

Respiratory Response Plan for Public Health

2023–2024

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Contents

- 1.0 Introduction 1**
- 2.0 Goals and Objectives 2**
- 3.0 Roles and Responsibilities 4**
 - 3.1 World Health Organization 4
 - 3.2 Federal Government..... 4
 - 3.3 Department of Health and Wellness (DHW)..... 5
 - 3.4 Department of Natural Resources and Renewables..... 6
 - 3.5 Nova Scotia Health (NSH) Public Health 6
- 4.0 Key Components 6**
 - 4.1 Immunization..... 7
 - 4.2 Risk Assessment and Communication..... 10
 - 4.3 Surveillance and Reporting..... 11
 - 4.4 Public Health Management of Respiratory Pathogens 12
 - 4.5 Outbreak Management..... 13
- 5.0 Conclusion 14**
- Appendix A: Technical Information for SARI and Emerging Respiratory Pathogens 15**
 - 1. Severe Acute Respiratory Infection (SARI) 16
 - 2. Coronaviruses 17
 - 3. Avian Influenza 20
 - 4. Variant Influenza Viruses of Swine 25
- Appendix B: Public Health Management of Emerging Respiratory Pathogens and SARI ... 26**
 - 1. Case Management 26
 - 2. Contact Management..... 28
 - 3. Infection Prevention and Control Measures for Health Care Settings 30
 - 4. Travel and Border Related Issues..... 31
- Appendix C: Reporting Emerging Respiratory Pathogens and SARI..... 32**
- Appendix D: Laboratory: Procedures 34**
 - 1. Laboratory Procedures for Known Respiratory Pathogens 34
 - 2. Lab Procedures for Emerging Respiratory Pathogens and SARI 38
- References..... 44**

1.0 Introduction

According to the World Health Organization (WHO), infectious diseases are emerging more quickly than ever, with the discovery of nearly 40 new diseases that were unknown a generation ago. The sudden emergence of an infectious respiratory pathogen can spread rapidly around the world. The COVID-19 pandemic was a reminder that events starting abroad can swiftly impact us in Canada. The threat of imported diseases has increased owing to several factors, including increased opportunities for disease emergence due to the effects of globalization; international spread through human and wildlife migration and travel; climate change; and health vulnerabilities related to an aging population.

Over the last twelve years the world has witnessed emergence of several respiratory pathogens; Avian Influenza A (H7N9), Middle East Respiratory Syndrome Coronavirus (MERS- CoV), and COVID-19 (SARS-CoV-2). The WHO and the Public Health Agency of Canada (PHAC) recommend increased vigilance and surveillance for severe acute respiratory illness (SARI).

This Respiratory Response Plan is intended to provide guidance to **public health professionals** to prepare for and respond to known and emerging respiratory pathogens with the potential to cause outbreaks and epidemics. This applies to emerging respiratory pathogen investigations where animal-to-human and human-to-human transmission are unknown and the risk to Nova Scotians is not clear.

The body of this document will provide context for how local, provincial and national, public health infrastructures can collaborate to prepare for and respond to respiratory pathogens. The appendices are included to ensure that public health professionals can easily access technical guidance for their approach and/or response. It will be reviewed and revised annually or as necessary based on evolving epidemiology. It does not replace the Nova Scotia Health System All Hazards Plan

2.0 Goals and Objectives

The goal of Nova Scotia's Respiratory Response Plan is to minimize severe illness and death from respiratory pathogens in Nova Scotia.

To achieve this goal, a set of objectives have been developed to provide tangible and strategic Public Health actions and interventions. These include:

Public Health Response

- To implement public health measures that minimize severe illness, death and societal disruption from respiratory pathogens, with an emphasis on protecting those at higher risk and vulnerable populations.
- To minimize the burden of illness through publicly funded vaccination programs for vaccine preventable respiratory pathogens.
- To ensure public health practitioners have the knowledge, skills, and tools needed to adequately respond to known and emerging respiratory pathogens causing severe illness.
- To communicate with the public and health system using risk communication strategies and tools.
- To inform and support the health system respiratory response readiness (e.g., preparing for seasonal surges).

Surveillance

- To monitor trends of COVID-19, influenza and influenza like illness (ILI), and other respiratory pathogens in the community to determine activity levels of disease, including re-emergence.
- To monitor morbidity and mortality related to respiratory pathogens.
- To identify groups at higher risk of morbidity and mortality related to respiratory pathogens.
- To detect and characterize known and emerging respiratory pathogens which may present as ILI or SARI, including seasonal influenza, COVID-19, and respiratory pathogens with the potential to cause outbreaks and epidemics.
- To monitor vaccine coverage and safety for vaccine preventable respiratory pathogens.
- To disseminate surveillance data in a timely manner to inform Public Health Action.

Evaluation

Evaluation of these objectives is an essential step to support the effectiveness of public health interventions.

Guiding Principles

Nova Scotia's Respiratory Response Plan is grounded in ethical guiding principles that underpin public health decision-making. Ethical consideration is paramount when balancing the risk to the public from a communicable disease while respecting the rights of individuals. Public health decision making is complex, and the following list does not attempt to describe the entirety of public health ethics, but rather defines a subset of key principles that should be considered as a starting point when making decisions about the control of a communicable disease.

- **Equity:** All people (individuals, groups, and communities) have a fair chance to reach their full health potential and are not disadvantaged by social, economic and environmental conditions.
- **Proportionality:** Any public health intervention should be proportionate to the threat faced, and that measures taken should not exceed those necessary to address the actual risk to the population. This includes demonstrating that the intervention should be effective in achieving the desired aim. In making judgements of proportionality, stronger actions require stronger evidence, and in the absence of evidence, interventions should include an evidence-gathering mechanism.
- **Least Restrictive Means:** Intrusion into people's lives should be the minimum possible, while the policy aim can still be achieved.
- **Reciprocity:** Every means possible should be sought to aid the individual in complying with the requests and impositions. In addition, complying with the public health program may impose sacrifices and burdens and, in whatever way possible, these should be compensated by the program or the agency.

3.0 Roles and Responsibilities

Roles and responsibilities may vary depending on local, provincial, or national involvement. While the Nova Scotia Respiratory Response Plan focuses specifically on communicable disease prevention and control related to respiratory pathogens and actions taken by the Department of Health and Wellness (DHW), Public Health Branch and Nova Scotia Health (NSH), Public Health, **it is acknowledged that there are additional partners who have important roles and responsibilities in the response to a respiratory event.** This includes partners inside the NSH and IWK health sector, non-health sector, private sector, municipalities, other provincial departments, and international organizations. Similarly, members of the public bear responsibility for keeping themselves informed and for adhering to measures that reduce the spread of illness.

3.1 World Health Organization

The WHO provides global guidance to PHAC regarding known and emerging respiratory pathogens which may present as ILI or SARI, including seasonal influenza and any respiratory pathogen with the potential to cause outbreaks and epidemics in a timely manner. WHO also advises on annual composition of influenza vaccines.

3.2 Federal Government

Public Health Agency of Canada (PHAC)

Canada's response to emerging and re-emerging infectious diseases and respiratory pathogens is led by PHAC in collaboration with provinces and territories. PHAC is involved in the routine detection, monitoring and analysis of national and international trends and spread of infectious disease threats. PHAC is responsible for leading the development of national standards for detection and reporting of such infectious disease threats, including case definitions and protocols for reporting to allow Canada-wide comparison. PHAC is advised by the National Advisory Committee on Immunization (NACI).

National Advisory Committee on Immunization

NACI is a national advisory committee of experts in the fields of pediatrics, infectious diseases, immunology, pharmacy, nursing, epidemiology, pharmacoeconomics, social science and public health. NACI provides guidance on the use of vaccines approved for use in Canada. The Committee reports to the Vice-President of the Infectious Disease Prevention and Control Branch and works with staff from PHAC to provide ongoing and timely medical, scientific and public health advice on vaccines.

National Microbiology Lab

The National Microbiology Lab (NML) of PHAC works with public health partners both nationally and internationally to prevent spread of infectious diseases through research, laboratory-based surveillance, emergency preparedness and response, specialized services for detection and diagnosis, leadership, networking, and capacity development.

Health Canada

Health Canada (HC) regulates pharmaceuticals, vaccines, and other health products in Canada. In collaboration with PHAC, HC has a role managing events such as outbreaks involving First Nation and Inuit communities.

3.3 Department of Health and Wellness (DHW)

Public Health Branch

In consultation with various key partners, the DHW Public Health Branch, inclusive of Health Promotion, Health Protection, Policy, Public Health Emergency Preparedness, and Surveillance develops the policies, standards, and protocols to guide the provincial public health response to known and emerging respiratory pathogens of interest and provides recommendations to the Chief Medical Officer of Health Team (CMOHT). The Public Health Branch Surveillance team systematically collects, analyzes, and reports on data pertaining to known and emerging respiratory pathogens. When a public health emergency exists and a threat to health is imminent, the Public Health Branch briefs and makes recommendations to government based on a health risk assessment and in consultation with other Nova Scotia government departments, PHAC and relevant agencies. Public Health Branch Sub-Committees, co-led with Nova Scotia Health, ensure collaboration and communication across Nova Scotia's Public Health system. When strategic direction is required, the Public Health Steering Committee provides input and guidance.

Provincial Public Health Laboratory Network (PPHLN)

PPHLN provides timely information and advice on specimen collection, shipping and obtaining results for laboratory investigations of known and emerging respiratory pathogens which may present as ILI or SARI, including seasonal influenza and any respiratory pathogen with the potential to cause outbreaks and epidemics.

