

Supplementary Material

Table S1. Study data sources by site

Site	Data Source				
	Health insurance registry data	Physician service claims data	Emergency department data	Inpatient hospitalization data	PCR test data
British Columbia	Medical Services Plan & Premium Billing (Consolidation file)	Medical Services Plan	CIHI NACRS	CIHI DAD	BC Ministry of Health COVID-19 Test Laboratory Data
Manitoba	Manitoba Health Insurance Registry	Manitoba Health Medical-Physician Services	Winnipeg Regional Health Authority Emergency Department Information System	CIHI DAD	Manitoba Cadham Provincial COVID-19 Laboratory Testing and Results Database
Ontario	Ontario Health Insurance Plan Registered Persons Database	Ontario Health Insurance Plan (OHIP) Claims History Database	CIHI NACRS	CIHI DAD	Ontario Laboratories Information System

Abbreviations: CIHI: Canadian Institute for Health Information; NACRS: National Ambulatory Care Reporting System; DAD: Discharge Abstract Database

Note: CIHI DAD and NACRS data are coded by trained abstractors using national coding standards and procedures (please see Canadian Institute for Health Information. Canadian Coding Standards for Version 2022 ICD-10-CA and CCI. Ottawa, ON: CIHI; 2022, available at www.cihi.ca). Physician billing records are not necessarily coded by trained abstractors and any coding directions and data quality assessments are provincial in scope.

Table S2: International Classification of Diseases (ICD) and service codes to ascertain COVID-19 cases in administrative data

Code	Descriptor	Source of Code	Purpose
U07.1	Diagnosis code: COVID-19, virus identified	CIHI, ICD-10-CA	Identify COVID-19 cases in inpatient and ED cohorts
C19	Diagnosis code: Services directly related to COVID-19	British Columbia Medical Services Plan (effective March 13, 2020)	Identify COVID-19 cases in outpatient cohort for British Columbia
13701	Service code: Office visit for COVID-19 with test	British Columbia Medical Services Plan (effective March 13, 2020)	Identify COVID-19 cases in outpatient cohort for British Columbia
13702	Service code: Office visit for COVID-19 without test	British Columbia Medical Services Plan (effective March 13, 2020)	Identify COVID-19 cases in outpatient cohort for British Columbia
13708	Service code: Family physician COVID-19 communication with specialist and/or allied care provider	British Columbia Medical Services Plan (effective March 13, 2020)	Identify COVID-19 cases in outpatient cohort for British Columbia
10008	Service code: Urgent specialist COVID-19 advice	British Columbia Medical Services Plan (effective March 13, 2020)	Identify COVID-19 cases in outpatient cohort for British Columbia
079.82	Diagnosis code: COVID-19 associated coronavirus	Manitoba Health (effective March 30, 2020)	Identify COVID-19 cases in outpatient cohort for Manitoba
080	Diagnosis code: Coronavirus	Ontario Health Insurance Plan (effective March 14, 2020)	Identify COVID-19 cases in outpatient cohort for Ontario

Abbreviations: CIHI: Canadian Institute for Health Information; ED: Emergency Department and ICD-10-CA: International Classification of Diseases, 10th revision, Canadian enhancement

Table S3. Characteristics of inpatient cohort by province

Characteristic	British Columbia	Manitoba	Ontario
Patients, N	563,271	72,143	665,755
Age, years			
Mean (SD)	56.7 (20.7)	52.2 (23.8)	55.6 (23.4)
<65, n (%)	325,157 (57.7)	45,422 (63.0)	382,322 (57.4)
65-79, n (%)	169,678 (30.1)	15,918 (22.1)	167,007 (25.1)
80+, n (%)	68,436 (12.2)	10,803 (15.0)	116,426 (17.5)
Sex, n (%)			
Males	259,002 (46.0)	27,484 (38.1)	270,243 (40.6)
Females	304,269 (54.0)	44,659 (61.9)	395,512 (59.4)
Income quintile, n (%)			
1st (Lowest)	74,570 (13.2)	19,335 (26.8)	152,780 (22.9)
2nd	43,965 (7.8)	15,169 (21.0)	137,980 (20.7)
3rd	40,479 (7.2)	13,916 (19.3)	131,971 (19.8)
4th	45,859 (8.1)	12,295 (17.0)	123,421 (18.5)
5th (Highest)	126,662 (22.5)	10,244 (14.2)	116,783 (17.5)
Missing	231,736 (41.1)	1,184 (1.6)	2,820 (0.4)
Area of residence, n (%)			
Rural	71,057 (12.6)	31,228 (43.3)	82,452 (12.4)
Urban	492,214 (87.4)	40,903 (56.7)	580,772 (87.2)
Missing	0 (0.0)	12 (0.0)	2,531 (0.4)

