Canadian Nosocomial Infection Surveillance Program

Surveillance for COVID-19 and other viral respiratory infections among inpatients in CNISP hospitals

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Background

Viral respiratory infections (VRI) cause increased morbidity and mortality in both adult and pediatric healthcare settings. Age is a key risk factor with regards to the severity, transmission and impact of VRI. The consequences of VRI are especially concerning for children and older adults with existing co-morbidities or underlying conditions such as cardiac and pulmonary disease, or immunosuppression. The emergence of SARS, avian influenza, novel H1N1 influenza, MERS-CoV and, recently, COVID-19 have underlined the need for data to inform infection prevention and control practices for respiratory pathogens in healthcare settings.

Rationale

A hospital's ability to appropriately manage COVID-19 and other VRI patients will be dependent on their understanding of the burden of both community and healthcare associated severe respiratory infections. This surveillance will assist in understanding the burden of COVID-19 and other VRI in adults and pediatric patients in Canadian hospitals.

A real-time hospital based surveillance system will assist in identifying high-risk groups, as well as describing risk factors and patient outcomes in order to inform public health decisions and evaluate interventions.

Short term objectives

1. Describe the inpatient population infected with SARS-CoV-2
2. Provide timely data (e.g. demographic, clinical and outcome data) to hospitals and PHAC regarding patients hospitalized with COVID-19

Long term objectives

1. Identify new and emerging respiratory viruses in Canadian acute care hospitals
2. Describe selected characteristics of the organisms involved and of the pediatric and adult populations who develop VRI in order to assist hospitals in the development of precautionary measures for patients at high risk
3. Facilitate intra- and inter-hospital comparison of adult and pediatric VRI rates over time
4. Compare the epidemiology of SARS-CoV-2 to other currently circulating respiratory viruses among pediatric and adult inpatients, and to compare the epidemiology of SARS-CoV-2 with pathogens that have emerged previously in Canada such as H1N1 and SARS-CoV-2

Methods

Study Design
Sentinel surveillance of adult and pediatric COVID-19 and other VRI at participating CNISP hospitals.

Site Eligibility
All CNISP hospitals are eligible to participate.

Surveillance period
Year round surveillance

Weekly reporting begins the week of March 15th to March 21st.

Detailed patient questionnaires for COVID-19 and other healthcare-associated VRI retrospective to March 1, 2020.

Case Eligibility

i. Any patient admitted to a CNISP participating hospital. All hospital inpatient wards are eligible (e.g. including long-term care, psychiatric wards, maternity wards etc.)

ii. Patient meets the case definition below.

Case definitions

a) **COVID-19 case definition:**

- A person with laboratory confirmation of infection with SARS-CoV-2

Inclusion criteria:

- Any patient identified with laboratory confirmed COVID-19 while admitted to a CNISP participating hospital

  OR

- Any patient identified with laboratory confirmed COVID-19 in the 14 days prior to being admitted to a CNISP participating hospital
  - *Please use your best clinical judgement when applying the 14 day time frame (i.e. date of admission could be greater than 14 days since positive COVID-19 result)*
  - *If the patient has multiple positive tests, please use the date of the first positive test ever to determine eligibility*

b) **VRI case definition (excluding COVID-19):**

- Positive viral culture or DFA (direct fluorescent antigen) or EIA (enzyme immunoassay) or PCR (polymerase chain reaction) for a viral respiratory tract pathogen

AND

- At least one of the following signs or symptoms:
  fever (> 38 °Celsius) or single temperature >1.1°Celsius over baseline from any site (oral, tympanic, auxiliary), rhinitis, nasal congestion, pharyngitis, sneezing, cough, wheeze, stridor, apnea, dyspnea, laboured breathing, increased respiratory secretions, change in characteristics of chronic secretions, decreased air entry on auscultation, rales, rhonchi, decreased oxygen saturation, need for increased Fi02, increased ventilator support, increased suctioning or new abnormality on chest radiograph.

AND

- No other evident cause for the abnormality

Exposure classification for COVID-19

Once the patient has been identified with a COVID-19, the case will be classified as healthcare-associated acquired in your acute-care facility, healthcare-associated any other healthcare exposure or community-associated based on the following criteria and in accordance with the best clinical judgement of the healthcare and/or infection prevention and control practitioner (ICP).

Healthcare-associated acquired in your acute care facility (HA-YAF)

- Symptom onset ≥ 7[1] calendar days after admission to the reporting hospital and using best clinical judgement (e.g. symptom onset < 7 days but known epi link to a positive case).

OR

- If patient is readmitted with a positive test < 7 days after discharge from hospital and using best clinical judgement.

Healthcare-associated any other healthcare exposure (HA-Other)

- Any patient who is identified with COVID-19 not acquired at your facility that is thought to be associated with any other healthcare exposure (e.g. another acute-care facility, long-term care or rehabilitation facility etc.). This also includes facilities such as a private or public care home, residential assisted living building or a nursing home with varying levels of care.

Community-associated

- No exposure to healthcare that would have resulted in this infection (using best clinical judgement) and does not meet the criteria for a healthcare-associated infection.

Exposure classification for VRI (excluding COVID-19)

For all other VRI (excluding COVID-19) only healthcare–associated cases are required to be reported based on the following criteria and in accordance with the best clinical judgement of the healthcare and/or infection prevention and control practitioner (ICP).

Healthcare-associated acquired in your acute care facility (HA-YAF)

- Symptom onset ≥ 72 hours (≥3 calendar days) after admission to the reporting hospital and using best clinical judgement.

OR

- If patient is readmitted with a positive test < 72 hours (3 calendar days) after discharge from hospital and using best clinical judgement.

Healthcare-associated any other healthcare exposure (HA-Other)

- Any patient who has a VRI not acquired at your facility that is thought to be associated with any other healthcare exposure (e.g. another acute-care facility, long-term care, rehabilitation facility or clinic etc.).

