

Respiratory Surveillance Plan for Public Health

Public Health Branch
Nova Scotia Department of Health and Wellness

2023–2024

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Respiratory Surveillance Plan for Public Health 2023
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1.0 Background

Public health surveillance is defined as the ongoing systematic collection, analysis, and interpretation of health-related data essential to planning, implementation and evaluation of public health practice.^{1,2} Respiratory disease surveillance is one of the pillars of public health surveillance in Nova Scotia and Canada. Each year, an extensive network of public health partners is involved in the surveillance and monitoring of respiratory pathogens in Nova Scotia.

Since the World Health Organization's (WHO) declaration of a global pandemic on March 11, 2020, COVID-19 surveillance in Nova Scotia has included regular reporting of indicators related to new cases, morbidity, and mortality. On May 5, 2023, the WHO declared the end of the public health emergency and Nova Scotia subsequently lifted the COVID-related Health Protection Act Order on May 23, 2023. Given this context, and in alignment with similar approaches from other Public Health organizations, such as the European Centre for Disease Control,³ Nova Scotia has integrated the surveillance of COVID-19 into routine respiratory surveillance effective as of the 2023/24 season. As COVID-19 becomes endemic, case numbers are lower and hospitals and long-term care facilities have incorporated COVID-19 into their routine protocols. This shift in reporting also aligns with other provinces and territories and will create a more sustainable and integrated surveillance system for monitoring COVID-19 and other respiratory pathogens.

This document outlines Nova Scotia's surveillance plan for respiratory pathogens, including COVID-19, for 2023/24. The creation of the plan was led by the Public Health Branch in Nova Scotia's Department of Health and Wellness (DHW) and was developed in consultation with key partners in the Government of Nova Scotia, Nova Scotia Health, the IWK Health Centre, and the Provincial Public Health Laboratory Network.

The Respiratory Surveillance Plan is a companion to [Nova Scotia's Respiratory Response Plan \(RRP\)](#). The overarching goal of Nova Scotia's RRP is to minimize severe illness and death from respiratory pathogens in Nova Scotia. The RRP is grounded in ethical guiding principles^a that underpin public health decision-making.

^a These principles are defined in [Appendix A: Glossary for Ethical Principles](#). Note, ethical consideration is paramount when balancing the risk to the public from a communicable disease while respecting the rights of individuals.

2.0 Overview of Respiratory Pathogen Surveillance in 2023/24

Effective control of respiratory pathogens requires knowledge of the distribution of these pathogens in the population over time, an understanding of the populations most susceptible to severe outcomes, and information about the uptake of control measures across communities. A well-designed surveillance system for respiratory pathogens provides these data in a timely manner to allow for targeted, data-driven public health action.

There is also an increasing recognition of the need for an equity-driven approach, which includes reporting on differences in health outcomes that are systematic, unfair, and avoidable. Reporting these differences generates public health knowledge that can be acted upon with targeted policies and programs that strive to improve health equity in populations.⁴ At present, there are few indicators of equity^b available in Nova Scotia's administrative health data; however, the DHW continues to explore approaches to integrate equity in standard reporting.

The following surveillance objectives were developed for the 2023-24 season, and informed by the guiding principles of collaboration, evidence-driven, efficient, and equitable.

2.1 Surveillance Objectives

1. To monitor and assess trends in activity levels of respiratory pathogens in Nova Scotia.
2. To monitor and describe the epidemiology of severe outcomes related to respiratory pathogens.
3. To detect, monitor, and characterize emerging respiratory pathogens that may present as ILI or Severe Acute Respiratory Infection (SARI) with the potential to cause outbreaks and epidemics.
4. To monitor vaccine coverage and safety for influenza and COVID-19.

Nova Scotia's respiratory surveillance system also contributes to Canada's national respiratory surveillance system, which coordinates data collection from provinces and territories, and distributes information on national respiratory pathogen activity.