Abbreviation: SD: standard deviation

Table S4. Characteristics of emergency department (ED) cohort by province

Characteristic	British Columbia	Manitoba	Ontario
Patients, N	534,607	166,158	2,472,119
Age, years			
Mean (SD)	44.0 (23.5)	42.0 (24.2)	43.3 (23.5)
<65, n (%)	416,553 (77.92)	131,468 (79.1)	1,948,851 (78.8)
65-79, n (%)	79,409 (14.9)	23,208 (14.0)	361,389 (14.6)
80+, n (%)	38,645 (7.2)	11,482 (6.9)	161,879 (6.5)
Sex, n (%)			
Males	260,531 (48.7)	78,692 (47.4)	1,181,949 (47.8)
Females	274,076 (51.3)	87,466 (52.6)	1,290,170 (52.2)
Income quintile, n (%)			
1st (Lowest)	56,441 (10.6)	41,294 (24.9)	541,669 (21.9)
2nd	28,257 (5.3)	32,655 (19.7)	498,663 (20.2)
3rd	26,088 (4.9)	28,540 (17.2)	494,497 (20.0)
4th	30,000 (5.6)	31,424 (18.9)	478,641 (19.4)
5th (Highest)	91,536 (17.1)	30,296 (18.2)	448,355 (18.1)
Missing	302,285 (56.5)	1,949 (1.2)	10,294 (0.4)
Area of residence, n (%)			
Rural	15,314 (2.9)	61,009 (36.7)	366,131 (14.8)
Urban	519,293 (97.2)	105,130 (63.3)	2,097,009 (84.8)
Missing	0 (0.0)	19 (0.0)	8,979 (0.4)

Abbreviation: SD: standard deviation

Table S5. Characteristics of outpatient cohort by province

Characteristic	British Columbia	Manitoba	Ontario
Patients, N	3,957,380	995,070	10,186,924
Age, years			
Mean (SD)	45.6 (22.9)	42.4 (23.7)	44.2 (23.4)
<65, n (%)	3,013,785 (76.2)	791,630 (79.6)	7,947,374 (78.0)
65-79, n (%)	701,382 (17.7)	151,703 (15.2)	1,653,837 (16.2)
80+, n (%)	242,213 (6.1)	51,737 (5.2)	585,713 (5.7)
Sex, n (%)			
Males	1,838,783 (46.5)	457,319 (46.0)	4,630,592 (45.5)
Females	2,118,597 (53.5)	537,751 (54.0)	5,556,332 (54.5)
Income quintile, n (%)			
1st (Lowest)	354,954 (9.0)	186,810 (18.8)	1,921,604 (18.9)
2nd	201,328 (5.1)	194,547 (19.5)	1,974,778 (19.4)
3rd	194,709 (4.9)	203,330 (20.4)	2,062,403 (20.2)
4th	231,708 (5.9)	197,987 (19.9)	2,093,465 (20.6)
5th (Highest)	745,651 (18.8)	203,409 (20.4)	2,094,745 (20.6)
Missing	2,229,030 (56.3)	8,987 (0.9)	39,929 (0.4)
Area of residence, n (%)			
Rural	412,296 (10.4)	348,274 (35.0)	929,450 (9.1)
Urban	3,545,084 (89.6)	646,683 (65.0)	9,221,005 (90.5)
Missing	0 (0.0)	113 (0.0)	36,469 (0.4)

Abbreviation: SD: standard deviation

Table S6. Frequency (%) and rates of COVID-19 PCR tests and positive PCR tests by quarter (Q) and month