[1] 7 days was chosen as the cut-off to attribute acquisition to the hospital based on a current estimate of a median incubation of 4 days (IQR 2-7 days) for hospitalized patients with COVID-19. This is a conservative estimate and can be later re-coded based on date of admission, symptom onset and test date if required.
https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-guidance-management-patients.html

Data collection and submission

1. A weekly report form with aggregate numbers of new hospitalizations, new ICU admissions and new deaths among patients with lab-confirmed COVID-19 stratified by age group will be submitted to CNISP electronically every Tuesday which will include all cases identified in the previous week, i.e. Sunday to Saturday (Appendix A).

   There are two ways that sites can choose to submit the weekly data:

   - Fill out the form on CNPHI Web Data (this is the preferred method)
   - Fill out the fillable Word document and email it to CNISP (phac.cnisp-pcsin.aspc@canada.ca)

2. For weekly COVID-19 surveillance, weekly admissions will be estimated using 2019 patient admissions.
3. For each case that meets the case definition for COVID-19 or other VRI, a detailed patient questionnaire (Appendix B) should be completed by reviewing the patients' chart and reported to PHAC. If a patient is re-admitted, please use the following criteria to determine data submission:

   - *If a patient is re-admitted within 30 days of positive test => collect all data on the same form*
   - *If a patient is re-admitted between 31 and 89 days after positive test => do not capture re-admission (using best clinical judgement)*
   - *If a patient is re-admitted $\geq$ 90 days (3 months) after first admission = > please complete a new form and indicate the PID from the 1st form so that we may link the case data*

   Please submit the detailed patient questionnaires for COVID-19 cases as time permits (we recognize that hospitals are extremely busy but these data are very useful). The patient questionnaires for other VRI cases may be submitted retrospectively. Please submit data electronically on CNPHI Web Data or via email to phac.cnisp-pcsin.aspc@canada.ca.

4. If possible, please stratify your denominator data (Appendix C) by age (<18, 19-39, 40-59, 60-79 and 80+ years). Please submit data electronically on CNPHI Web Data or via email to phac.cnisp-pcsin.aspc@canada.ca.

   The data collected will include:

   1. Total number of patient admissions*
   2. Total number of inpatient-days*
   3. Total number of ICU patient admissions
   4. Total number of ICU inpatient-days

   **Collected for MRSA, VRE and CPO surveillance*

Data reporting

All CNISP hospitals will receive a weekly aggregate report by age group and regional/provincial level data (weekly and cumulative totals) by Friday of the reporting week. In order to calculate trends over time, only sites who have consistently submitted weekly data back to March 15th will be included in the respective figures. In addition, all CNISP hospitals will receive a monthly descriptive report based on national level data from the detailed patient questionnaires.

Zero report

For any week where your site does not have weekly data to report, please enter zero in the weekly report form and submit to CNISP either under Web Data in CNPHI or email the report to phac.cnisp-pcsin.aspc@canada.ca.

APPENDIX A. WEEKLY COVID-19 REPORT FORM

CHEC Site # : Select CHEC Site. **Submission date:** yyyy-mm-dd

Surveillance week (i.e. Sunday to Saturday)

Sunday: yyyy-mm-dd to Saturday: yyyy-mm-dd

Please provide data for **newly**[a] identified lab confirmed COVID-19 inpatients for the surveillance period specified above.

	0-17 yrs	18-39 yrs	40-59 yrs	60-79 yrs	80+ yrs	Weekly Total
Number of new COVID-19 hospitalizations						

For the surveillance period specified above, please indicate the number of lab confirmed COVID-19 inpatients with the following outcomes:

	0-17 yrs	18-39 yrs	40-59 yrs	60-79 yrs	80+ yrs	Weekly Total
Number of new COVID-19 ICU admissions						
Number of new ventilated patients						
Number of patients where ECMO support was initiated						
Number of new COVID-19 deaths						

Note: a patient may be counted in multiple categories (for instance, if patient was both admitted to the ICU and ventilated within the specified 7 days they would be included in both categories). If there is a delay in obtaining any of this information for a week please include in a subsequent report (for instance, if a patient was admitted to the ICU on a Friday and your system does not capture in time for that weekly report, please include in the following report.) Cumulative totals will be calculated by CNISP PHAC.

If possible, for the COVID-19 hospitalizations above, please indicate the number of COVID-19 hospitalizations by acquisition

	Number HA-YAF[b]	Number HA-Other[c]	Number CA[d]	Unknown
Number of new COVID-19 hospitalizations				

[a]Data to reflect <u>new</u> cases every week.

[b]Healthcare-associated acquired in your acute care facility (HA-YAF)

Symptom onset ≥ 7 days after admission to the reporting hospital and using best clinical judgement (e.g. symptom onset < 7 days but known epi link to a positive case) OR if patient is readmitted with a positive test < 7 days after discharge from hospital and using best clinical judgement.

[c]Healthcare-associated any other healthcare exposure (HA-Other)

Any patient who is identified with COVID-19 not acquired at your facility that is thought to be associated with any other healthcare exposure (e.g. another acute-care facility, long-term care or rehabilitation facility etc.).

[d]Community-associated

No exposure to healthcare that would have resulted in this infection (using best clinical judgement) and does not meet the criteria for a healthcare-associated infection.