^b [Equity stratifiers | CIHI](#)

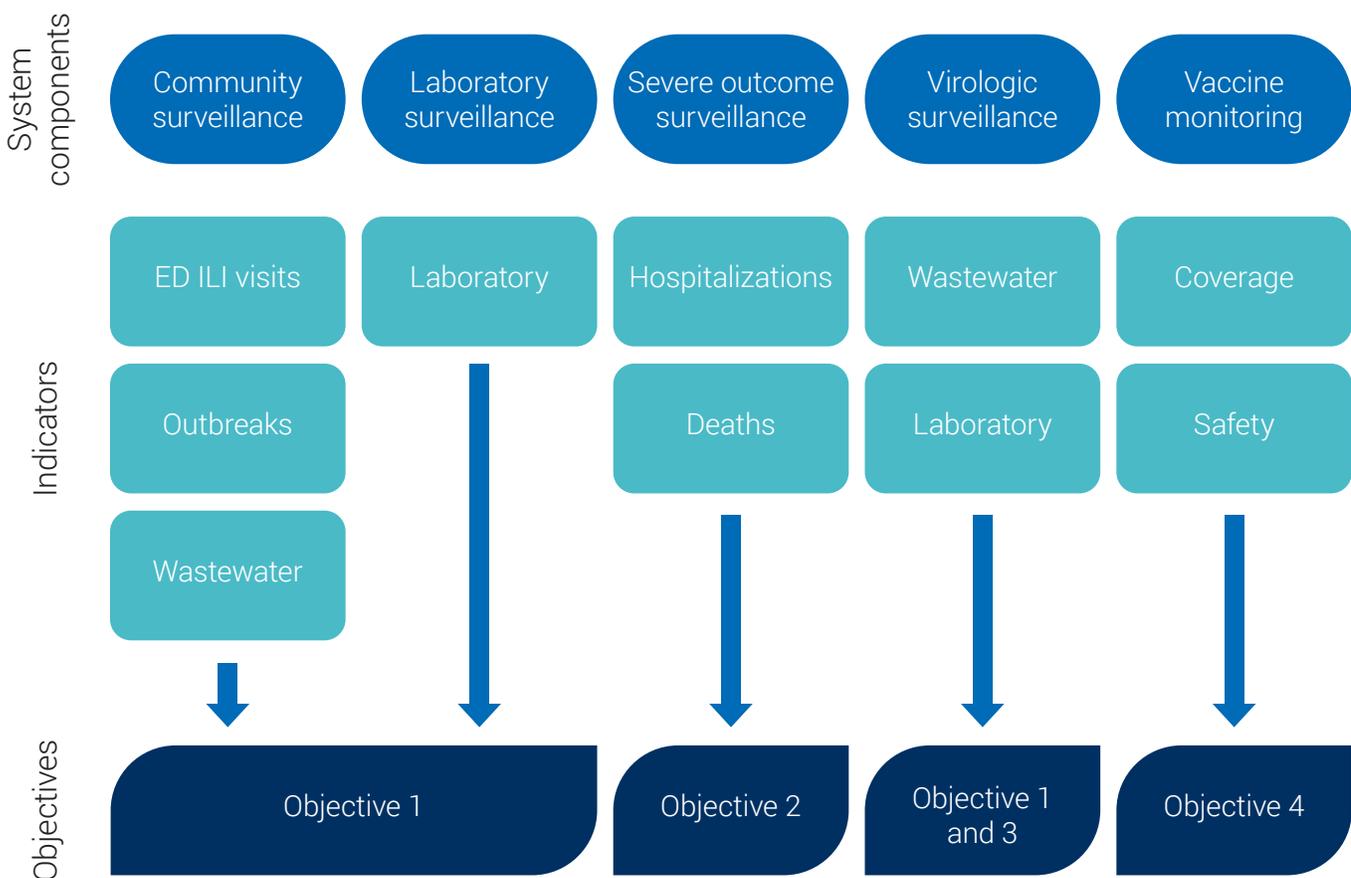
2.2 Surveillance System Components

There are five different system components to Nova Scotia’s respiratory surveillance plan:

- Community surveillance
- Laboratory surveillance
- Severe outcome surveillance
- Virologic surveillance
- Vaccine monitoring

A framework of the system is shown in Figure 1.