3.4 Department of Natural Resources and Renewables

The Department of Natural Resources and Renewables (NRR) works with federal and provincial partners including the Canadian Food Inspection Agency (CFIA) and other stakeholders in the surveillance, management and response of respiratory pathogens involving wildlife.

3.5 Nova Scotia Health (NSH) Public Health

Provides investigation oversight to relevant situation(s) in order to take reasonable action to protect the public's health from viral respiratory pathogens (among other communicable diseases), including issuing public advisories and bulletins; conducting case and contact management; implementing proportional public health measures to prevent transmission; monitoring condition of a detained person and issuing a certificate for release, when applicable; implementing enhanced surveillance activities and taking such action as a Public Health Nurse (PHN) or the Regional Medical Officer of Health (RMOH) reasonably believes is necessary to prevent, control, or manage a public health emergency.

Provincial Biological Depot

The Provincial Biological Depot manages the publicly funded vaccine supply, storage, and distribution to zonal public health offices and local providers.

4.0 Key Components

This document outlines guidance for timely public health response to known and emerging respiratory pathogens with the potential to cause outbreaks and epidemics.

Key components include:

- Immunization
- Risk Assessment
- Surveillance and Reporting
- Public Health Management of Respiratory Pathogens
- Outbreak Management

4.1 Immunization

Elements of a respiratory pathogen immunization program discussed in this section include:

- Objectives
- Planning Principles and Assumptions
- Vaccine Supply
- Vaccine Safety
- Coverage
- Communication Strategy

Objectives

The objectives of the Nova Scotia's immunization programs for vaccine-preventable respiratory diseases are to:

- Provide safe and effective vaccine to all Nova Scotians
- Decrease morbidity and mortality
- Allocate, distribute, and administer vaccine as rapidly and equitably as possible
- Monitor the safety and effectiveness of the vaccine program
- Limit societal disruption

As part of a collaborative approach to COVID-19 pandemic response, Nova Scotia is guided by the PHAC Federal-Provincial-Territorial (FPT) COVID-19 immunization goals and objectives and follows NACI guidance.

Vaccines are the cornerstone of primary prevention and pandemic preparedness and response. Immunization of susceptible individuals can be effective at protecting against severe disease and death and in preventing transmission of respiratory pathogens.

Nova Scotia's publicly funded immunization program offers free routine and high-risk immunization programs for children, youth, and adults, including an annual influenza immunization program and COVID-19 immunization program.

For more information, see:

[Publicly Funded Vaccine/Immunoglobulin Eligibility Policy](#)

[Publicly Funded Vaccine Eligibility for Individuals at High Risk of Acquiring Vaccine Preventable Diseases](#)

[Nova Scotia Immunization Manual](#)

[Publicly Funded Seasonal Inactivated Influenza Vaccine Information for Health Care Providers.](#)

[Nova Scotia COVID-19 Vaccine Program Information for Health Care Providers](#)

Planning Principles and Assumptions

- DHW Public Health Branch will provide guidance and communication regarding priority populations and eligibility for vaccines.
- NSH Public Health will manage allocation and distribution of vaccine products to immunization providers.
- Accurate real-time knowledge of vaccine supply and inventory through Panorama allows for adjustments to vaccine shipments or clinic schedules as needed. The inventory system tracks vaccine lots to ensure timely identification of specific products that may be required to be held or recalled in the event of a potential vaccine safety issue.
- Vaccines require specialized storage, handling, and transport. Protocols, including those in the [Nova Scotia Immunization Manual](#) and product-specific drug monographs, should be reviewed and followed.
- Vaccine safety surveillance must be in place to monitor AEFIs.

Vaccine Supply

Vaccines are procured at the federal level and the DHW Public Health Branch is responsible for forecasting and ordering of sufficient supply for Nova Scotians. Forecasting and ordering of vaccines, including those which protect against respiratory pathogens, is based on previous year usage, demographics and eligibility. Vaccines are delivered to the Nova Scotia Provincial Biological Depot and are distributed to providers based on population numbers.

Vaccine Safety

Adverse Events Following Immunization (AEFI)

All AEFIs not normally expected (i.e. listed in the product monograph) that are temporally related to administration of the vaccine need to be reported to local public health in accordance with [It's the Law: Reporting of Adverse Events Following Immunization](#).

Providers reporting an AEFI to public health can obtain the AEFI form and the User Guide from the Public Health Agency of Canada.

Vaccine Storage and Handling

Safe vaccine storage and handling, including cold chain maintenance is a shared responsibility from the time the vaccine is manufactured until it is administered.

Specifications for storage and handling of vaccines are outlined in the respective product monographs. For more detail regarding vaccine storage and handling see the [Nova Scotia Immunization Manual](#).

Immunization Coverage

Immunization coverage is an important health indicator to monitor population level protection against vaccine-preventable respiratory pathogens. Regular monitoring of immunization coverage contributes to the planning of public health interventions and programs (e.g., identifying populations most at risk and subsequent targeting of public health action), as well as the evaluation of immunization programs (e.g., achievement of coverage targets).

Information on immunization coverage reporting can be found in the [Respiratory Surveillance Plan](#).

Immunization Entry and Electronic Records

To understand vaccine coverage; assess and improve the effectiveness of public health program; and to inform vaccine inventory management, accurate and complete immunization data must be reported to Public Health.

Panorama is used as the province's immunization repository and its completeness relies on providers entering data for all immunizations correctly into the source platform (CANImmunize Clinic Flow, the Drug Information System (DIS), direct entry into Panorama, Electronic Medical Records (EMRs)). In order for Panorama to accept records from an EMR, the EMR must be configured exactly following the [EMR Panorama Vaccine List](#). Questions on EMR and Panorama interface can be emailed to: panorama@novascotia.ca

Immunization Communication Strategy

Immunization communication strategy is jointly developed between DHW and Communications Nova Scotia, in collaboration with key partners including NSH and IWK. The overall purpose of a given immunization awareness campaign to:

- Clearly communicate vaccine eligibility and articulate when and where the public can access vaccination.
- Encourage Nova Scotians to protect themselves and their loved ones by getting vaccinated.
- Educate the public and providers on what is known and unknown with regards to vaccine safety.
- Communicate the need to take protective measures in addition to immunization, as necessary.

This is achieved by:

- Providing Nova Scotians with consistent, current and reliable information about respiratory pathogens, prevention measures (e.g. hand hygiene, staying home when sick, etc.) and vaccines.
- Ensuring healthcare providers, the health system and public health have access to information about vaccines.

4.2 Risk Assessment and Communication

Risk assessment is a systematic process for gathering, analyzing, and evaluating information to assign a level of public health risk. It provides the basis for taking action to manage and reduce the negative consequences of acute public health risks.

These assessments provide valuable input across the country by identifying what is known about circulating respiratory pathogens at a point in time, allowing evidence-based predictions on what might occur and major areas of uncertainty. In Nova Scotia, risk assessments occur in several ways to inform the response to respiratory pathogens.

Assessment of risk may be based on:

- pathogen characteristics
- anticipated or experienced impact on the health care system and/or community
- population immunity
- age and other populations at risk of severe illness and death
- severity of illness
- antiviral resistance
- estimated effectiveness of control measures
- public health and health system preparedness
- population willingness to adhere to public health measures
- availability and efficacy of antivirals, treatments and vaccines
- health system capacity

A risk management assessment requires access to timely information, analyzed and presented in a useful manner. Epidemiological and laboratory surveillance data are key components of risk assessments that are produced to inform the response. One of the most critical requirements of Nova Scotia's risk assessment of respiratory pathogens is an early assessment of the potential impact of a respiratory pathogen on the health system so it can prepare and plan public health interventions proportional to the situation.

Risk Communication

Effectively communicating the public health risk associated with a known or emerging respiratory pathogen to both appropriate partners and the public is an essential part of Nova Scotia's respiratory response. All communication efforts and information dissemination must be timely, transparent, relevant, and empathetic to gain and maintain trust.

Communication strategies will vary based on assessed risk to the public and may include:

- Identification of appropriate partners, such as those most affected by a public health response to a respiratory pathogen (e.g., local public health, acute and long-term care settings, other government departments) and development of an operational communication strategy for internal and external partners including roles and responsibilities.
- In collaboration with Communications leads, a communication strategy for the public is also developed. Public communication should aim to ensure communities and individuals are made aware of the public health risk and the recommended personal and community-level prevention measures in order to make informed decisions.

4.3 Surveillance and Reporting

Surveillance

Surveillance is the ongoing systematic collection, analysis, and interpretation of health data which informs the understanding of population health, disease trends and outbreaks. Surveillance makes it possible to not only identify threats to public health, but to respond quickly and develop evidence informed policies, programs and meet Canada's international public health obligations.

Nova Scotia's respiratory surveillance system involves collaboration with an extensive network of public health partners for ongoing surveillance of laboratory-confirmed influenza, ILI, COVID-19, and other respiratory pathogens such as respiratory syncytial virus (RSV). The provincial laboratories provide valuable expertise with respect to laboratory investigations for respiratory pathogens and are consulted on an annual basis regarding Nova Scotia's surveillance plan.

Nova Scotia's respiratory surveillance system also contributes to the national respiratory surveillance system which coordinates provincial/territorial data collection and dissemination of respiratory pathogen activity in Canada.