APPENDIX B. COVID-19/VRI PATIENT QUESTIONNAIRE

1.	**CHEC Site # :** Select CHEC Site.
2.	**Unique Patient ID :** Enter unique patient ID. (CHEC Site #) (Year) (Case Number)
3.	**Age :** Enter age. **Specify :** Years, months or days
4.	**Sex :** ☐ Male ☐ Female ☐ Unknown
5.	**Postal Code[2]** *(first 3 digits):* _____
6.	**Date of admission** yyyy-mm-dd
7.	**Date of re-admission[3]** yyyy-mm-dd
8.	**Was this patient previously admitted > 3 months prior to this admission and met the COVID-19 case definition[4]?** ☐ Yes, please specify unique PID: _____ ☐ No ☐ Unknown
9.	**Where was this VRI acquired?** ☐ Healthcare-associated (acquired at your acute care facility) [5] ☐ Healthcare-associated (other healthcare exposure)[6] ☐ Community-associated [7] ☐ Unknown

[2] *If the postal code is unknown or not available, please enter 999*

[3] *If a patient is re-admitted within 30 days of positive test => collect all data on the same form*
If a patient is re-admitted between 31 and 89 days after positive test => do not capture re-admission

[4] *If a patient is re-admitted ≥ 90 days (3 months) after first admission => please complete a new form and indicate the PID from the 1st form so that we may link the case data*

[5] *COVID-19: Symptom onset ≥ 7 days after admission to the reporting hospital and using best clinical judgement (e.g. symptom onset < 7 days but known epi link to a positive case) OR if patient is readmitted with a positive test < 7 days after discharge from hospital and using best clinical judgement.*

Other VRI: Symptom onset ≥ 72 hours (≥ 3 calendar days) after admission to the reporting hospital and using best clinical judgement OR if patient is readmitted with a positive test < 72 hours after discharge from hospital and using best clinical judgement.

[6] *Any patient who has a VRI not acquired at your facility that is thought to be associated with any other healthcare exposure (e.g. another acute-care facility, long-term care or rehabilitation facility etc.).*

[7] *No exposure to healthcare that would have resulted in this infection (using best clinical judgement) and does not meet the criteria for a healthcare-associated infection.*

10.	**If community-associated, please specify the source of exposure if available** ☐ Household contact of a positive case ☐ School setting ☐ Daycare setting ☐ Social contact – not school/child care ☐ Workplace/occupational ☐ Unknown ☐ Other, please specify:
11.	**Is this patient a healthcare personnel (HCP)[8]?** ☐ Yes ☐ No ☐ Unknown ☐ N/A (e.g. pediatric patient)
12.	**If this patient is a HCP, in the 14 days prior to their positive test, did this patient work in any of the following settings? Please check all that apply.** ☐ Hospital ☐ Long-term care or retirement home ☐ Unknown ☐ Other healthcare setting, please specify: _____ ☐ N/A
13.	**If this patient is a HCP, what type of healthcare personnel is this patient?** ☐ Physician ☐ Nurse (RN, RPN, NP) ☐ Respiratory therapist ☐ Dietician ☐ Housekeeping ☐ Personal support/care worker/aide/orderly/PAB ☐ Volunteer ☐ Administrator ☐ Physiotherapist/Occupational therapist ☐ Social worker ☐ Paramedic/ambulance driver ☐ Midwife ☐ Pharmacist ☐ Unknown ☐ Other, please specify: _____ ☐ N/A

[8] *Healthcare personnel is defined as any individual who works in a healthcare setting (this includes acute care and long term care).*

14.	**If this patient is a HCP, did they provide direct care[9] to a COVID-19 positive patient(s) in the 14 days prior to positive test?** ☐ Yes ☐ No ☐ Unknown ☐ N/A
15.	**Was this patient admitted from a long-term care or retirement home[10]?** ☐ Yes ☐ No ☐ Unknown ☐ N/A (e.g. pediatric patient)
16.	**Is there any evidence of travel outside of Canada in the 14 days prior to the patient's symptom onset?** ☐ Yes, if known please specify country : Enter country travelled to. ☐ No ☐ Unknown
17.	**Primary admitting diagnosis:** Please specify the reason the patient was admitted to hospital. ☐ Acute respiratory illness (e.g. COVID-19, influenza, pneumonia, ILI etc.) ☐ Elective surgery ☐ Labour ☐ Acute coronary event ☐ Stroke ☐ Trauma ☐ Other, please specify: Click here to specify. ☐ Unknown
18.	**Is there evidence the patient has underlying medical condition(s)? Please check all that apply.** ☐ No ☐ Yes *(please check all that apply)* ☐ Liver disease ☐ Cancer (active) ☐ Lung disease (e.g. asthma, COPD) ☐ Kidney disease (includes all patients on dialysis) ☐ Pregnancy, if yes weeks of gestation Enter weeks of gestation.

[9] *Direct patient care defined as in-person patient care with or without the use of personal protective equipment*.

[10] *This includes facilities such as a private or public care home, residential assisted living building or a nursing home with varying levels of care for older persons. This excludes group homes for persons with developmental disabilities, mental health or addiction issues.*

	☐ Organ transplant recipient ☐ Other immunosuppression[11], please specify Click here to specify. ☐ Chronic heart disease (includes hypertension) ☐ Severe neurological disease[12] ☐ Diabetes ☐ Dementia/Alzheimer's disease ☐ Obesity (as recorded in patient chart or BMI ≥30 kg/m^2) ☐ Other, please specify Click here to specify. ☐ Unknown
19.	**Symptoms** (*please check all that apply and if possible, indicate each symptom's start date*): ☐ Symptom data available, please select all symptoms that apply: ☐ Symptom data available, asymptomatic ☐ Symptom data not available ☐ Cough yyyy-mm-dd ☐ Fever yyyy-mm-dd ☐ Chills yyyy-mm-dd ☐ Sore throat yyyy-mm-dd ☐ Runny nose yyyy-mm-dd ☐ Shortness of breath/difficulty breathing yyyy-mm-dd ☐ Hypoxia/desaturation yyyy-mm-dd ☐ Headache yyyy-mm-dd ☐ General weakness yyyy-mm-dd ☐ Pain (muscular (myalgia), joint (arthralgia), chest, abdominal) yyyy-mm-dd ☐ Irritability yyyy-mm-dd ☐ Fatigue/lethargy yyyy-mm-dd ☐ Poor appetite/weight loss yyyy-mm-dd ☐ Dizziness yyyy-mm-dd ☐ Dehydration yyyy-mm-dd ☐ Altered mental status (e.g. confusion, delirium) yyyy-mm-dd ☐ Diarrhea yyyy-mm-dd ☐ Nausea/vomiting yyyy-mm-dd ☐ Anosmia and ageusia yyyy-mm-dd ☐ Other, please specify Click here to specify. yyyy-mm-dd