Figure 1. Framework of Nova Scotia’s 2023-2024 respiratory surveillance system



2.3 Data Sources

Each of the components of the surveillance system relies on specific data sources to inform the associated objectives. These sources are described in Table 1.

Table 1. Surveillance system data sources

Component	Indicator	Description of data source
Community surveillance	ILI	Each week, participating emergency departments (EDs) submit data on the proportion of ED visits for ILI to the Canadian Network for Public Health Intelligence (CNPHI). These data are made available to the DHW via CNPHI's platform.
	LTCF outbreaks	Panorama is Nova Scotia's electronic public health surveillance system. Long term care facility (LTCF) and acute care facility outbreaks are recorded in Panorama, as well as reported to CNPHI.
	Wastewater	The National Microbiology Lab (NML) analyzes and reports on wastewater data in Nova Scotia. This includes information on viral load and whole genome sequencing information from 9 wastewater treatment plants in 6 municipalities ³ .
Laboratory surveillance	PCR positive cases	<p>The Provincial Public Health Laboratory Network (PPHLN) integrates data from laboratory information systems used around the province, resulting in a repository of test results from hospital, public health, and community laboratories. Data on PCR positive cases of COVID-19 and influenza (including typing) flow into Panorama, and data on respiratory syncytial virus (RSV) and other respiratory pathogens come to the DHW directly from the laboratory.</p> <p>Rates of new PCR positive cases are calculated using Statistics Canada's 2021 population denominators.</p>

³ Wastewater treatment plants included as of October 26, 2023: Battery Point and Bridgeport (in the Cape Breton Regional Municipality), Halifax (Halifax Peninsula), Dartmouth, Mill Cove (in Bedford), Central Colchester (Colchester County) Trenton (Pictou County), Bridgewater (Lunenburg County), and Yarmouth (Yarmouth County).

Severe outcome surveillance	Hospitalizations, ICU admissions, and deaths	<p>Data on hospitalizations, ICU admissions, and deaths attributable to respiratory pathogens come from Panorama. When a person is hospitalized, admitted to ICU, or dies because of a notifiable respiratory pathogen (e.g., COVID-19, influenza, or other SARI), this information is entered into Panorama.</p> <p>Rates of hospitalizations (including ICU admissions) and deaths are calculated using Statistics Canada’s 2021 population denominators.</p>
Virologic surveillance	COVID-19 lineages, novel pathogens	<p>Laboratory data includes whole genome sequencing results on a subset of COVID-19 samples, provided by the PPHLN. The NML provides whole genome sequencing results from wastewater sampling, as well as molecular sequencing data on a small subset of influenza samples</p>
Vaccine monitoring	Immunization coverage	<p>Panorama includes almost all COVID-19 and most influenza immunization data. These data come from various sources, and are de-duplicated prior to analysis:</p> <ul style="list-style-type: none"> • Vaccines administered through public health and LTCF are directly entered into Panorama. • CanIMMUNIZE is an application that records COVID-19 immunizations administered in Nova Scotia to those with a valid health card. Influenza vaccines administered at pharmacies are also recorded in CanIMMUNIZE. • The Medical Services Insurance (MSI) Encounters database contains insured service performed by a physician, nurse practitioner, optometrist, or prosthetist is captured. This includes immunizations delivered by a primary care provider.

		<ul style="list-style-type: none"> The Drug Information System (DIS) also contains data on individuals receiving high dose influenza vaccination. <p>Vaccination coverage rates are calculated using the MSI-eligible population as of September 1, 2023, as the denominator.</p>
	AEFI	<p>Adverse Events Following Immunization (AEFI) include any untoward medical occurrence which follows administration of an active immunizing agent, and which does not necessarily have a causal relationship with the use of a vaccine. The adverse event may be any unfavourable or unintended sign, abnormal laboratory finding, symptom, or disease. The general definition of AEFI specifies that the event is not necessarily due to the vaccine.⁴ There is a legislative requirement for AEFIs to be reported to public health through Panorama.</p>

3.0 Details of Surveillance Plan by Objective

3.1 Surveillance Objective 1: To monitor and assess trends in activity levels of respiratory pathogens in Nova Scotia

Understanding the trends of respiratory disease in the community, along with data on laboratory-confirmed cases and outbreaks, can provide an early warning signal, allowing the health system time to appropriately prepare to and respond to potential increases in cases, hospitalizations, and death. Community and laboratory surveillance are not meant to capture every case, but to give an indication of where and when respiratory pathogen transmission is occurring and assess the burden of respiratory illness at a certain time and place.