For further information on Nova Scotia's surveillance plan for respiratory pathogens, including types of data, data flow (within the province and to the national level), and outputs/reports produced see [Respiratory Surveillance Plan for Nova Scotia](#).

To review public outputs produced as part of the respiratory surveillance system in Nova Scotia see [Surveillance Reports](#).

Reporting

The Health Protection Act (HPA) provides the legal framework enabling public health officials to carry out disease control activities without unduly interfering with civil rights and liberties. The HPA requires specific diseases and conditions be reported according to the timeframes indicated in [It's The Law](#).

Procedures for reporting ILI, laboratory confirmed influenza, and COVID-19 can be found in [Respiratory Surveillance Plan for Nova Scotia](#).

Procedures for reporting emerging respiratory pathogens and SARI can be found in [Appendix C](#).

Case Definitions

Case definitions are a set of standard criteria for classifying whether an individual has a particular disease and to ensure comparability for national surveillance purposes. They are intended to support public health activities rather than clinical diagnosis. Nova Scotia tends to adopt national case definitions. Case definitions and reporting requirements for known respiratory pathogens can be found in the [DHW Surveillance Guidelines](#).

4.4 Public Health Management of Respiratory Pathogens

Public Health management of respiratory pathogens aims to prevent ongoing transmission of disease and to protect the health of populations, and includes case and contact management and public health measures such as infection prevention and control and border/travel health.

See [Appendix A](#) for Technical Information for SARI and Emerging Respiratory Pathogens (including SARS, MERS, avian influenza, and variant influenza viruses) and [Appendix B](#) for Public Health Management of SARI and Emerging Respiratory Pathogens.

COVID-19 and influenza case and contact management guidance and technical information can be found in the [Nova Scotia Communicable Disease Protection and Control Manual](#).

4.5 Outbreak Management

A disease outbreak is the occurrence of more cases of a specific disease than expected in a given area or among a specific group of persons during a specific period. Usually, the cases are presumed to have a common cause or to be related to one another in some way. Consultation with the RMOH may be needed to determine further public health management in the event of an outbreak (e.g., community-based control strategies such as closure of schools/gatherings).

Refer to the following documents for guidance related to outbreak management of respiratory pathogens, including influenza, ILI, COVID-19, emerging pathogens, and SARI:

- [Public Health Outbreak Response Plan](#)
- [2023–2024 A Guide to Respiratory Virus Infections and Outbreak Management in Long-Term Care Facilities](#)
- [Nova Scotia Surveillance Guidelines for Notifiable Diseases and Conditions, Public Health Alerts section](#)
- [Guidance Document for Respiratory Viruses in Congregate Living Settings](#)

For further information regarding outbreak reporting procedures, refer to [Respiratory Surveillance Plan for Nova Scotia](#) and [Appendix C](#).

5.0 Conclusion

The Respiratory Response Plan does not cover all aspects of respiratory pathogens that have the potential to affect the public health system. It is a tool for public health professionals to utilize in respiratory pathogen response planning and preparation efforts to ensure a coordinated response to unknown and unexpected threats that may emerge. These efforts are a shared responsibility across the health system in Nova Scotia.

Appendix A: Technical Information for SARI and Emerging Respiratory Pathogens

Emerging respiratory pathogens refer to respiratory pathogens that have potential to cause serious public health impact, including potential to spread rapidly around the world leading to a pandemic. Emerging pathogens may be caused by the emergence of new variants of known respiratory pathogens or emergence of novel pathogens. Therefore, increased vigilance in the surveillance of SARI and other known emerging respiratory pathogens as listed below, is required to ensure a prompt response according to Nova Scotia's Respiratory Response Plan.

1. **Severe Acute Respiratory Infection (SARI)**
2. **Emerging Coronaviruses**
3. **Avian Influenza**
4. **Variant Influenza Viruses of Swine Origin**

Please note the information in this Appendix is intended to assist public health professionals to manage a case of an emerging respiratory pathogen. It does not provide specific guidance to clinicians to diagnose an emerging respiratory pathogen, nor does it replace clinical judgement.

Refer to [It's the Law](#) for a full list of disease and conditions required by the Health Protection Act to be reported to Public Health.

Refer to [Appendix D](#) for 'Think Test Tell' information regarding what to do if a clinician suspects a case of an emerging pathogen.

For more information on emerging respiratory pathogens, please see the following:

Canadian Pandemic Influenza Preparedness: Planning Guidance for the Health Sector is a federal, provincial, and territorial (FPT) planning guidance document that outlines how jurisdictions work together to ensure a coordinated and consistent health-sector approach for influenza pandemic preparedness and response.

Public Health Agency of Canada: Emerging Respiratory Pathogens provides technical information on known emerging respiratory pathogens, such as Coronaviruses, Influenza A (pandemic influenza), Avian Influenza, as well as SARI.

The Centre for Immunization and Respiratory Infectious Diseases (CIRID) "Human Emerging Respiratory Pathogens Bulletin" provides a monthly a situational analysis of emerging respiratory diseases affecting humans.

WHO's Disease Outbreak website for information on confirmed acute public health events or potential events of concern.

1. Severe Acute Respiratory Infection (SARI)

Case Definitions

Surveillance case definition can be found [here](#).

Causative Agent

Clinicians should maintain an awareness of known circulating respiratory pathogens, as well as novel respiratory viruses circulating elsewhere in the world and consider virus-specific risk assessments for Canada. Recognition of a cluster or similar cases within a household or community is an important detail.

Symptoms

Symptoms of SARI may vary depending on etiological agent; however, are primarily defined by acute onset of respiratory symptoms such as:

- Fever (over 38°C). Fever may not be prominent in patients under 5 years or 65 years and older as well as in immunosuppressed individuals. Failure to clinically obtain temperature should not rule out a history of self-reported fever.
- New onset of (or exacerbation of chronic) cough or breathing difficulty.
- Evidence of severe illness progression, including clinical, radiological or histo-pathological evidence of pulmonary parenchymal disease (e.g., pneumonia, pneumonitis) typically associated with the need for hospitalization, intensive care unit monitoring and/or other severity markers (such as death).
- Acute Respiratory Distress Syndrome (ARDS) or severe ILI which may include complications such as encephalitis, myocarditis or other severe and life-threatening complications.

It is important to note that a spectrum of illness is recognized for most infectious diseases inclusive of mild or asymptomatic infection. Atypical presentations without any respiratory symptoms can occur with some emerging pathogens particularly when the individual has comorbidities, notably immunosuppression. Therefore, both clinicians and public health need to apply judgment when assessing patients with milder or atypical presentations, where, based on travel, contact, exposure settings, comorbidity or cluster history, the index of suspicion may be raised.

Diagnostic Testing

Refer to [Appendix D](#).

Treatment

Treatment is under the direction of the attending health care provider and is beyond the scope of public health.

2. Coronaviruses

Coronaviruses are a large family of viruses. They can cause diseases ranging from the common cold to severe acute respiratory syndrome

2.1 Middle East Respiratory Syndrome Coronavirus (MERS-CoV)

Case Definition

The national surveillance case definition can be found [here](#).

Causative Agent

MERS-CoV is a zoonotic virus.

Source

The origin of MERS-CoV is not well understood. Analysis suggests the virus originated in bats and was transmitted to camels at some point. Recent studies point to the role of camels as the primary source of MERS-CoV infection in humans through direct or indirect contact with infected camels or camel-related products (e.g., raw camel milk).

Incubation

The incubation period for MERS-CoV is still largely unknown but has been estimated to be 2–14 day (median approximately 5 days). Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) also demonstrated a prolonged incubation period (median 4–5 days; range 2–10 days) compared to other human coronavirus infections (average 2 days; typical range 12 hours to 5 days).

To allow for inherent variability, recall error and to establish consistency with other emerging respiratory virus monitoring, exposure history based on the prior 14 days is a reasonable and safe approximation.

Transmission

The current pattern of disease suggests that the virus can spread between humans. Clusters have been reported among close contacts and in health care settings; however, there has been no sustained person-to-person transmission and the risk of contracting this infection is still considered to be low. Outbreaks of MERS-CoV have mainly resulted from nosocomial transmission in healthcare facilities. Outside the health care setting, there has been no sustained human-to-human transmission documented anywhere in the world.

Communicability

The period of communicability for MERS-CoV is unknown at this time.

Symptoms

MERS-CoV infections are wide ranging from showing no symptoms (asymptomatic) or mild respiratory symptoms to severe acute respiratory disease and death. A typical presentation of MERS-CoV involves fever, cough, and shortness of breath. Pneumonia is also common, but not always present. Gastrointestinal symptoms such as vomiting, and diarrhea have also been reported.

Those who are immunocompromised, have chronic health conditions, or are older are believed to be at higher risk of severe disease.

Diagnostic Testing

Clinician and public health judgment should be used in assessing patients with milder or atypical presentations, where, based on contact, comorbidity or cluster history, the index of suspicion may be raised. Clinician discretion, epidemiologic context and local feasibility should be considered in discussions with local/provincial health authorities.

Refer to [Appendix D](#) for further information on diagnosis of emerging respiratory pathogens.

Treatment

Treatment is under the direction of the attending health care provider and is beyond the scope of public health.