[11] *Includes congenital or acquired immunodeficiency, chemotherapy, immunosuppressive drugs, chronic high-dose systemic steroids (≥ 2 mg/kg or ≥ 20 mg/day prednisone or equivalent for > 2 weeks).*

[12] *Includes:*

a. *moderate to profound intellectual disability or developmental delay*
b. *epilepsy or cerebral palsy if accompanied by (a)*
c. *neuromuscular disorders (e.g, muscular dystrophy), when associated with impaired respiratory function*
d. *other neurological disorders associated with impaired pulmonary function and/or difficulty handling lung secretions*

20.	**Site of respiratory infection, please check all that apply:** ☐ Upper respiratory tract infection only[13] ☐ Pneumonia with or without URTI[14] ☐ Other lower respiratory tract infection with or without URTI[15] ☐ Respiratory tract infection, unspecified site[16] ☐ Other, please specify : Click here to specify.
21.	**Viruses isolated *(please check all that apply and specify date of specimen collection)*:** ☐ Adenovirus yyyy-mm-dd ☐ Date not available ☐ Parainfluenza yyyy-mm-dd ☐ Date not available ☐ Enterovirus yyyy-mm-dd ☐ Date not available ☐ Enterovirus/Rhinovirus yyyy-mm-dd ☐ Date not available ☐ Rhinovirus yyyy-mm-dd ☐ Date not available ☐ Influenza A yyyy-mm-dd ☐ Date not available ☐ Influenza B yyyy-mm-dd ☐ Date not available ☐ Metapneumovirus yyyy-mm-dd ☐ Date not available ☐ Bocavirus yyyy-mm-dd ☐ Date not available ☐ SARS-CoV-2 (COVID-19) yyyy-mm-dd ☐ Date not available ☐ RSV yyyy-mm-dd ☐ Date not available ☐ Other Click here to specify. yyyy-mm-dd ☐ Date not available
22.	**Specimen type:** ☐ Bronchial specimen (BAL) ☐ Endotracheal aspirate (ET) ☐ Nasopharyngeal swab/aspirate (NP) ☐ Sputum (SP) ☐ Throat swab or wash (TS) ☐ Data not available
23.	**Test:** ☐ DFA: direct fluorescent antibody ☐ EIA: enzyme immunoassay ☐ M-PCR: Multiplex PCR ☐ PCR: polymerase chain reaction ☐ Other, please specify: Click here to specify. ☐ Data not available

[13] *e.g. rhinitis, pharyngitis, laryngitis, cold, epiglottitis*

[14] *Must be supported by radiographic evidence*

[15] *e.g. bronchiolitis, tracheitis*

[16] *unable to rule out pneumonia clinically and chest radiographic not done or not interpretable*

24.	**Was the patient treated with an antiviral for their current VRI?** ☐ No ☐ Yes *(please check all that apply and indicate each treatment's start date)* ☐ Oseltamivir (Tamiflu) yyyy-mm-dd ☐ Zanamivir (Relenza) yyyy-mm-dd ☐ Amantadine (Symmetrel) yyyy-mm-dd ☐ Peramavir yyyy-mm-dd ☐ Remdesivir yyyy-mm-dd ☐ Kaletra yyyy-mm-dd ☐ Ribavirin yyyy-mm-dd ☐ Other, please specify : Click here to specify. yyyy-mm-dd ☐ Unknown
25.	**Was this patient receiving any of the following treatments for their current VRI?** ☐ No ☐ Yes *(please check all that apply and indicate each treatment's start date)* ☐ Ibuprofen yyyy-mm-dd ☐ Angiotensin receptor blockers (e.g. losartan, valsartan, etc.) yyyy-mm-dd ☐ ACE inhibitors (e.g. captopril, enalapril, etc.) yyyy-mm-dd ☐ Hydroxychloroquine yyyy-mm-dd ☐ Other, please specify : Click here to specify. yyyy-mm-dd ☐ Unknown
26.	**Did this patient receive an antimicrobial for their current VRI?** ☐ No ☐ Yes *(please check all that apply and indicate each start date)* ☐ Azithromycin yyyy-mm-dd ☐ Amoxicillin/clavulanate yyyy-mm-dd ☐ Cefazolin yyyy-mm-dd ☐ Ceftriaxone yyyy-mm-dd ☐ Piperacillin/Tazobactam yyyy-mm-dd ☐ Meropenem yyyy-mm-dd ☐ Vancomycin yyyy-mm-dd ☐ Doxycycline yyyy-mm-dd ☐ Other, please specify : Click here to specify. yyyy-mm-dd ☐ Unknown
27.	**Did this patient receive a corticosteroid for their current VRI?** ☐ No ☐ Yes *(please check all that apply and indicate each start date)* ☐ Dexamethasone yyyy-mm-dd ☐ Prednisone yyyy-mm-dd ☐ Methylprednisolone yyyy-mm-dd ☐ Hydrocortisone yyyy-mm-dd ☐ Other, please specify : Click here to specify. yyyy-mm-dd ☐ Unknown