The surveillance system components that support this objective include community and laboratory surveillance. See [Table 2](#) for additional detail.

⁴ [Adverse events following immunization \(AEFI\): Canadian Immunization Guide - Canada.ca](#)

Community surveillance

Syndromic surveillance of ILI in Emergency Departments (ED)

Syndromic surveillance of ILI is based on data collected in the ED on the proportion of total visits that occurred for symptoms of ILI. The program was implemented in April 2009, and all EDs in the province are included, including the IWK ED.

- All of Nova Scotia's EDs report the total number of overall visits weekly, as well as the total number of those visits that were for a chief complaint of ILI. These are reported to CNPHI, where the DHW can access the local Nova Scotia data.
 - ILI is based on the national case definition: Acute onset of respiratory illness with fever and cough and one or more of the following – sore throat, arthralgia, myalgia or prostration which is likely 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.

Outbreaks in high-risk settings

- Acute care facilities and LTCF are required to immediately report outbreaks or suspected outbreaks of COVID-19, influenza, RSV, and/or ILI to the local public health office. Local public health reports outbreaks to CNPHI and notifies DHW via Panorama.

Wastewater surveillance

- The NML analyzes and reports on wastewater data in Nova Scotia. The DHW regularly receives reports from the NML with the results of wastewater monitoring in the province. These reports provide site-specific information about long- and short-term trends in detection of SARS-CoV-2, influenza, and RSV enabling assessment of geographic areas where viral activity maybe increasing, decreasing, or remaining stable in the community. This information is also available in a public dashboard.⁵

Laboratory surveillance

The reporting of confirmed cases⁶ (i.e., PCR positive cases) of COVID-19, and influenza (including subtype), as well as PCR positive cases of RSV and other respiratory pathogens by the PPHLN is a fundamental component of respiratory pathogen surveillance. This provides information on currently circulating pathogens, age group- and region-specific data, and allows for the monitoring of trends over time/comparisons to previous seasons. Nova Scotia's respiratory testing algorithm for the 2023-2024 year can be found in [Appendix B](#).

⁵ [COVID-19 wastewater monitoring dashboard – Canada.ca](#)

⁶ Case definitions can be found here: [Surveillance Guidelines | novascotia.ca](#)

Table 2: Community and lab surveillance measures

Indicator	Measure	Strata	Data Sources
ILI	% of all ED visits attributed to ILI, current reporting period Epidemic curve (seasonal)	Zone	CNPHI
LTCF outbreaks	# of new outbreaks per week over time	Influenza COVID-19 RSV	Panorama
Influenza laboratory confirmed cases	Number of new PCR positive cases per reporting period, by subtype Cumulative PCR positive cases reported Epidemic curve	Influenza subtype Geography Age Group	PPHLN via Panorama
COVID-19 laboratory confirmed cases	Number of new PCR positive cases per reporting period Cumulative PCR positive cases reported Epidemic curve	Geography Age Group	PPHLN via Panorama
RSV laboratory confirmed cases	Number of new cases per reporting period Cumulative cases reported Epidemic curve	Age Group	PPHLN
Other respiratory pathogens laboratory confirmed cases	Number of new cases per reporting period Cumulative cases reported		PPHLN

3.2 Surveillance Objective 2: To monitor and describe the epidemiology of severe outcomes related to respiratory pathogens

Severe outcome surveillance provides insight into the burden of respiratory illness on the health system and can support clinical decision-making by identifying at-risk groups. Understanding the burden of severe outcomes can also inform public health measures to prevent or control the spread of disease.

Severe outcome surveillance monitors hospital admissions and deaths related to COVID-19 and influenza. See [Table 3](#) for additional detail.