Additional Resources

- **For health professionals: Middle East respiratory syndrome (MERS)**
- **Public Health management of human illness associated with Middle East Respiratory Syndrome Coronavirus (MERS-CoV): Interim guidance for containment when imported cases are suspected/confirmed in Canada**
- **Infection Prevention and Control Guidance for Middle East Respiratory Syndrome Coronavirus (MERS-CoV) in Acute Care Settings**
- **Summary of Assessment of Public Health Risk to Canada Associated with Middle East Respiratory Syndrome Coronavirus (MERS-CoV)**

2.2 Severe Acute Respiratory Syndrome (SARS)

Case Definition

The provincial case definition can be found [here](#).

Causative agent

A previously unknown type of coronavirus.

Source

The first Canadian cases were identified in March 2003, during a global outbreak involving 4 countries. Cases were in people who had traveled to Hong Kong and returned to Canada. Subsequent cases in Canada were traced to the first cases through close contacts, including health care workers, or to other travelers who had been in areas of Asia affected by SARS. There is still a great deal about SARS that remains unknown.

Incubation

Incubation period of SARS has typically been 2 to 7 days but may last up to 10 days in some people.

To allow for inherent variability, recall error and to establish consistency with other emerging respiratory virus monitoring, exposure history based on the prior 14 days is a reasonable and safe approximation.

Transmission

SARS is understood to be a readily transmissible virus which spreads through small respiratory droplets produced from a cough or sneeze of an infected individual. These droplets are propelled through the air and may be spread directly to others nearby by entering the mouth, nose, or eyes. The virus is also spread indirectly by others touching surfaces contaminated with droplets and then touching their mouth, nose or eyes. It is unknown at this time whether the SARS virus is spread more broadly via airborne transmission.

Communicability

The period of communicability for SARS is unknown at this time. It is recommended that outbreak containment measures involve quarantine of suspect contacts for 10 days.

Symptoms

Initial onset is typically marked by high fever (>38 degrees C), chills, headache, malaise, and muscle pain. Symptoms may progress to cough (dry, non-productive), dyspnea, and at times hypoxemia around 2–7 days following onset. 10–20% of cases may suffer from more severe symptoms requiring mechanical ventilation. Case fatality has been reported around 9%, but over 50% in those 65 years and older.

Diagnostic testing

Symptoms of SARS are similar to those of other respiratory infections. SARs cannot be diagnosed on symptoms alone. Refer to [Appendix D](#) for further information on diagnosis of emerging respiratory infections.

Treatment

Treatment is under the direction of the attending health care provider and is beyond the scope of public health.

3. Avian Influenza

Avian influenza is an infectious zoonotic pathogen caused by influenza A viruses that occur naturally among wild aquatic birds around the globe, including waterfowl (e.g., geese, ducks) and shorebirds (e.g., plovers, sandpipers). Avian Influenza is easily transmitted among wild and domestic birds including poultry (e.g, turkey) and has been transmitted to some wild mammals. Rare and sporadic human cases have been reported caused by exposure through direct transmission with infected birds or contaminated environments; human to human transmission is extremely rare. Avian influenza viruses are categorized into two types based on pathogenicity in birds (not predictive of severity in humans):

Low Pathogenic Avian Influenza (LPAI): cause mild to no signs of disease; however, in poultry LPAI can mutate into highly pathogenic avian influenza viruses.

Highly Pathogenic Avian Influenza (HPAI): can cause severe disease and high mortality in avian species including domestic poultry.

In Nova Scotia, Avian Influenza in wildlife (birds and other animals) are investigated by the **Department of Natural Resources and Renewables (NRR)**, and cases in domestic poultry are investigated by the Department of Agriculture and/or the Canadian Food Inspection Agency (CFIA). NSH Public Health will be notified when wild animals test “non-negative” for Avian Influenza by the Canadian Wildlife Health Cooperative. These animal specimens will then be sent for confirmatory testing by the CFIA (typically 2–3 weeks for confirmatory results). For these cases, NSH Public Health conducts a risk assessment and investigates any associated human exposures. NRR staff will follow departmental procedures involving human exposures and Public Health is available to provide support and guidance as needed. Public Health does **not** follow cases of Avian Influenza in birds, poultry, or other animals.

Risk to Human Health

Currently, avian influenza viruses pose little risk to human health; however, sporadic human infections do occur and there is concern around potential for avian influenza viruses to mutate into a highly transmissible human infection. Human to human transmission is rare and most often limited to close contacts; no sustained or community level transmission has been identified to date. Two avian influenza strains are of recent interest due to potential impact on human health: 1) **H5N1** and 2) **H7N9**.

Avian influenza A H5N1 reemerged as a public health concern in North America in December 2021 when it was identified on Canada's east coast and quickly spread across North America infecting resident and migratory aquatic birds, commercial poultry, and mammals, including foxes, skunks, and mink. Nova Scotia was the first province to detect HPAI H5N1 in commercial domestic poultry on February 3, 2022. Since this time, a significant number of H5N1 detections have been reported in Canadian domestic, backyard, and wild bird populations, as well as other animal species. To date there have been no domestically acquired human infections of H5N1 reported in Canada.

In June 2022, the Public Health Agency of Canada assessed the risk of H5N1 to human health stating **the risk of infection to the general population is low**, however the population with close contact to infected animals is at increased risk due to the higher probability of exposure. Ultimately, the current associated pandemic risk constitutes a low probability, yet high impact event.

Public Health Management: Upon notification of an avian influenza outbreak with human health implications, i.e. humans have been exposed, NSH Public Health should initiate an investigation and implement appropriate public health measures in accordance with NSH Standard Operating Procedures. These measures will include primary prevention (e.g., infection control measures and antiviral prophylaxis), and case management activities as described in [Appendix B](#). Investigations would also include identification, understanding and containing sources of human infection. Public health measures taken will largely depend on the initial findings from the epidemiologic assessment of the outbreak. NSH Public Health should refer to internal standard operating procedures and the Nova Scotia Health Avian Exposure Checklist for further guidance on high, moderate and low risk exposure investigations.

For more information and updates on human health issues related to avian influenza refer to:

- **[Guidance on human health issues related to avian influenza in Canada \(HHA1\)](#)**
- **[Human Emerging Respiratory Pathogens Bulletin \(Avian influenza updates\)](#)**
- **[Nova Scotia Government Avian Influenza](#)**

3.1 Avian Influenza A H5N1

Case Definition

The national case definition for H5N1 can be found [here](#).

Causative Agent

Epizootic subtype of avian influenza A virus.

Source

Sick or dead wild birds or poultry are the main source of human infections.

Incubation

Incubation period of H5N1 in humans has been commonly reported as 1 to 5 days, with longer incubation periods being reported up to 17 days. This is a much more prolonged incubation period than seasonal influenza viruses (i.e. 1 to 3 days).

To allow for inherent variability, recall error and to establish consistency with other emerging respiratory virus monitoring, exposure history based on the prior 10 days is a reasonable and safe approximation.

Transmission

Avian influenza is transmitted through bird saliva, nasal secretions and feces. Human cases of avian influenza are caused by close contact with infected live or dead birds or contaminated objects or environments. People are most likely exposed to the virus during slaughter, defeathering, butchering, and preparing for cooking. There is no evidence to suggest transmission can occur through the consumption of fully cooked poultry, game meat or eggs. The virus may also be carried on soiled objects such as boots, vehicle tires, or other gear, and can survive in water.

Communicability

Human to human transmission has been rare and non-sustained though has occurred in with close and prolonged contact, usually between family members.

Symptoms

It can take from 1 to 5 days or longer for symptoms to appear after exposure, but those infected can develop severe illness quickly. Common initial symptoms include high fever (greater than 38°C), cough, aching muscles, shortness of breath and headache. Other early symptom may include sore throat, runny nose, fatigue, diarrhea, conjunctivitis, bleeding gums. Infection can progress rapidly to an acute respiratory distress syndrome (difficulty breathing, pneumonia) or neurological changes such as change from baseline mental state or seizures.

Diagnostic testing

Refer to [Appendix D](#) for further information on diagnosis of emerging respiratory infections.

Treatment

Treatment is under the direction of the attending health care provider and is beyond the scope of public health. Briefly, early treatment with appropriate antiviral drugs may reduce duration and severity of illness. It is ideal to start antiviral treatment within 48 hrs of symptom onset and can be initiated while awaiting confirmatory test results. Please consult an Infectious Disease specialist for current treatment details.

3.2 Avian Influenza A H7N9

Case Definition

The national case definition for H7N9 can be found [here](#).

Causative Agent

Epizootic subtype of avian influenza A virus.

Source

Migrant aquatic birds are most likely the original infection source. Majority of human infections are associated with exposure to live poultry.

Incubation

Incubation period for H7N9 has been reported as ranging from 1 to 10 days (average 5 days). To allow for inherent variability, recall error and to establish consistency with other emerging respiratory virus monitoring, exposure history based on the prior 14 days is a reasonable and safe approximation.

Transmission

The available data strongly indicates that most known human H7N9 infections result from direct contact with infected poultry or indirect contact through contaminated environments where live poultry are sold. The virus does not appear to transmit easily between humans and sustained human-to-human transmission has not been reported based on information gathered from outbreaks in China.

H7N9 infections do not cause severe disease in poultry and therefore, infection can spread “silently” among poultry. Under such circumstances, the exact exposure for individual cases of human infection may be difficult to establish.

Communicability

Limited human-to-human transmission reported, whereby transmission probably occurred during close unprotected contact with a severely ill patient.

Symptoms

Initial presentation of illness may include mild symptoms such as fever, sore throat, muscle aches, fatigue, loss of appetite and rhinitis. However, symptoms are known to progress into a severe respiratory illness. Pneumonia is a common complication leading to dyspnea, hypoxemia, and acute respiratory distress syndrome. Death may also occur in severe cases.