	Q1		
	April 2020	May 2020	June 2020
British Columbia			
COVID-19 PCR tests, n	46,442	53,819	49,586
Positive COVID-19 PCR tests, n (%)	1,342 (2.9)	743 (1.4)	388 (0.8)
COVID-19 PCR tests per 10,000 population*	91	105	96
Positive COVID-19 PCR tests per 10,000 population*	3	1	1
Manitoba			
COVID-19 PCR tests, n	10,096	13,480	13,262
Positive COVID-19 PCR tests, n (%)	69 (0.7)	16 (0.1)	14 (0.1)
COVID-19 PCR tests per 10,000 population*	73	97	99
Positive COVID-19 PCR tests per 10,000 population*	1	0.1	0.1
Ontario			
COVID-19 PCR tests, n	246,303	382,865	660,301
Positive COVID-19 PCR tests, n (%)	18,719 (7.6)	16,199 (4.2)	8,582 (1.3)
COVID-19 PCR tests per 10,000 population*	162	252	435
Positive COVID-19 PCR tests per 10,000 population*	12	11	6
	Q2		
	July 2020	August 2020	September 2020
British Columbia			
COVID-19 PCR tests, n	69,974	92,338	146,203
Positive COVID-19 PCR tests, n (%)	849 (1.2)	2,236 (2.4)	3,565 (2.4)
COVID-19 PCR tests per 10,000 population*	136	180	284
Positive COVID-19 PCR tests per 10,000 population*	2	4	7
Manitoba			
COVID-19 PCR tests, n	18,772	28,376	29,920
Positive COVID-19 PCR tests, n (%)	64 (0.3)	489 (1.7)	531 (1.8)
COVID-19 PCR tests per 10,000 population*	135	204	215
Positive COVID-19 PCR tests per 10,000 population*	1	4	4
Ontario			
COVID-19 PCR tests, n	702,302	695,185	998,664
Positive COVID-19 PCR tests, n (%)	4,798 (0.7)	3,575 (0.5)	12,041 (1.2)
COVID-19 PCR tests per 10,000 population*	462	456	654
Positive COVID-19 PCR tests per 10,000 population*	3	2	8
	Q3		

	October 2020	November 2020	December 2020
British Columbia			
COVID-19 PCR tests, n	198,655	242,841	232,560
Positive COVID-19 PCR tests, n (%)	6,458 (3.3)	20,193 (8.3)	18,883 (8.1)
COVID-19 PCR tests per 10,000 population*	386	470	450
Positive COVID-19 PCR tests per 10,000 population*	13	39	37
Manitoba			
COVID-19 PCR tests, n	45,569	56,524	40,037
Positive COVID-19 PCR tests, n (%)	2,706 (5.9)	7,099 (12.6)	4,310 (10.8)
COVID-19 PCR tests per 10,000 population*	328	406	288
Positive COVID-19 PCR tests per 10,000 population*	19	51	31
Ontario			
COVID-19 PCR tests, n	983,112	1,045,716	1,457,041
Positive COVID-19 PCR tests, n (%)	24,548 (2.5)	43,514 (4.2)	71,071 (4.8)
COVID-19 PCR tests per 10,000 population*	643	683	951
Positive COVID-19 PCR tests per 10,000 population*	16	28	46
Q4			
	January 2021	February 2021	March 2021
British Columbia			
COVID-19 PCR tests, n	196,609	175,432	203,192
Positive COVID-19 PCR tests, n (%)	15,204 (7.7)	13,165 (7.5)	20,566 (10.1)
COVID-19 PCR tests per 10,000 population*	379	338	390
Positive COVID-19 PCR tests per 10,000 population*	29	25	40
Manitoba			
COVID-19 PCR tests, n	33,323	29,515	36,338
Positive COVID-19 PCR tests, n (%)	2,485 (7.5)	1,048 (3.6)	1,033 (2.8)
COVID-19 PCR tests per 10,000 population*	240	21	261
Positive COVID-19 PCR tests per 10,000 population*	18	1	7
Ontario			
COVID-19 PCR tests, n	1,372,756	1,184,112	1,396,884
Positive COVID-19 PCR tests, n (%)	78,116 (5.7)	32,693 (2.8)	54,260 (3.9)
COVID-19 PCR tests per 10,000 population*	896	772	910
Positive COVID-19 PCR tests per 10,000 population*	51	21	35