Hospitalizations

- The surveillance system aims to capture all patients who are hospitalized with influenza or COVID-19 as a direct or contributing cause, as opposed to patients who have an incidental diagnosis.
- All cases of influenza or COVID-19 who are determined to be hospitalized related to these diseases are entered in Panorama, and the outcome (hospitalization) recorded in the investigation.

ICU admissions

- ICU admissions for influenza and COVID-19 are identified in the same manner as hospitalizations are identified.

Deaths

- Deaths due to COVID-19 and influenza are identified by a death certificate where COVID-19 or influenza is listed as an immediate cause of death, antecedent cause giving rise to the immediate cause, or other significant condition contributing to, but not causally related to the immediate cause of death. In cases where one of these criteria is met, the outcome is entered into Panorama.

Table 3: Severe outcome measures

Indicator	Measure	Strata	Data Sources
COVID-19 and influenza hospitalizations	Number of new hospitalizations by week (epi curve) Cumulative number of hospitalizations	Age Group	Panorama
COVID-19 and influenza ICU admissions	Number of new ICU admissions by week (epi curve) Cumulative number of ICU admissions	Age Group	Panorama
Mortality	Cumulative number of deaths	Age Group	Panorama

3.3 Surveillance Objective 3: To detect, monitor, and characterize emerging respiratory pathogens that may present as ILI or SARI with the potential to cause outbreaks and epidemics

Detection of new respiratory pathogens is an important component of surveillance. Emerging pathogens have the potential to cause outbreaks and epidemics and identifying them early is critical to informing the public health response. Additionally, new variants of known pathogens can affect the clinical and epidemiological features of cases. For example, variants might demonstrate changes in communicability of disease and/or severity of cases. Early detection of new variants through whole genome sequencing (WGS) and monitoring of existing variants provides additional context for overall respiratory surveillance. Respiratory pathogens, strains, and lineages that are being monitored in NS are listed in [Appendix C](#). This list is current as of October 2023.

Virologic surveillance relies on laboratory testing and WGS to identify potential new variants. See [Table 4](#) for additional details.

PCR positive samples

Testing for known pathogens is a key component of respiratory surveillance. Such monitoring also allows for the identification of new or emerging pathogens, which may not have been seen before. If a pathogen emerges that is causing human illnesses, and testing cannot attribute it to known pathogens under monitoring, public health can further investigate to determine if an emerging or novel pathogen is circulating.

- The procedure for a suspect or probable emerging respiratory pathogen or SARI is outlined in the [Respiratory Response Plan](#).

WGS of PCR positive samples

- A subset of PCR positive influenza and COVID-19 samples undergo WGS.
- The NML has outlined criteria for prioritizing some specimens for WGS analysis; some are analyzed by the NML and others by the PPHLN. Note, only partial subtyping is available for samples analyzed at the PPHLN.

WGS of wastewater samples

- The NML is responsible for sequencing and analyzing wastewater samples from the 9 wastewater sampling sites previously noted.
- The DHW receives and reviews these results to monitor trends.

Table 4: Virologic surveillance measures

Indicator	Measure	Data Sources
PCR positive samples	# new unidentified or novel pathogens identified	PPHLN
WGS of PCR positive influenza and SARS-CoV-2 samples	Number of identified lineages Distribution of lineages over time, by % samples (SARS-CoV-2)	PPHLN, NML
WGS of wastewater samples	Lineages identified in samples, by % and site	NML

3.4 Surveillance Objective 4: To monitor vaccine coverage and safety for influenza and COVID-19

Routine vaccine monitoring provides information on vaccination coverage in the population overall, and among specific subgroups. Understanding coverage by age, gender, and geographic region allows for targeted public health action such as vaccination campaigns. Monitoring AEFIs contributes to the understanding of vaccine safety.

- Vaccine coverage rates: percent of population vaccinated against COVID-19 and influenza

- Vaccine safety: Rate and severity of AEFIs for COVID-19 and influenza vaccines.

Vaccine surveillance relies on coverage rates for COVID-19 and influenza vaccination and monitoring AEFIs. See [Table 5](#) for more details.