Clinician and public health judgment should be used in assessing patients, where, based on contact, comorbidity or cluster history, the index of suspicion may be raised. Assessment of symptoms should focus on the detection of SARI as defined above.

Diagnostic Testing

Refer to [Appendix D](#) for further information on diagnosis of emerging respiratory infections.

Treatment

Treatment is under the direction of the attending health care provider and is beyond the scope of this plan. Briefly, early treatment with appropriate antiviral drugs may reduce duration and severity of illness. It is ideal to start antiviral treatment within 48hrs of symptom onset and can be initiated while awaiting confirmatory test results. Please consult an Infectious Disease specialist for current treatment details.

For information regarding antiviral use in the context of Avian Influenza A (H7N9) virus infection (cases and contacts), please consult **AMMI Canada**.

Additional Resources

- **Public Health management of human illness associated with avian influenza A(H7N9) virus: Interim guidance for containment when imported cases are suspected/confirmed in Canada**
- **Summary of Assessment of Public Health Risk to Canada Associated with Avian Influenza A(H7N9) Virus in China**

3.3 Other Avian Influenza

For further information regarding other Influenza A virus subtypes H5, H7 and H9, please see the following website: **Influenza A virus subtypes H5, H7, and H9: Infectious substances pathogen safety data sheet**.

4. Variant Influenza Viruses of Swine

Influenza A viruses that circulate in swine (pigs) and have infected humans are referred to as variant viruses and denoted with a letter “v”. H1N1v, H1N2v, and H3N2v are influenza A variant viruses that have been found in humans; however, cases in humans are rare and recent evidence indicates no sustained human to human spread has occurred.

4.1 Influenza A H3N2v

Symptoms

Clinical characteristics of human influenza A H3N2v are similar to symptoms of uncomplicated seasonal influenza, including chills, cough, and headache followed by fever, pharyngitis, rhinitis, myalgia, fatigue and headache. Vomiting and diarrhea may also occur, particularly among infections in children. The duration of illness also appears to be similar to uncomplicated seasonal influenza; approximately 3 to 5 days and up to 10 days.

Incubation

An incubation period of two to three days has been reported but estimated up to seven days.

Source

Swine influenza viruses are endemic in pigs.

Transmission

Most human infections have occurred following close proximity to infected pigs or their environment. However, some human-to-human transmission has occurred, such as during the outbreak of influenza A (H3N2v) in the USA in 2012. It is believed that H3N2v and other influenza A variants of swine origin are transmitted through direct and indirect contact with infected respiratory droplets, similar to seasonal influenza.

Communicability

Limited human-to-human spread of this virus has been detected in the past but no sustained or community spread of H3N2v has been identified.

Diagnostic Testing

Refer to [Appendix D](#) for further information on diagnosis of emerging respiratory infections.

Treatment

Treatment is under the direction of the attending health care provider and is beyond the scope of this plan, however the same antiviral drugs used to treat seasonal influenza may be used to treat human influenza A with swine origin. Consult an Infectious Disease specialist for current treatment details.

Appendix B: Public Health Management of Emerging Respiratory Pathogens and SARI

This section contains the following information for public health management of emerging respiratory pathogens (suspect, probable or confirmed) and SARI:

1. Case Management

- Investigation
- Education
- Case Exclusion and Isolation

2. Contact Management

3. Infection Prevention and Control Measures for Healthcare Settings

4. Travel and Border Related Issues

1. Case Management

1.1 Investigation

The extent of an investigation should be guided by laboratory confirmation; however, because collection, shipment, and testing of specimens often require several days or longer, an investigation may need to begin before laboratory test results are available. If laboratory confirmation is **not** possible, an investigation should still be launched.

Upon notification of a suspect, probable or confirmed emerging respiratory pathogen or SARI case, **public health should:**

- Review the clinical status; review the radiological, laboratory findings and travel/occupational exposures.
- Ensure consultation with an infectious disease physician and/or medical microbiologist regarding the laboratory protocol.
- Interview the case and/or guardian/proxy within the first 24 to 48 hours of the investigation to collect basic demographic, clinical, and epidemiological information. Essential basic information may include:
 - Outbreak or cluster related
 - Sex

- Age
- Date of onset
- Symptoms
- Whether hospitalized/Date of hospitalization
- Whether in ICU/Date of ICU admission
- If deceased/Date of death
- Lab-date of sample collection, test method and result (when available)
- Travel history
- Vaccine history
- Other possible exposures or risk factors (e.g., ill contact, animal, food)
- Notify Chief MOH/Deputy Chief MOH/Provincial MOH
- Ensure completion and immediate reporting of [Emerging respiratory pathogens and SARI](#) case report form to DHW surveillance team
 - It is not expected that all fields will be initially completed, but as updates are available, form will be updated.
 - DHW will review the case report and forward to PHAC (excluding identifiers).
 - See [Figure 1](#) for further information on reporting emerging respiratory pathogens/SARI cases and provincial communication channels.
- Initiate mandatory active daily monitoring of cases' individual health status and continue for the duration of illness, or until a probable case no longer meets the case definition (e.g., due to further testing results or symptoms are resolved).
 - If case is hospitalized, liaise with hospital staff to complete active daily monitoring.
- Identify close contacts (defined and detailed below).
- Although outside the scope of Public Health, the clinical management of emerging respiratory pathogen or SARI cases should be under the direction of the attending health care provider and guided by the identified pathogen.

1.2 Education

Public Health should provide information regarding:

- Managing symptoms at home
- When and where to seek medical advice or assessment and to report relevant diagnosis, travel or contact history immediately upon presenting to a health care setting.
 - Maintain good respiratory etiquette and hand hygiene practices
 - Wear a well-fitting medical mask around others
 - Infection, prevention and control measures (e.g. disinfecting high touch surfaces in the home)

1.3 Case Exclusion and Isolation

Case exclusion and/or isolation requirements may be determined in consultation with RMOH based on the threat to public health.

In general, the case should be advised to avoid close contact with others in their household, as well as stay away from work, school, daycares, and other vulnerable populations (e.g., those who are immunocompromised, pregnant persons, persons 65 years or older, etc) until symptoms are improving, they are able to fully participate in their usual day-to-day activities, and/or Public Health has deemed them recovered.

Those who live or work in high-risk settings, such as health care settings, long term care facilities or congregate living settings, should consult their occupational health safety and wellness (OHSW) guidelines and manager to determine if additional exclusion is necessary and length of exclusion.

Discuss and identify any barriers to exclusion or isolation. Support may be needed to decrease any undue burden and aid the case in effectively following Public Health requirements.

For situations that are not clear, consult with the RMOH to determine on a case-by-case basis, what further public health measures and/or follow-up may be required.

2. Contact Management

Contact management of confirmed and probable cases of SARI or emerging respiratory pathogens assists public health:

- to better understand the epidemiology of these pathogens during the period where questions remain about issues such as person-to-person transmission and the reservoir for infection

- with the rapid identification of symptomatic contacts to reduce the opportunity of transmission to others
- to review what is known about emerging respiratory pathogens and their associated illness with contacts

Close Contact: typically, a person exposed to a case during the infectious period within 2 meters, for at least 15 minutes with insufficient PPE, or as otherwise determined in consultation with Public Health.

Contact management and preventative measures will be determined in consultation with RMOH based on the threat of the identified or suspected pathogen to the public's health, current and/or known epidemiology of the pathogen, as well as the objective (e. g. to stop versus limit spread).

In general, contact management of cases of SARI or emerging respiratory pathogens involves active daily monitoring by public health staff for the duration of the incubation period or 14 days if the pathogen is unknown. In circumstances where the index case no longer meets a case definition (e.g., testing results rule out emerging respiratory pathogen), consult with RMOH to determine need for continued monitoring. If contact(s) is hospitalized, liaise with hospital staff for daily monitoring.

For the duration the incubation period, contacts should be advised to:

- Self-monitor for fever and new onset of symptoms of ILI. Consider staying in an area where health care is readily accessible, if possible.
- Maintain good respiratory etiquette and hand hygiene practices.
- Wear a well-fitting medical mask around others particularly in indoor public places.
- If sharing living arrangements with a non-hospitalized case avoid close contact as much as possible and follow relevant advice provided under case management section.
- Should symptoms develop, isolate as quickly as possible and contact local public health for further direction.
- Follow all other recommended Public Health measures including testing, exclusions, or self-isolation.

Additional contact management measures (e.g., quarantine, aircraft related travel contact tracing procedures etc.) may be required as requested by the RMOH.

3. Infection Prevention and Control Measures for Health Care Settings

It is an expectation across all health care settings that infection prevention and control (IPAC) measures are adhered to at all times. Consistent application of routine practices for the care of all patients and use of additional precautions when needed remain the cornerstones of prevention of the spread of respiratory pathogens.

Routine practices that are to be considered and used at all times include point of care risk assessments (PCRA), frequent hand hygiene, appropriate use of PPE, source control (e.g., respiratory hygiene, two-metre spatial separation), environmental cleaning and disinfection, among other pertinent practices found in detail at the link below.