28.	**Did this patient have a bacterial co-infection?** ☐ Yes ☐ No ☐ Unknown		
	Date of positive culture yyyy-mm-dd	**Site of infection** ☐ Blood ☐ Wound ☐ Urine ☐ Surgical site ☐ Sputum ☐ Skin/soft tissue ☐ Endotracheal aspirate ☐ Stool ☐ Other please specify :	**Pathogen(s) identified** ☐ *E. coli* ☐ *Klebsiella* spp ☐ *Pseudomonas spp* ☐ *Enterobacter* ☐ *Enterococcus* spp (not VRE) ☐ *Streptococcus* ☐ Coagulase negative staphylococci (CONS) ☐ *S. aureus* (MSSA and unspecified *S. aureus*) ☐ Other, please specify: ☐ *C. difficile*, *if possible*, *please specify the PID assigned to this patient for CNISP CDI surveillance:* _____ ☐ VRE, *if a bloodstream infection, if possible, please specify the PID assigned to this patient for CNISP VRE BSI surveillance:* _____ ☐ MRSA, *if a bloodstream infection, if possible, please specify the PID assigned to this patient for CNISP MRSA BSI surveillance:* _____ ☐ CPE, *if possible, please specify the PID assigned to this patient for CNISP CPE surveillance:* _____
29.	**Did this patient have a stroke 30 days following positive test?** ☐ Yes ☐ No ☐ Unable to determine		
30.	**Did this patient have a pulmonary embolism 30 days following positive test?** ☐ Yes ☐ No ☐ Unable to determine		
	INTERVENTIONS		
31.	**Did this patient require BiPAP or CPAP within 30 days of positive test?** ☐ Yes ☐ No ☐ Unable to determine		
32.	**If yes, total number of days on BiPAP/CPAP: _____** ☐ Data not available		
33.	**Did this patient require dialysis (hemo- or peritoneal dialysis) within 30 days of positive test as a complication from COVID-19 infection?** ☐ Yes ☐ No ☐ Unable to determine		
34.	**Did this patient require mechanical ventilation within 30 days of positive test?** ☐ Yes ☐ No ☐ Already ventilated at time of test ☐ Unable to determine		
35.	**If yes, total number of days ventilated: _____** ☐ Data not available		

36.	**Did this patient require ECMO within 30 days of the positive test?** ☐ Yes ☐ No ☐ Already on ECMO at time of test ☐ Unable to determine
37.	**Was this patient admitted to the ICU within 30 days of positive test?** ☐ Yes, related to VRI ☐ Yes, unrelated to VRI ☐ No ☐ Unable to determine
38.	**Date of ICU admission** yyyy-mm-dd ☐ Not applicable
39.	**Date of discharge from ICU** yyyy-mm-dd ☐ Not applicable ☐ Patient still admitted
30 DAY OUTCOME	
40.	**What was the patient outcome within 30 days of positive test?** ☐ Patient alive, still in hospital ☐ Patient survived and discharged Date of discharge yyyy-mm-dd Date of discharge from re-admission yyyy-mm-dd ☐ Patient survived and transferred Date of transfer: yyyy-mm-dd ☐ Patient died Date of death: yyyy-mm-dd ☐ Unknown
41.	**If the patient died within 30 days after positive test, please indicate the relationship of VRI to the death** ☐ VRI was the cause of death[17] ☐ VRI contributed to death[18] ☐ Death is unrelated to VRI[19] ☐ Causality between VRI and death cannot be determined[20]
42.	**Additional comments** Click here

[17] *VRI was the cause of death (i.e. the patient had no other condition that would have cause death during this hospitalization)*
[18] *VRI contributed to death (i.e. VRI exacerbated an existing condition that led to the patient's death)*
[19] *VRI was unrelated to death*
[20] *Unable to determine the causality between VRI and death.*

APPENDIX C. VRI DENOMINATOR DATA

Please submit denominator data electronically on CNPHI Web Data or via email to phac.cnisp-pcsin.aspc@canada.ca. If possible, please stratify patient admissions and patient days by age (<18, 19-39, 40-59, 60-79 and 80+ years).

CHEC Site # : Choose an item. **Surveillance period : January 1 to December 31, 2020**

Annual patient days (<18 years)	Annual patient admissions (<18 years)
Annual patient days (19-39 years)	Annual patient admissions (19-39 years)
Annual patient days (40-59 years)	Annual patient admissions (40-59 years)
Annual patient days (60-79 years)	Annual patient admissions (60-79 years)
Annual patient days (80+ years)	Annual patient admissions (80+ years)
Total annual patient days	Total annual patient admissions

Annual ICU patient days (<18 years)	Annual ICU patient admissions (<18 years)
Annual ICU patient days (19-39 years)	Annual ICU patient admissions (19-39 years)
Annual ICU patient days (40-59 years)	Annual ICU patient admissions (40-59 years)
Annual ICU patient days (60-79 years)	Annual ICU patient admissions (60-79 years)
Annual ICU patient days (80+ years)	Annual ICU patient admissions (80+ years)
Total annual ICU patient days	Total annual ICU patient admissions

Appendix D - Data Dictionary

1. **CHEC Site #**

   This will be the **3-character** alphanumeric number assigned to your institution. It will always begin with the two digit number assigned to your CHEC member e.g., 07, 15, and a letter assigned by the CHEC member for that specific institution e.g., A, B, C, etc. The CHEC site # for each institution should always be the same for all the CHEC/CNISP surveillance projects and will always have all three alphanumeric digits reported as the CHEC site #, e.g., 07A, 15A.

2. **Unique patient ID**

   This 10 character code should consist of the 3 character CHEC site # (e.g., 99Z), the surveillance year the infection occurred in (e.g., 20), and a consecutive number starting at 001 and continuing on with each additional case. An example of the first case in an institution would be 99Z20001. An example of the thirty-fifth case would be 99Z20035, and so on.