Vaccination coverage rates

- Vaccination coverage for both influenza and COVID-19 are monitored throughout the respiratory season. Vaccination data comes from Panorama, which includes data from other sources such as physician Electronic Medical Records and CanImmunize. MSI billing data and the Drug Information System (DIS) are also used.
- Coverage rates are calculated using the MSI-eligible population as of September 1, 2023, as the denominator.

Adverse Events Following Vaccination (AEFIs)

- AEFIs are reported to the DHW through Panorama, and subsequently to the Public Health Agency of Canada (PHAC).
- COVID-19 vaccine safety surveillance also involves monitoring of specific conditions identified by Canadian and international health authorities and called adverse events of special interest (AESIs). AESIs must also be reporting to public health by providers. For more information on AESIs refer to [Nova Scotia COVID-19 Vaccine Program Information for Health Care Professionals](#).

Table 5: Vaccine monitoring for influenza and COVID-19

Indicator	Measure	Strata	Data Sources
Vaccination coverage rates for influenza and COVID-19	% vaccinated (numerator = number vaccinated, denominator = eligible population)	Age Group Gender Geography Provider type	Panorama
AEFIs for influenza and COVID-19 vaccinations	Number and incidence of AEFI Most frequent AEFI (n, %) Number and incidence, severe AEFI	Severity Age Group Sex Dose Vaccine product	Panorama

Dissemination Strategy

During respiratory season, the DHW publicly reports much of the surveillance data outlined in this document. These reports are posted according to PHAC's reporting schedule, and reporting periods are aligned with the current season's surveillance weeks ([Appendix D](#)). Reports are distributed more frequently during the height of the season, and less often during times of lower respiratory virus activity.

Prior to the 2023/2024 respiratory season, COVID-19 was reported separately. Historical COVID-19 reports can be found on the DHW's [COVID-19 epidemiologic summaries page](#). Historic and current respiratory surveillance reports (now including COVID-19) can be accessed on the DHW's [Respiratory Watch page](#).

COVID-19 vaccine safety data is available from PHAC and includes safety data from Nova Scotia. It can be accessed here: [COVID-19 vaccine safety: Summary of weekly report on side effects following immunization - Canada.ca](#)

Appendix A: Glossary for Ethical Principles

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 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.⁵

Least coercive means: Intrusion into people's lives should be the minimum possible, while the policy aim can still be achieved.⁶

Proportionality: Any public health intervention should be proportionate to the threat faced, and measures taken should not exceed those necessary to address the actual risk. This includes demonstrating (using robust evidence) 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.^{6,7}

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.^{7,8}

Appendix B: Nova Scotia Respiratory Testing Algorithm for 2023-2024

NOVA SCOTIA RESPIRATORY TESTING ALGORITHM 2023-2024

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

NOTES

- Urgent testing (results <6h) for SARS-CoV-2, FluA/B, and RSV is available in all zones (using GeneXpert).
- Routine testing for RSV is available in Central zone/IWK, and for other zones, is available upon request.

MOH Medical Officer of Health
IPAC Infection Prevention and Control
ILI Influenza like illness

SURVEILLANCE

- SARS-CoV-2 and influenza positive specimens should be archived for surveillance. A subset will be selected by PPHLN for further characterization.

- Further characterization may be based upon the following criteria:

- representatives of the respiratory season
- suspected treatment failure
- suspected animal-to-human transmission (avian influenza)
- severely ill
- special request (outbreak investigations)