Additional precautions are required when managing cases with a suspected or confirmed respiratory pathogen. These include **contact, droplet, and airborne** precautions. Dependent on the respiratory pathogen, clinical presentation, or medical procedures (e.g., aerosol generating medical procedures [AGMPs]) a combination of additional precautions may be required. It is important to note, that as new information is gathered on SARI or novel emerging pathogens, modifications to recommended additional precautions may be required and will be communicated to healthcare providers. For example, recommendations for the management of MERS-CoV and Avian Influenza H7N9 include the use of airborne precautions (including the use of a respirator) when performing AGMP on cases.

Refer to the **Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Healthcare Settings** and **Routine Practice and Additional Precautions Assessment and Education Tools** by the PHAC for more detailed information on routine practices and additional precautions.

Further information and IPAC resources for health care settings can be found here:

Nova Scotia Health Infection Prevention and Control Policy: http://policy.nshealth.ca/Site_Published/NSHA/document_render.aspx?documentRender.IdType=6&documentRender.GenericField=&documentRender.Id=88920

For outbreak management measures in long term care and residential care facilities: **2022-2022-2023 A Guide to Respiratory Virus Infection and Outbreak Management for Long-Term Care Facilities**

MERS-CoV: **Infection Prevention and Control Guidance for Middle East Respiratory Syndrome Coronavirus (MERS-CoV) in Acute Care Settings**

H7N9: **Interim Guidance - Avian Influenza A(H7N9) Virus**

Home Care Settings

Routine practices are required in home settings where health care is provided. Additional precautions applied may be specific to the setting and local epidemiology. Care of an individual with a respiratory pathogen should be performed in a location with spatial separation from others in the home, preferably in a well-ventilated (e.g., open window) room of their own. If a separate room is not feasible, a two-metre distance should be established in a shared room whenever possible. AGMPs should not be carried out in the home setting.

Further information regarding IPAC guidance for the home setting is available here:

Seasonal Influenza: <https://www.canada.ca/en/public-health/services/infectious-diseases/nosocomial-occupational-infections/seasonal-influenza-infection-prevention-control-guidance-management-home-care-settings.html>

For infection prevention and control for COVID-19 for Home Care: <https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/health-professionals/infection-prevention-control-covid-19-interim-guidance-home-care-settings.html>

For more information on infection prevention and control measures for respiratory pathogens use search:

Diseases and conditions - Canada.ca

NS Health Infection Prevention and Control Website

4. Travel and Border Related Issues

PHAC's [Office of Border Health Services](#) will be involved in the reporting and case management of arriving or departing international passengers who may be persons under investigation (PUI); with the federal Quarantine Officer notifying local public health authorities should such situations arise. Quarantine officers have no authority over domestic flights. Agency Environmental Health Officers will provide information to the operator regarding the cleaning of the conveyance. The Office of Border Health Services at PHAC may be of assistance with requesting passenger manifests from conveyance operators, when requested to do so by a local public health authority.

To contact a Quarantine Officer, Environmental Health Officer, or manager at PHAC call the Central Notification System at 1-833-615-2384. This line is answered 24h/7. For non-urgent inquiries, email cns-snc@phac-aspc.gc.ca.

Visit PHAC's website at the following link: <https://www.canada.ca/en/public-health/services/emerging-respiratory-pathogens.html> to receive updates as new details become available regarding public health management of emerging respiratory pathogens.

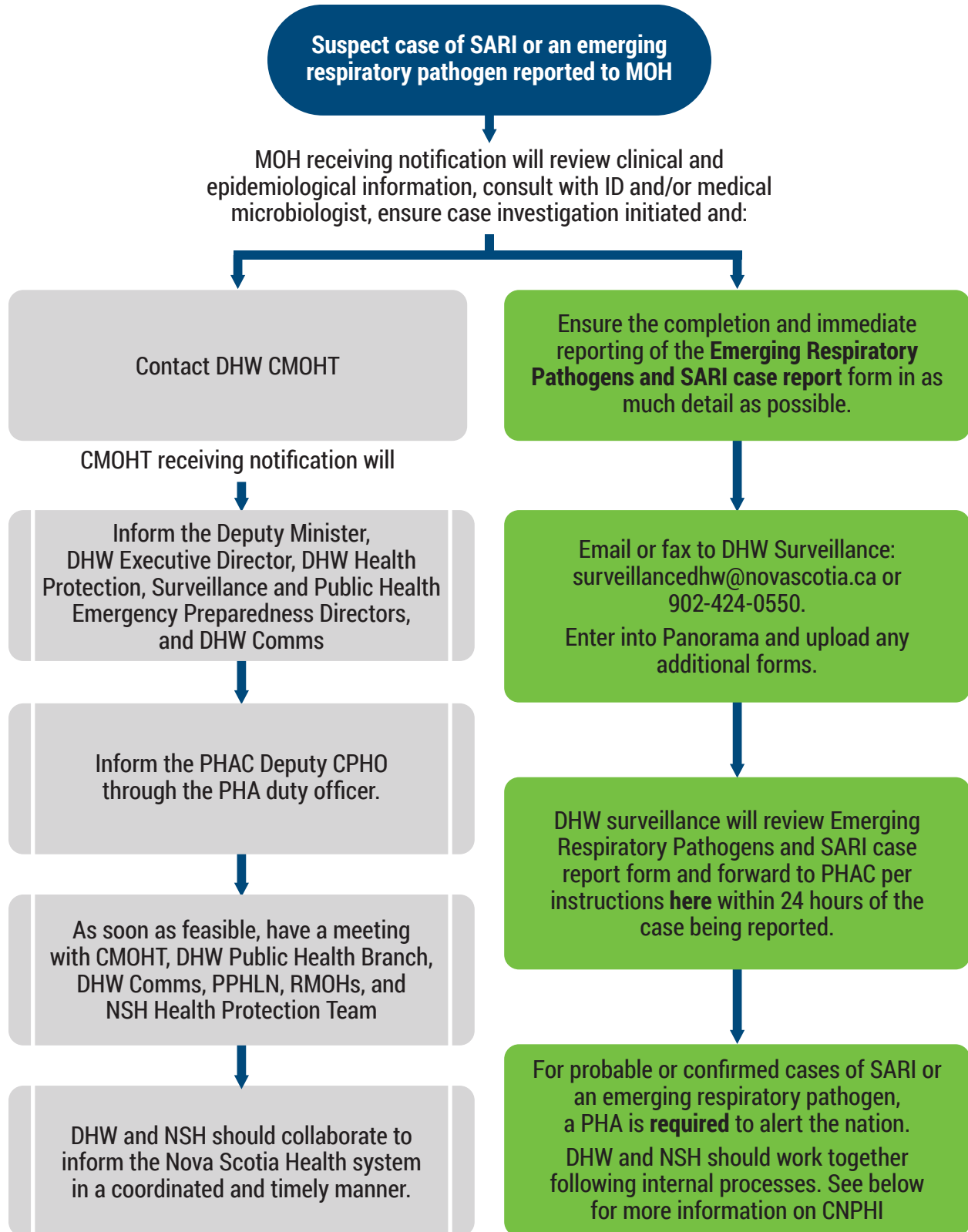
Appendix C: Reporting Emerging Respiratory Pathogens and SARI

To ensure rapid alerting of senior Public Health officials and consistent and immediate public messaging, the following steps detailed in [Figure 1 Procedure for reporting a suspected case of SARI or emerging respiratory pathogen in Nova Scotia](#) need to be taken. Please refer to [Appendix B](#) for information pertaining to Public Health case management.

For probable/confirmed cases of SARI and emerging respiratory pathogen cases, a **Canadian Network for Public Health Intelligence (CNPHI) Public Health Alert (PHA)** is also required to alert the nation. PHA are an application on CNPHI that allows for the timely notification and/or dissemination of information between local/regional, provincial, territorial, and national public health stakeholders. Please note that Public Health may consider the use of a PHA to notify other jurisdictions of certain outbreaks or unusual events outside of SARI or emerging pathogens (note that the definition of unusual is subjective and may require a certain level of public health professional discretion).

For details on PHAs see [Public Health Alerts Quick Reference for Postings](#).

Figure 1: Procedure for reporting a suspected case of SARI or emerging respiratory pathogen in Nova Scotia



Appendix D: Laboratory: Procedures

This appendix includes:

- 1. Laboratory Procedures for Known Respiratory Pathogens**
- 2. Laboratory Procedures for Emerging Respiratory Pathogens and SARI**

1. Laboratory Procedures for Known Respiratory Pathogens

Respiratory pathogen testing is available in acute care setting (including inpatients and emergency department patients), long-term care facilities, and for approved community specimens with testing for SARS-CoV2 and Influenza A/B or SARS-CoV2, influenza A/B and RSV. Please refer to [Figure 2](#) for Nova Scotia's Respiratory Testing Algorithm.