*Note: maximum of one test per person per day

Table S7. COVID-19 diagnosed cases by province and quarter (Q): inpatient cohort

Case Type	Q1 (Apr 2020 – Jun 2020)	Q2 (Jul 2020 – Sept 2020)	Q3 (Oct 2020 – Dec 2020)	Q4 (Jan 2021 – Mar 2021)
British Columbia				
True Positive	260	134	952	1,400
False Positive	607	618	1,076	975
False Negative	34	105	880	1,216
True Negative	23,447	25,737	42,290	57,899
Total	24,348	26,594	45,198	61,490
Manitoba				
True Positive	s	86	752	280
False Positive	28	56	606	242
False Negative	s	28	520	301
True Negative	6,251	7,841	12,172	15,767
Total	6,306	8,011	14,050	16,590
Ontario				
True Positive	2,862	707	3,170	6,350
False Positive	954	253	1,475	2,869
False Negative	468	261	1,920	2,592
True Negative	81,835	113,828	122,061	140,211
Total	86,119	115,049	128,626	152,022

Abbreviation: s = suppressed cell for values under 6

Table S8. COVID-19 diagnosed cases by province and quarter (Q): emergency department (ED) cohort

Case Type	Q1 (Apr 2020 – Jun 2020)	Q2 (Jul 2020 – Sept 2020)	Q3 (Oct 2020 – Dec 2020)	Q4 (Jan 2021 – Mar 2021)
British Columbia				
True Positive	140	336	1,207	1,024
False Positive	37	84	759	740
False Negative	127	422	2,593	2,544
True Negative	20,068	28,937	40,888	38,628
Total	20,372	29,779	45,447	42,936
Manitoba				
True Positive	0	s	223	109
False Positive	9	s	428	164
False Negative	18	148	2,032	833
True Negative	9,539	12,920	15,371	14,451
Total	9,566	13,100	18,054	15,557
Ontario				
True Positive	3,653	1,645	11,710	11,073
False Positive	1,094	423	2,688	4,755
False Negative	2,338	1,499	8,118	10,104
True Negative	168,109	264,129	233,122	223,935
Total	175,194	267,696	255,638	249,867

Abbreviation: s = suppressed cell for values under 6

Table S9. COVID-19 diagnosed cases by province and quarter (Q): outpatient cohort

Case Type	Q1 (Apr 2020 – Jun 2020)	Q2 (Jul 2020 – Sept 2020)	Q3 (Oct 2020 – Dec 2020)	Q4 (Jan 2021 – Mar 2021)
British Columbia				
True Positive	145	311	854	996
False Positive	13,937	20,101	14,453	6,724
False Negative	1,274	4,826	35,541	39,252
True Negative	107,086	221,715	448,235	373,009
Total	122,442	246,953	499,083	419,981
Manitoba				
True Positive	s	15	526	203
False Positive	169	165	3,237	3,332
False Negative	s	877	10,108	3,002
True Negative	31,038	64,504	93,690	65,535
Total	31,286	65,561	107,561	72,072
Ontario				
True Positive	4,095	1,955	26,096	32,389
False Positive	44,223	59,352	90,070	71,676
False Negative	15,278	7,794	52,999	58,681
True Negative	542,811	886,211	1,040,493	1,027,919
Total	606,407	955,312	1,209,658	1,190,665

Abbreviation: s = suppressed cell for values under 6

Table S10. Overall validation estimates (95% confidence intervals) by age group, sex, and quarter (Q): inpatient cohort