3. **Age**

   Please enter the patient's age at the time of positive test and please specify the age units (in years, months or days).

4. **Sex**

   Check male, female or unknown as appropriate.

5. **Postal code (first 3 digits)**

   Please indicate the patient's residential postal code (first 3 digits). If the postal code is unknown or not available, please enter 999 for postal code.

6. **Date of admission**

   Please indicate the date when the patient was admitted to the hospital.

7. **Date of re-admission**

   If the patient was re-admitted within 30 days of positive test, please indicate the date of re-admission.

   If a patient is re-admitted within 30 days of positive test => collect all data on the same form

   If a patient is re-admitted between 31 and 89 days after positive test => do not capture re-admission (using best clinical judgement)

   If a patient is re-admitted $\geq$ 90 days (3 months) after first admission = > please complete a new form and indicate the PID from the 1st form so that we may link the case data

8. Was this patient previously admitted > 3 months prior to this admission and met the COVID-19 case definition?

Please indicate if this patient was previously positive 3 months or greater than the current admission. If yes, please specify the unique patient identifier from the first admission so that we may link the data. Additional information (e.g. symptoms) and viral swabs (for genetic testing) may be collected to determine re-infection.

9. Source of acquisition

Exposure classification for COVID-19

Once the patient has been identified with a COVID-19, the case will be classified as "healthcare-associated acquired in your acute-care facility", "healthcare-associated any other healthcare exposure" or "community-associated" based on the following criteria and in accordance with the best clinical judgement of the healthcare and/or infection prevention and control practitioner (ICP).

Healthcare-associated acquired in your acute care facility (HA-YAF)

- Symptom onset ≥ 7 calendar days[21] after admission to the reporting hospital and using best clinical judgement (e.g. symptom onset < 7 days but known epi link to a positive case).

OR

- If patient is readmitted with a positive test < 7 days after discharge from hospital and using best clinical judgement.

Healthcare-associated any other healthcare exposure (HA-Other)

- Any patient who is identified with COVID-19 not acquired at your facility that is thought to be associated with any other healthcare exposure (e.g. another acute-care facility, long-term care or rehabilitation facility etc.).

Community-associated

- No exposure to healthcare that would have resulted in this infection (using best clinical judgement) and does not meet the criteria for a healthcare-associated infection.

Exposure classification for VRI (excluding COVID-19)

For all other VRI (excluding COVID-19) only healthcare–associated cases are required to be reported based on the following criteria and in accordance with the best clinical judgement of the healthcare and/or infection prevention and control practitioner (ICP).

[21] 7 days was chosen as the cut-off to attribute acquisition to the hospital based on a current estimate of a median incubation of 4 days (IQR 2-7 days) for hospitalized patients with COVID-19. This is a conservative estimate and can be later re-coded based on date of admission, symptom onset and test date if required.
https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-guidance-management-patients.html

Healthcare-associated acquired in your acute care facility (HA-YAF)

- Symptom onset ≥ 72 hours (≥3 calendar days) after admission to the reporting hospital and using best clinical judgement.

OR

- If patient is readmitted with a positive test < 72 hours (3 calendar days) after discharge from hospital and using best clinical judgement.

Healthcare-associated any other healthcare exposure (HA-Other)

- Any patient who has a VRI not acquired at your facility that is thought to be associated with any other healthcare exposure (e.g. another acute-care facility, long-term care, rehabilitation facility or clinic etc.). This also includes facilities such as a private or public care home, residential assisted living building or a nursing home with varying levels of care.

10. If community-associated, please specify the source of exposure if available

If the source of acquisition of this patient was community, if available please specify the most likely source of exposure from the list provided.

11. Is this patient a healthcare personnel (HCP)?

Please indicate if the patient is a healthcare personnel (HCP). Healthcare personnel is defined as any individual who works in a healthcare setting (this includes acute care and long term care). Please select not applicable (N/A) as appropriate (e.g. for pediatric patients).

12. If this patient is a HCP, in the 14 days prior to positive test, did this patient work in any of the following settings?

If this patient is a HCP, in the 14 days prior to positive test, please indicate if the patient worked in a hospital, long term care or other healthcare setting. Please check all that apply.

13. If this patient is a HCP, what type of HCP are they?

If this patient is a HCP, please indicate the type of HCP.

14. If this patient is a HCP, did they provide direct care to a COVID-19 positive patient(s) in the 14 days prior to positive test?

If this patient is a HCP, please indicate if they provided direct care to a COVID-19 positive patient(s) in the 14 days prior to positive test. Direct patient care is defined as in-person patient care with or without the use of personal protective equipment.

15. Was this patient admitted from a long-term care or retirement home?

Please indicate if this patient was admitted from a long-term care or retirement home. This includes facilities such as a private or public care home, residential assisted living building or a nursing home with varying levels of care for older persons. This excludes group homes for persons with developmental disabilities, mental health or addiction issues.

16. Is there any evidence of travel outside of Canada in the 14 days prior to the patient's symptom onset?

Please indicate if the patient traveled outside of Canada in the 14 days prior to symptom onset. This question only applies to the patient and not close contacts. If yes, please specify the country where they traveled to.

17. Primary admitting diagnosis

Please select one of the response options for the reason that the patient was admitted to hospital. If a COVID-19 positive patient was admitted from a long term care or retirement home for non-clinical reasons (e.g. home cannot cope with isolation requirements, lack of nursing support etc.), please specify and include this information in the "other" text field.

18. Is there evidence the patient has underlying medical condition(s)?

If yes, please select all conditions that apply from the list provided. If patient is pregnant, please specify the number of week's gestation. If the patient has an immunosuppression condition as per the definition below, please specify. If the patient has other conditions not listed, please specify under 'other'.

Hypertension should be included under chronic heart disease.