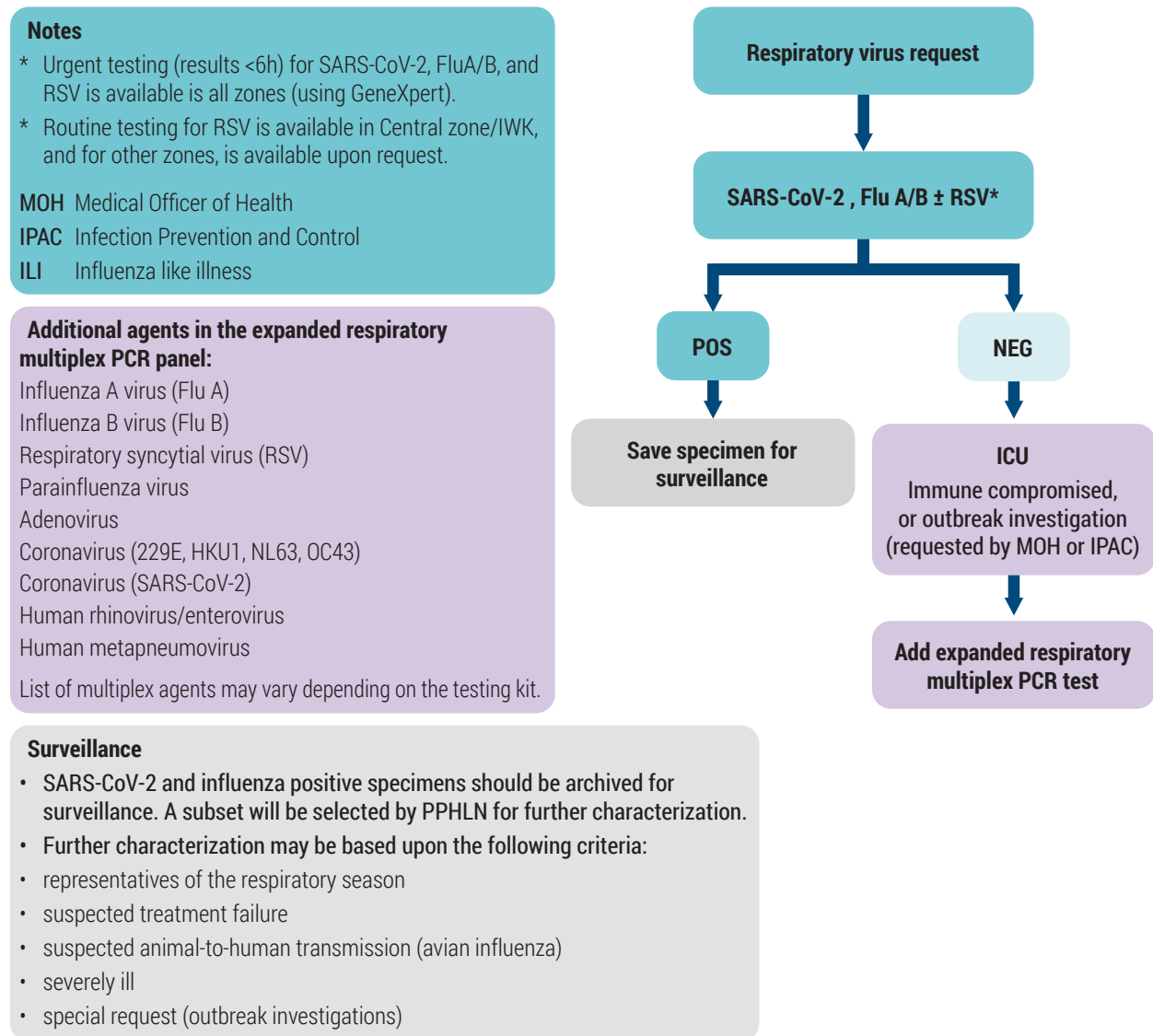
Expanded respiratory virus testing (e.g. rhinovirus, adenovirus, human metapneumovirus, etc) will only be performed in specimens submitted from the ICU or immunocompromised individuals, but can be requested on limited basis such during outbreaks (as directed by Public Health or IPAC), otherwise consultation with a microbiologist or RMOH is required.

For further information on diagnostic testing for Influenza or COVID-19 see:

- [COVID-19 CD Manual Chapter](#)
- [Influenza CD Manual Chapter](#)
- [Guide to Respiratory Virus Infection and Outbreak Management in Long-Term Care Facilities](#)

Figure 2: Nova Scotia Respiratory Testing Algorithm 2023–2024

Viral respiratory testing performed by Nova Scotia Health Laboratories or IWK Health Laboratory



Central/Northern zone/IWK: routine test includes SARS CoV-2 and FLU/RSV

Western/Eastern zone: routine test includes SARS CoV-2 and FLU except where the GeneXpert instrument is run locally to also includes RSV.

1.2 Specimen Collection

Diagnosis of respiratory pathogens depends on the collection of high-quality specimens, their rapid transport to the lab and appropriate storage. For specific laboratory requirements see the [Provincial Microbiology Users Manual](#) and applicable NSH, IWK Health or LTCF policies and protocols. If more information is required, consult with local Public Health, RMOH, or microbiologist on-call.

1.3 Laboratory Testing

Laboratory testing services for respiratory pathogens are available at NSH local/regional hospital laboratories and the IWK Health laboratory. Testing frequency (weekday/weekend) is assessed on an ongoing basis by the testing facilities. Please note that the turn-around time for results may be further impacted by transportation from zonal/regional labs to the testing facility(s).

Public health surveillance subtyping of influenza virus type A and COVID-19 positive samples may occur at the PPHLN Anchor Laboratory at the QEII and/or NML in consultation with the PPHLN. Testing during a SARI case investigation will be prioritized. See [Figure 2](#) for further details on criteria for subtyping.

There are multiple main streams of influenza and COVID-19 surveillance available:

1. Routine surveillance: Molecular subtyping may be performed at the QEII on a representative number of provincial influenza A positive samples throughout the influenza year. Most influenza A positive samples are shipped to the QEII to be available for selection.
2. Routine sequencing surveillance: Sub-selection of influenza A and COVID-19 positive samples may be sequenced for further characterization at the QEII (e.g., mutations, lineage assignment).
3. WHO influenza program surveillance: Nova Scotia participates in the WHO influenza program which is offered through the NML in Winnipeg. A select subset of influenza positive samples are cultured at the QEII and referred to the NML for strain characterization and/or molecular typing and antiviral susceptibility testing. Preseason isolates, peak and late season influenza positive cases are represented. Select criteria samples may be cultured for inclusion as well (see [Figure 2](#) for criteria).
4. Case investigation: This may include suspected treatment failure, SARI case investigation or specific special requests through consultation with PPHLN. Local molecular subtyping may be performed with consideration for sample referral to the NML.

1.4 Point of Care Testing (POCT)

POCT is defined as medical diagnostic testing performed outside the clinical laboratory in close proximity to where an individual is receiving care or testing. Currently the only respiratory virus POCT testing in use are those used to detect SARS CoV-2. These can be either rapid antigen detection tests (RADTs) or molecular based methods.

Rapid antigen tests are predominantly used in the detection of SARS-CoV-2 in community settings and designed to be self-administered and produce a result in about 15 minutes. While the specificity of these test is high, they are less sensitive than traditional laboratory- based PCR. In symptomatic individuals who test negative, the RADT should be repeated in 48 hours to identify those with early COVID infection.

Molecular point of care tests are more sensitive than antigen-based POCTs with data suggesting sensitivity approaching that of lab-based PCR tests. **There are currently no settings where these tests have been implemented.**

1.5 Result Inquiry

- Turnaround time for results may be up to 48 hours unless impacted by a surge in respiratory testing
- Result inquiries can be directed to your local/regional lab

1.6 After Hours Consultation

The Microbiologist on call is accessible through QEII Locating at **902-473-2222**.

2. Lab Procedures for Emerging Respiratory Pathogens and SARI

The lab procedures for detecting emerging respiratory pathogens and SARI in this plan have been adapted from the [Protocol for Microbiological Investigations of SARI](#). This protocol is intended to facilitate the diagnosis of severe respiratory infections due to both unknown and known respiratory pathogens that have the potential for large scale epidemics.

A key factor in diagnosing emerging respiratory pathogens, such as MERS-COV, H7N9, H5N1, etc., is the determination of risk based on epidemiologic factors. If an initial assessment indicates there is a potential risk for an emerging respiratory pathogen or SARI, clinicians must “**Think, Tell and Test**” (See [Figure 3](#)):

- **Think** about the possibility of an emerging respiratory infection (e.g., novel influenza A virus)
- **Tell** the local medical officer of health or local public health official
- **Test** for pathogen only after appropriate consultation and based on clinical symptoms

2.1 Laboratory Protocol

In patients with no epidemiological risk factors, the most common pathogens should be ruled out before considering an unusual or more highly virulent pathogen. This may be done at the local laboratory or the PPHL depending on local capacity and expertise.

Specimens to be considered for collection include a nasopharyngeal swab (NPS) (preferred specimen), throat swab, nasopharyngeal aspirate (NPA), bronchoalveolar lavage (BAL), endotracheal secretions, and sputum. For pediatric patients, a nasopharyngeal aspirate is a suitable replacement to a NPS.