	Sensitivity	Specificity	PPV	NPV
Q1 (Apr 2020 – Jun 2020)				
Age Group				
<65	83.9 (80.5, 87.3)	98.6 (98.4, 98.7)	60.1 (57.0, 63.2)	99.6 (99.5, 99.7)
65-79	89.2 (86.1, 92.4)	98.7 (98.4, 98.9)	69.0 (65.5, 72.5)	99.6 (99.5, 99.7)
80+	86.0 (82.6, 89.4)	98.6 (98.3, 98.8)	72.2 (68.7, 75.7)	99.4 (99.3, 99.5)
Sex				
Male	88.2 (85.7, 90.7)	98.4 (98.2, 98.6)	65.5 (62.8, 68.1)	99.6 (99.5, 99.7)
Female	83.8 (80.8, 86.8)	98.8 (98.6, 98.9)	67.6 (64.7, 70.5)	99.5 (99.4, 99.6)
Q2 (Jul 2020 – Sept 2020)				
Age Group				
<65	60.9 (54.1, 67.7)	99.4 (99.3, 99.5)	46.7 (41.7, 51.8)	99.7 (99.6, 99.7)
65-79	76.4 (68.8, 84.0)	99.3 (99.2, 99.5)	48.5 (43.0, 54.0)	99.8 (99.7, 99.9)
80+	79.1 (71.9, 86.3)	99.3 (99.2, 99.5)	56.5 (50.5, 62.5)	99.8 (99.7, 99.8)
Sex				
Male	77.6 (72.1, 83.1)	99.2 (99.1, 99.4)	49.5 (45.4, 53.6)	99.8 (99.7, 99.8)
Female	62.7 (56.2, 69.1)	99.5 (99.4, 99.6)	50.6 (45.7, 55.6)	99.7 (99.6, 99.7)
Q3 (Oct 2020 – Dec 2020)				
Age Group				
<65	46.0 (43.2, 48.8)	98.3 (98.2, 98.5)	52.1 (49.5, 54.7)	97.8 (97.7, 98.0)
65-79	70.2 (66.9, 73.4)	98.2 (98.0, 98.4)	63.4 (60.6, 66.2)	98.6 (98.5, 98.8)
80+	70.7 (67.5, 74.0)	98.2 (97.9, 98.4)	70.1 (67.2, 73.0)	98.2 (98.0, 98.4)
Sex				
Male	66.5 (64.0, 69.0)	97.9 (97.7, 98.1)	60.4 (58.3, 62.5)	98.4 (98.3, 98.5)
Female	52.6 (50.0, 55.3)	98.6 (98.4, 98.7)	61.1 (58.6, 63.5)	98.0 (97.9, 98.1)
Q4 (Jan 2021 – Mar 2021)				
Age Group				
<65	50.6 (48.3, 52.9)	98.2 (98.1, 98.3)	56.7 (54.5, 58.8)	97.7 (97.6, 97.8)
65-79	76.9 (74.5, 79.3)	98.1 (97.9, 98.3)	69.9 (67.7, 72.1)	98.7 (98.5, 98.8)
80+	80.4 (78.0, 82.7)	97.9 (97.7, 98.2)	75.6 (73.4, 77.9)	98.4 (98.2, 98.6)
Sex				
Male	72.4 (70.5, 74.4)	97.8 (97.6, 97.9)	66.6 (64.9, 68.3)	98.3 (98.2, 98.4)
Female	59.8 (57.7, 62.0)	98.4 (98.3, 98.6)	65.9 (64.0, 67.8)	98.0 (97.9, 98.1)

Abbreviations: PPV: Positive predictive value; NPV: Negative predictive value

Table S11. Overall validation estimates (95% confidence intervals) by age group, sex, and quarter (Q): emergency department (ED) cohort