Other immunosuppression includes congenital or acquired immunodeficiency, chemotherapy, immunosuppressive drugs, chronic high-dose systemic steroids (≥ 2 mg/kg or ≥ 20 mg/day prednisone or equivalent for > 2 weeks).

Severe neurological disease includes:

a. moderate to profound intellectual disability or developmental delay
b. epilepsy or cerebral palsy if accompanied by (a)
c. neuromuscular disorders (e.g, muscular dystrophy), when associated with impaired respiratory function
d. other neurological disorders associated with impaired pulmonary function and/or difficulty handling lung secretions

Active cancer is defined as any malignancy for which active treatment (systemic chemotherapy or RT) is scheduled, and non cutaneous malignancy not under active treatment (including lymphoma, leukemia or solid tumour not requiring active treatment, or receiving only palliative care).

Obesity defined as recorded in patient chart or BMI >30kg/m^2

19. Symptoms

If symptom data are available, please select "data available, please select all symptoms that apply" and select all symptoms that apply and if possible indicate the onset date of each symptom.

If the patient is asymptomatic, please select 'data available, asymptomatic" and leave all symptoms blank.

If the data are not available, please select "data not available" and leave all symptoms blank

20. Site of respiratory infection

Please indicate all sites of respiratory infection that apply.

Upper respiratory tract infection (URTI) only (e.g. rhinitis, pharyngitis, laryngitis, cold, epiglottitis).

Pneumonia with or without URTI must be supported by radiographic evidence.

Other lower respiratory tract infection with or without URTI (e.g. bronchiolitis, tracheitis).

Respiratory tract infection, unspecified site defined as unable to rule out pneumonia clinically and chest radiographic not done or not interpretable.

21. Viruses isolated

Please select all viruses that were isolated. If other viruses were isolated, please specify. Please indicate the date the specimen for the positive test was collected. If unknown (e.g. was collected prior to hospitalization) please indicate date not available.

22. Specimen type

Please specify the type of specimen that was collected that tested positive. If unknown, please select data not available.

23. Test

Please indicate the test conducted for the specimen which tested positive. If unknown, please select data not available.

24. Was this patient treated with an antiviral for their current VRI?

If the patient was treated with an antiviral, please select all antivirals that the patient received and if possible indicate the start date of each antiviral.

25. Was the patient receiving any of the following specific treatments for their current VRI?

If the patient received any of the treatments listed, please select all treatments received and if possible indicate the start date of each treatment.

26. Did the patient receive an antimicrobial for their current VRI?

If the patient received an antimicrobial, please select all antimicrobials that the patient received and if possible indicate the start date of each antimicrobial.

27. Did this patient receive a corticosteroid for their current VRI?

If this patient received a corticosteroid, please select all corticosteroids that the patient received and if possible, indicate the start date of each corticosteroid.

28. Did this patient have a bacterial co-infection?

A bacterial co-infection is defined as a positive culture obtained from any infected site with a new pathogen. If yes, please specify the date of positive culture, site of infection and pathogen identified. If an ARO for which CNISP conducts surveillance (e.g. CDR, MRSA BSI, VRE BSI, CPE) was identified, please indicate the CNISP PID so that we may link patient data.

29. Did this patient have a stroke within 30 days of positive test?

Please indicate if this patient had a stroke within 30 days of positive test.

30. Did this patient have a pulmonary embolism within 30 days of positive test?

Please indicate if this patient had a pulmonary embolism within 30 days of positive test.

31. Did this patient require BiPAP or CPAP within 30 days of positive test?

Please indicate if the patient required BiPAP or CPAP (including CPAP in a neonatal isolette) within 30 days of positive test.

32. Non-invasive ventilation - total number of days ventilated

If yes to 31 and if possible, please specify the total number of days ventilated.

33. Did this patient require dialysis (hemo or peritoneal dialysis) within 30 days of positive test as a complication from COVID-19 infection?

Please indicate if the patient required dialysis (hemo or peritoneal) or continuous renal replacement therapy (CCRT) within 30 days of positive test as a complication from COVID-19 infection. If the patient was receiving dialysis prior to their positive test, please select no.

34. Did this patient require mechanical ventilation within 30 days of positive test?

Please indicate if the patient required mechanical ventilation within 30 days of positive test.

35. Mechanical ventilation – total number of days ventilated

If yes to Q35 and if possible, please specify the total number of days ventilated.

36. Did this patient require ECMO within 30 days of positive test?

Please indicate if the patient required extracorporeal membrane oxygenation (ECMO) within 30 days of positive test.

37. ICU admission

Please indicate if the patient required admission or transfer to the ICU within 30 days of positive test. If yes, please indicate their ICU admission and discharge dates or if the patient was still admitted at 30 days.

38. Date of ICU admission

If yes to Q37, please indicate the date of ICU admission

39. Date of ICU discharge

If yes to Q37, please indicate the date of ICU discharge

40. What was the patient outcome 30 days after positive test?

At 30 days after positive test, please select one of the outcome options available. Please indicate discharge, transfer or date of death if applicable.

Transferred refers to transfer to another facility; discharge refers to being discharged home (e.g. where they were living prior to hospitalization); if the patient is still hospitalized (doesn't matter which unit) in your hospital then they would be captured under 'patient alive, still in hospital'.

41. If the patient died within 30 days after positive test, please indicate the relationship of VRI to the death.

If the patient died within 30 days after positive test, please indicate if VRI was the cause of death (i.e. the patient had no other condition that would have cause death during this hospitalization); VRI contributed to death (i.e. VRI exacerbated an existing condition that led to the patient's death); VRI was unrelated to death or unable to determine the causality between VRI and death.