Pathogens that should be excluded on preliminary testing include:

Conventional bacteria (including *Mycoplasma pneumoniae*, *Legionella pneumophila*, *Bordetella pertussis*)

- Specimen: Throat swab, NPS, NPA, sputum and urine
- Testing: gram stain and routine culture + Legionella.
 - *Mycoplasma pneumoniae* PCR,
 - *Legionella* urinary antigen
 - *Bordetella pertussis*

Conventional respiratory viruses (including human influenza A/B, SARS-CoV2, parainfluenza, RSV, adenovirus, human metapneumovirus, rhinovirus/ enterovirus, coronavirus)

- Specimens: NPS, endotracheal secretions, BAL, +/- throat swab and sputum.
 - NPS is the primary specimen type for respiratory viruses including seasonal influenza. However, deeper specimens such as endotracheal secretions or BAL must be collected in cases of severe respiratory infection with negative NPS.
 - A number of avian Influenza A viruses, including H7N9, have been detected in throat swabs. Recently, H7N9 was only detectable in sputum specimen in 1 of 4 patients. While sputum and throat swabs are not ideal for most influenza viruses, until the ideal specimen for avian influenza A viruses like H5Nx and H7N9 can be identified, multiple specimens types should be considered in patients suspected of having avian Influenza A viruses.
- Testing:
 - Influenza A and B by RT-PCR with subtyping (H3N2 or H1N1) should be the primary method for detection of influenza (24 hour turnaround time).
 - SARS-CoV2 is tested by nucleic acid detection using a nucleic acid amplification test (NAAT) (e.g. reverse transcription polymerase chain reaction (RT-PCR) test or transcription mediated amplification (TMA)).
 - Respiratory multiplex RT-PCR for RSV, parainfluenza, human metapneumovirus, coronavirus, rhinovirus/enterovirus, and adenovirus will be done on negative influenza specimens (48 hour turnaround time) when there is a clinical indication to detect non-influenza viruses.
 - RADTs should not be used to rule out influenza A. The sensitivity of currently available RADT for human and avian influenza strains is suboptimal. The performance characteristics of currently available commercial tests for detection of swine variants are unknown and likely to be poor based on the suboptimal sensitivity of these assays for other Influenza strains.
 - Novel influenza A viruses and the novel coronavirus (e.g., MERS-CoV) are classified as Risk Group 3 pathogens. Routine culturing of specimens from suspect patients should only be considered in public health labs with containment level 3 facilities
- If more invasive samples are collected, they should be processed for a wide range of pathogens:
 - Bronchial-alveolar wash for all cultures (bacteria, viruses, mycobacteria, fungi)
 - Open lung biopsy – for all cultures, RT-PCR and histology (ensure specimen is not put in formalin for microbiology testing.)

2.2 When to suspect the novel coronavirus (MERS-CoV):

Limited data suggests that MERS-CoV can present as a co-infection with other viral pathogens.

As such, in addition to specimens that are negative for conventional pathogens, those that do have other identified pathogens **but are consistent with suspect cases of novel coronavirus based on the PHAC case definition** should be tested for MERS-CoV. The details regarding testing and some control materials for method development are available from the NML. To date only a few PPHLs have developed the capacity to test for this pathogen in-house. All other PPHLs will forward the suspect specimens to the NML for further testing.

2.3 When to suspect a novel influenza virus (including avian and swine variants):

Influenza viruses that are positive on the initial influenza identification test but cannot be subtyped using RT-PCR should be further characterized. NS will rely on the NML for further characterization of all suspect avian strains, as well as novel or nontypeable samples. However, given that subtyping assays are usually less sensitive than the identification assays, weak positives may not be able to be typed.

Influenza positive specimens outside the influenza season or obtained from patients with a history of exposure to animals (e.g., pigs or chickens), should be identified so that they can be submitted to the NML for characterization.

NOTE: While initial analysis of in-house assays used by many labs suggest they should be effective in identifying avian and swine variants, it is difficult to determine the effect on the sensitivity of testing. This is particularly true of the performance of commercial assays whose primer sequences are not known.

2.4 If a front-line laboratory suspects a novel respiratory pathogen:

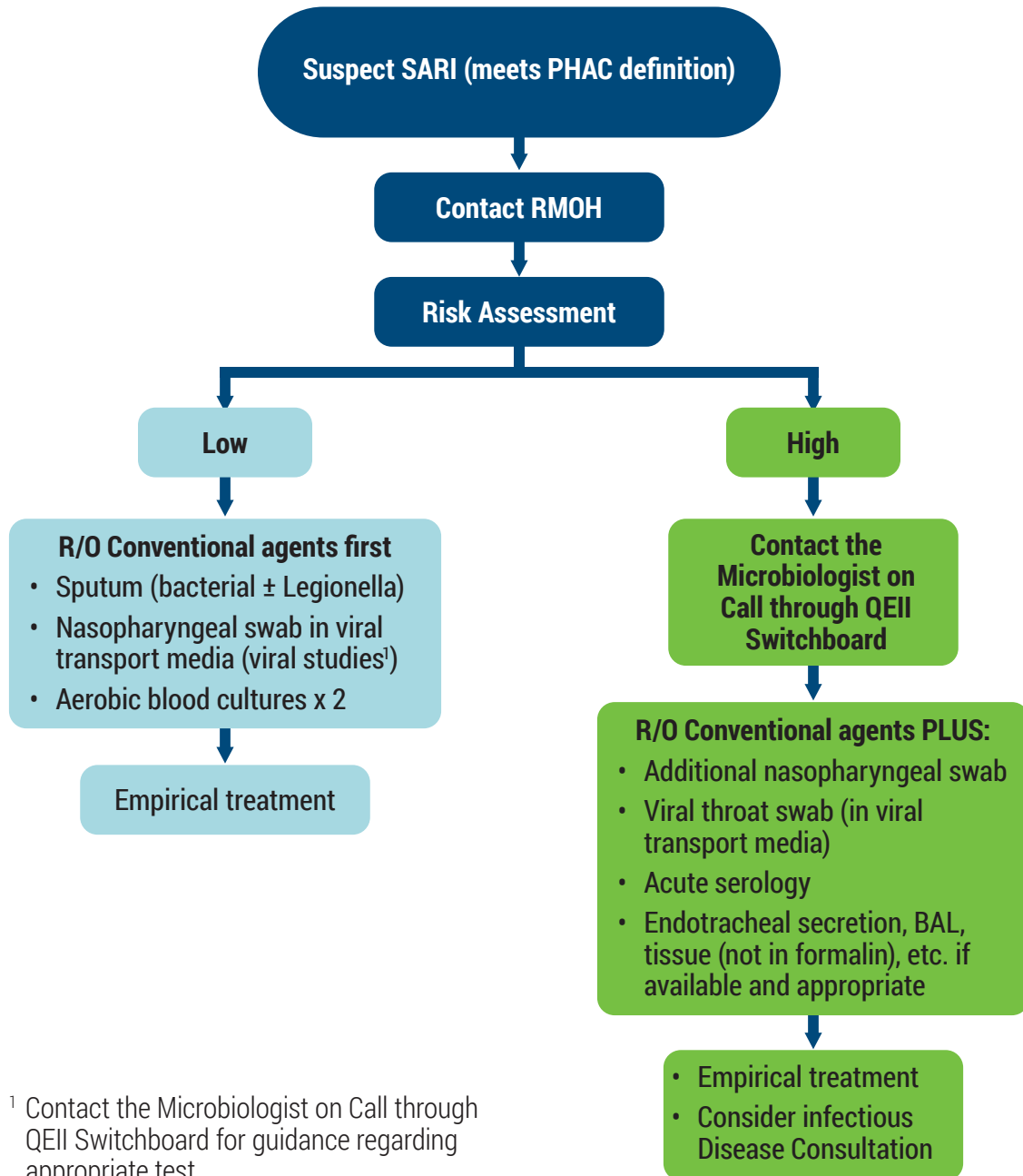
The initial tests (as outlined above) would be similar but supplemental testing will be required at the anchor laboratories of PPHLN. If the laboratory is informed by a Public Health representative in the NSH or a clinician, that a novel respiratory pathogen is suspected, the laboratory should communicate with the clinician to ensure that the following specimens are collected:

- A second NPS/endotracheal aspirate or BAL to be used for confirmation by the NML
- A viral throat swab (in viral transport media) – Several avian Influenza A viruses including the H7N9 have been detected in throat swabs. Until the ideal specimen can be collected multiple specimen types should be considered
- Acute and convalescent sera
- Conjunctival swab if clinically appropriate (in viral transport media)

2.5 If a PPHLN laboratory suspects a novel respiratory pathogen:

- The laboratory director will notify the RMOH immediately when a suspect specimen is identified
- All specimens with suspected novel respiratory pathogens will be forwarded to the NML for confirmatory testing
- The laboratory and/or Public Health should also communicate with the PPHLN that a suspect novel respiratory pathogen sample is being transported.

Figure 3: Laboratory Testing for SARI



2.6 Transportation of Specimens

If the case has been linked to another proven case of a novel respiratory virus, or has strong epidemiological evidence to link it with avian influenza or other emerging pathogens like coronaviruses, then the specimen should be handled in the manner described below; otherwise treat specimens as routine clinical specimens:

Transport by Land:

If the suspected agent is classified as Risk Group 3, use a Type 1A package. (There is a modification possible for transport by air, see below.)

Other requirements of the Transportation of Dangerous Goods (TDG) regulations such as training, labeling, marking and documentation apply.

Transport by Aircraft:

The International Civil Aviation Organization (ICAO) Technical Instructions (TI) with some additional provisions of the TDG Regulations may be used for the transportation of diagnostic specimens by aircraft. Consignments prepared this way may be transported by road to and from the airport as well.

Under the ICAO TI, the shipping name DIAGNOSTIC SPECIMEN, UN3373 must be used for all diagnostic specimens if they may contain influenza Risk Group 3 agent. Diagnostic specimens are exempt from other requirements in the ICAO technical instructions if they are packaged in packaging of good quality, capable of passing a 1.2m drop test.

A Type 1A package meets these requirements. A Type 1B package may only be used if it meets the additional ICAO requirements regarding cushioning of the secondary receptacle, drop test and pressure retention capability.

NOTE: Applicable temporary certificates may be used instead of the general guidelines provided. Temporary certificates can be searched and found here: [Approvals - Search by Certificate Number \(tc.gc.ca\)](#)

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