	Sensitivity	Specificity	PPV	NPV
Q1 (Apr 2020 – Jun 2020)				
Age Group				
<65	63.5 (61.2, 65.8)	99.4 (99.3, 99.5)	78.0 (76.0, 80.0)	98.8 (98.7, 98.8)
65-79	55.7 (49.5, 61.8)	99.6 (99.5, 99.7)	76.7 (70.9, 82.4)	99.0 (98.9, 99.1)
80+	35.7 (28.3, 43.1)	99.4 (99.2, 99.6)	60.4 (51.3, 69.4)	98.3 (98.2, 98.5)
Sex				
Male	63.9 (60.9, 66.9)	99.5 (99.4, 99.6)	80.3 (77.7, 82.9)	98.8 (98.7, 98.9)
Female	57.4 (54.5, 60.3)	99.4 (99.3, 99.5)	74.0 (71.3, 76.6)	98.7 (98.6, 98.8)
Q2 (Jul 2020 – Sept 2020)				
Age Group				
<65	49.3 (46.5, 52.2)	99.8 (99.8, 99.8)	78.9 (76.1, 81.7)	99.3 (99.2, 99.3)
65-79	50.4 (41.5, 59.4)	99.9 (99.8, 99.9)	78.4 (69.7, 87.0)	99.6 (99.5, 99.6)
80+	36.9 (23.5, 50.3)	99.9 (99.8, 100)	73.3 (56.9, 89.8)	99.5 (99.5, 99.6)
Sex				
Male	49.4 (45.6, 53.1)	99.8 (99.8, 99.9)	80.0 (76.4, 83.7)	99.3 (99.2, 99.3)
Female	48.6 (44.9, 52.4)	99.8 (99.8, 99.9)	77.5 (73.8, 81.3)	99.4 (99.3, 99.4)
Q3 (Oct 2020 – Dec 2020)				
Age Group				
<65	52.5 (51.3, 53.7)	98.6 (98.6, 98.7)	77.9 (76.8, 79.0)	95.8 (95.7, 95.9)
65-79	48.2 (45.0, 51.3)	98.8 (98.6, 99.0)	75.5 (72.4, 78.6)	96.1 (95.9, 96.3)
80+	31.3 (27.2, 35.4)	99.0 (98.8, 99.2)	68.4 (62.7, 74.0)	95.4 (95.1, 95.6)
Sex				
Male	53.8 (52.3, 55.3)	98.6 (98.5, 98.7)	79.3 (78.0, 80.7)	95.6 (95.5, 95.8)
Female	47.9 (46.4, 49.4)	98.7 (98.6, 98.8)	75.1 (73.6, 76.6)	95.9 (95.8, 96.0)
Q4 (Jan 2021 – Mar 2021)				
Age Group				
<65	47.8 (46.7, 49.0)	97.8 (97.7, 97.9)	68.1 (66.9, 69.3)	95.1 (95.0, 95.2)
65-79	50.1 (47.0, 53.1)	98.4 (98.2, 98.6)	69.9 (66.8, 72.9)	96.3 (96.1, 96.5)
80+	37.1 (32.7, 41.5)	99.0 (98.8, 99.2)	68.8 (63.4, 74.1)	96.3 (96.1, 96.6)
Sex				
Male	48.4 (46.8, 49.9)	97.9 (97.8, 98.0)	69.9 (68.3, 71.4)	94.9 (94.8, 95.1)
Female	46.7 (45.2, 48.2)	98.1 (98.0, 98.2)	66.9 (65.3, 68.4)	95.7 (95.6, 95.8)

Abbreviations: PPV: Positive predictive value; NPV: Negative predictive value

Table S12. Overall validation estimates (95% confidence intervals) by age group, sex, and quarter (Q): outpatient cohort

