about the possibility of SARS
 - **Tell** the local medical office of health
 - **Test** for SARS-CoV only after appropriate consultation
- Development and implementation of a case tracking system is recommended to ensure rapid linkage of laboratory and epidemiological data while providing a practical mechanism to control/limit SARS testing. (See [SARS-CoV Laboratory Investigation Protocol for the SARS Post-Outbreak Period](#), Appendix A: Case Tracking Form for SARS-CoV Testing in the SARS Post-Outbreak Period, available at www.sars.gc.ca (POST-OUTBREAK PERIOD).

8.0 Prioritizing influenza testing

- Appropriate testing for routine respiratory pathogens should be reinforced.
- Any difficult to identify viruses should be referred to the National Microbiology Laboratory in Winnipeg (NML), immediately.
- Laboratories should ensure that specimens are forwarded in the most timely manner possible and that any samples with a **positive travel history, severe and unexpected presentation or unusual epidemiology** notation are forwarded to NML immediately (do not cohort these specimens for batch mailing) for subtyping and/or identification as necessary.