Revision History

Date	Revisions Made
March 27, 2020	• Updated weekly aggregate report form (removed line list and added older age group) • Added symptoms to patient questionnaire (Q13)
April 9, 2020	• Added question regarding if HCW provided direct patient care to COVID-19 positive patient(s) (Q7b)

April 20, 2020	• Updated patient questionnaire
	  ○ Added date of readmission
	  ○ Primary admitting diagnosis changed to a text field
	  ○ Added date of onset for each symptom
	  ○ Added secondary bacterial infection
	  ○ Added dialysis required under impact within 30 days
	  ○ Added date of ICU admission and discharge from ICU
	  ○ Added date of discharge from readmission
	  ○ Added comments section

April 28, 2020	• Added asymptomatic as a response option under symptoms • Modified the COVID-19 case definition to reflect that best clinical judgement should be used for patients who are COVID-19 positive greater than 14 days prior to being admitted
June 11, 2020	• For all other VRI (i.e. non-COVID-19 cases), a patient questionnaire is only required to be completed for healthcare-associated cases • Zero report section updated to reflect reporting of zero reports for weekly data • Definitions included as footnotes in questionnaire moved to Appendix D - data dictionary • Q10 modified from 'long-term care facility' to 'long-term care and retirement homes' • Added response options for admitting diagnosis • Added the following underlying medical conditions (Q13): dementia/Alzheimer's disease and obesity • Added the following under symptoms (Q14): chills, hypoxia, fatigue/lethargy, poor appetite/weight loss, dizziness, dehydration and altered mental status • Q15 modified from 'type of VRI' to 'site of respiratory infection' • Chloroquine removed from antiviral question (Q20) as it is captured under other treatment question (Q21) • Added the following response options under 'other treatment" (Q21): Amoxcillin/Clavulin, Cefazolin, Ceftriaxone, Piperacillin/Tazobactam, Meropenem, Vancomycin and Steroid • For Q22 secondary bacterial infection, added pathogen response options • Removed the question 'Impact within 30 days' and created separate questions for the following: non-invasive ventilation, new oxygen requirements and dialysis required due to COVID-19 • Removed 'increase in ventilator settings' question

	• Added 'total number of days ventilated' for mechanical and non-invasive ventilation
Sept 18, 2020	• Beginning the week of Aug 23-29th, new age groups are collected on the weekly report form • Updated denominator data collection form to collect patient days and patient admissions by age group Updated COVID-19 case definition to specify: • If the patient has multiple positive tests, please use the first positive test date to determine eligibility • Any patient who has met the case definition in the past and is re-admitted to a participating hospital with laboratory confirmed COVID-19 identified either during their re-admission or in the 14 days prior to being re-admitted • Please complete a questionnaire for every admission that occurs within 14 days of a SARS-CoV-2 positive test The following changes were made to the patient questionnaire: • For consistently with other CNISP surveillance projects, added the first three digits of the patient's postal code • Added 'was this patient previously admitted and me the COVID-19 case definition' • Under primary admitting diagnosis the following response options will be combined under acute respiratory illness: FRI, ILI, COVID-19, pneumonia, ARD • Added 'has this patient tested positive for SARS-CoV-2 in the three months prior to this positive test' • Added 'if CA, please specify the source of exposure if available' • Changed healthcare worker to healthcare personnel • Added 'setting where HCP worked in 14 days prior to positive test' • Added 'type of HCP' • Removed steroid response option from 'other treatment' and created specific question asking about receipt of corticosteroid, type and date. • Added date of positive culture and site of infection to question regarding secondary bacterial infection • Also collecting CNISP PID if CDI, MRSA BSI, VRE BSI and CPE are identified among COVID-19 patients • Added 'did this patient have a stroke within 30 days of positive test?' • Added 'did this patient have a pulmonary embolism within 30 days of positive test? • Updated non-invasive ventilation question from "Did this patient require non-invasive ventilation (e.g. BiPAP, CPAP) within 30 days of positive test?" to "Did this patient require BiPAP or CPAP within 30 days of positive test" • Removed question regarding 'did this patient require new oxygen requirements?'

Oct 20, 2020	• Clarified COVID-19 case definition: *If the patient has multiple positive tests, please use the first positive test <u>related to this admission date</u> to determine eligibility* • Updated the following question from "Did this patient have a secondary bacterial infection?" to "Did this patient have a bacterial co-infection?" • Updated criteria to indicate that continuous renal replacement therapy (CCRT) should be captured under Q33. Did this patient require dialysis (hemo or peritoneal dialysis) within 30 days of positive test as a complication from COVID-19 infection? • Updated definition of long term care or retirement home to include facilities such as a private or public care home, residential assisted living building or a nursing home with varying levels of care for older persons. This excludes group homes for persons with developmental disabilities, mental health or addiction issues. • For primary admitting diagnosis if a COVID-19 positive patient was admitted from a long term care or retirement home for non-clinical reasons (e.g. home cannot cope with isolation requirements, lack of nursing support etc.), please specify and include this information in the "other" text field. • Added the following definition regarding data submission for re-admitted patients: *If a patient is re-admitted within 30 days of positive test => collect all data on the same form* *If a patient is re-admitted between 31 and 89 days after positive test => do not capture re-admission* *If a patient is re-admitted <u>≥</u> 90 days (3 months) after first admission => please complete a new form and indicate the PID from the 1st form so that we may link the case data* • Date of re-admission (that was removed Sept 28th) have been added back in. • Clarified the following question: "Was this patient previously admitted <u>> 3 months prior to this admission</u> and met the COVID-19 case definition? • Clarified the following question: "Was the patient treated with an antiviral <u>for their current VRI</u>?" • Clarified the following question: "Did this patient receive an antimicrobial <u>for their current VRI</u>?" • Clarified the following question: "Did this patient receive a corticosteroid <u>for their current VRI</u>?" • Clarified the following question: "Was this patient receiving any of the following treatments <u>for their current VRI</u>?" • If the postal code is unknown or not available, please enter 999 for postal code