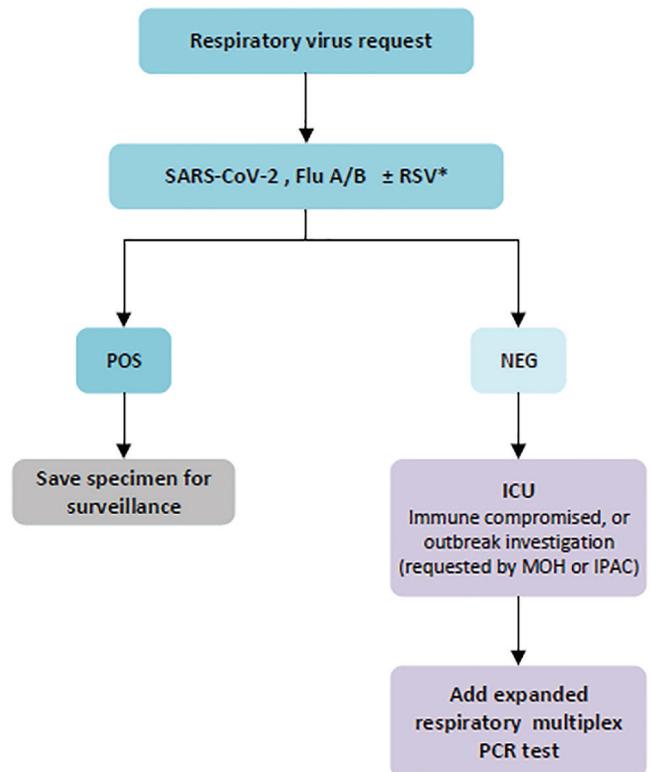
Additional agents in the expanded respiratory multiplex PCR panel:

Influenza A virus (Flu A)
Influenza B virus (Flu B)
Respiratory syncytial virus (RSV)
Parainfluenza virus
Adenovirus
Coronavirus (229E, HKU1, NL63, OC43)
Coronavirus (SARS-CoV-2)
Human rhinovirus / enterovirus
Human metapneumovirus

(list of multiplex agents may vary depending on the testing kit)

Footnote:

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.



Appendix C: Lineages being monitored in Nova Scotia

Respiratory Pathogens

- COVID-19 including lineages of current relevance
- Influenza including subtypes (A and B)
- Adenovirus
- Bocavirus
- Coronavirus* (excluding COVID-19)
- Enterovirus/Rhinovirus
- Metapneumovirus
- Parainfluenza
- Respiratory Syncytial Virus (RSV)

Appendix D: 2023/2024 Surveillance Weeks Calendar

Week	Start	End
35	27-Aug-23	02-Sep-23
36	03-Sep-23	09-Sep-23
37	10-Sep-23	16-Sep-23
38	17-Sep-23	23-Sep-23
39	24-Sep-23	30-Sep-23
40	01-Oct-23	07-Oct-23
41	08-Oct-23	14-Oct-23
42	15-Oct-23	21-Oct-23
43	22-Oct-23	28-Oct-23
44	29-Oct-23	04-Nov-23
45	05-Nov-23	11-Nov-23
46	12-Nov-23	18-Nov-23
47	19-Nov-23	25-Nov-23
48	26-Nov-23	02-Dec-23
49	03-Dec-23	09-Dec-23
50	10-Dec-23	16-Dec-23
51	17-Dec-23	23-Dec-23
52	24-Dec-23	30-Dec-23
1	31-Dec-23	06-Jan-24
2	07-Jan-24	13-Jan-24
3	14-Jan-24	20-Jan-24
4	21-Jan-24	27-Jan-24
5	28-Jan-24	03-Feb-24
6	04-Feb-24	10-Feb-24

Week	Start	End
7	11-Feb-24	17-Feb-24
8	18-Feb-24	24-Feb-24
9	25-Feb-24	02-Mar-24
10	03-Mar-24	09-Mar-24
11	10-Mar-24	16-Mar-24
12	17-Mar-24	23-Mar-24
13	24-Mar-24	30-Mar-24
14	31-Mar-24	06-Apr-24
15	07-Apr-24	13-Apr-24
16	14-Apr-24	20-Apr-24
17	21-Apr-24	27-Apr-24
18	28-Apr-24	04-May-24
19	05-May-24	11-May-24
20	12-May-24	18-May-24
21	19-May-24	25-May-24
22	26-May-24	01-Jun-24
23	02-Jun-24	08-Jun-24
24	09-Jun-24	15-Jun-24
25	16-Jun-24	22-Jun-24
26	23-Jun-24	29-Jun-24
27	30-Jun-24	06-Jul-24
28	07-Jul-24	13-Jul-24
29	14-Jul-24	20-Jul-24
30	21-Jul-24	27-Jul-24
31	28-Jul-24	03-Aug-24
32	04-Aug-24	10-Aug-24
33	11-Aug-24	17-Aug-24
34	18-Aug-24	24-Aug-24

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