	Sensitivity	Specificity	PPV	NPV
Q1 (Apr 2020 – Jun 2020)				
Age Group				
<65	26.0 (24.7, 27.3)	90.6 (90.4, 90.7)	7.0 (6.6, 7.3)	97.8 (97.8, 97.9)
65-79	13.0 (10.9, 15.1)	94.1 (93.9, 94.3)	4.3 (3.7, 5.0)	98.1 (98.1, 98.2)
80+	8.7 (7.3, 10.1)	96.4 (96.2, 96.6)	9.4 (8.0, 10.9)	96.1 (96.1, 96.2)
Sex				
Male	20.6 (19.2, 22.1)	91.6 (91.4, 91.8)	6.9 (6.4, 7.4)	97.5 (97.4, 97.5)
Female	20.1 (18.9, 21.3)	92.4 (92.3, 92.6)	6.7 (6.3, 7.1)	97.7 (97.7, 97.8)
Q2 (Jul 2020 – Sept 2020)				
Age Group				
<65	15.3 (14.3, 16.4)	92.9 (92.8, 93.0)	2.9 (2.7, 3.1)	98.7 (98.7, 98.8)
65-79	21.1 (17.0, 25.1)	96.6 (96.5, 96.8)	3.9 (3.2, 4.6)	99.5 (99.4, 99.5)
80+	5.0 (2.2, 7.8)	97.4 (97.2, 97.6)	1.5 (0.7, 2.4)	99.2 (99.2, 99.2)
Sex				
Male	14.6 (13.2, 16.0)	93.2 (93.1, 93.3)	3.1 (2.8, 3.4)	98.7 (98.7, 98.7)
Female	14.3 (13.0, 15.6)	93.9 (93.8, 94.0)	2.6 (2.3, 2.8)	99.0 (99.0, 99.0)
Q3 (Oct 2020 – Dec 2020)				
Age Group				
<65	23.5 (23.0, 23.9)	93.1 (93.0, 93.1)	20.5 (20.1, 20.8)	94.1 (94.1, 94.1)
65-79	26.5 (25.1, 27.9)	95.8 (95.7, 96.0)	25.9 (24.7, 27.1)	95.9 (95.9, 96.0)
80+	9.5 (8.4, 10.6)	96.9 (96.7, 97.1)	19.3 (17.3, 21.2)	93.2 (93.1, 93.3)
Sex				
Male	23.0 (22.4, 23.5)	92.9 (92.8, 93.0)	21.7 (21.2, 22.2)	93.4 (93.3, 93.4)
Female	20.8 (20.2, 21.3)	94.1 (94.0, 94.2)	19.1 (18.7, 19.6)	94.6 (94.6, 94.7)
Q4 (Jan 2021 – Mar 2021)				
Age Group				
<65	25.9 (25.5, 26.4)	94.8 (94.7, 94.8)	31.9 (31.4, 32.3)	93.1 (93.1, 93.2)
65-79	33.9 (32.4, 35.3)	95.0 (94.9, 95.2)	26.7 (25.6, 27.7)	96.4 (96.3, 96.5)
80+	14.9 (13.4, 16.4)	94.3 (94.0, 94.5)	12.9 (11.7, 14.1)	95.1 (95.0, 95.2)
Sex				
Male	25.6 (25.0, 26.2)	94.4 (94.3, 94.5)	31.5 (30.9, 32.1)	92.6 (92.5, 92.7)
Female	24.4 (23.9, 25.0)	95.0 (94.9, 95.1)	27.2 (26.7, 27.7)	94.2 (94.2, 94.3)

Abbreviations: PPV: Positive predictive value; NPV: Negative predictive value

Table S13. Sensitivity analyses of validation estimates (95% confidence intervals) for the inpatient cohort: positive test no more than 7 days before hospital admission date or before discharge date

Measure	Q1 (Apr 2020 – Jun 2020)	Q2 (Jul 2020 – Sept 2020)	Q3 (Oct 2020 – Dec 2020)	Q4 (Jan 2021 – Mar 2021)
British Columbia				
Sensitivity	97.3 (95.5, 99.2)	95.7 (92.9, 98.6)	98.0 (97.2, 98.7)	95.3 (94.4, 96.2)
Specificity	97.1 (96.9, 97.4)	97.2 (97.0, 97.4)	97.9 (97.8, 98.1)	99.1 (99.1, 99.2)
PPV	33.3 (30.2, 36.5)	23.9 (20.9, 27.0)	67.1 (65.0, 69.1)	81.0 (79.4, 82.6)
NPV	99.9 (99.9, 100.0)	100.0 (99.9, 100.0)	99.9 (99.9, 99.9)	99.8 (99.8, 99.9)
Manitoba				
Sensitivity	90.3 (79.9, 100)	80.4 (73.9, 86.9)	69.7 (67.5, 71.9)	60.2 (56.7, 63.7)
Specificity	99.6 (99.5, 99.8)	99.7 (99.5, 99.8)	98.7 (98.5, 98.9)	99.6 (99.5, 99.7)
PPV	53.9 (40.3, 67.4)	81.0 (74.5, 87.4)	88.0 (86.3, 89.7)	87.2 (84.3, 90.0)
NPV	99.9 (99.9, 100)	99.6 (99.5, 99.8)	95.9 (95.6, 96.2)	98.1 (97.9, 98.3)
Ontario				
Sensitivity	88.3 (87.3, 89.3)	76.7 (74.2, 79.2)	68.7 (67.5, 69.8)	76.2 (75.5, 77.0)
Specificity	99.6 (99.6, 99.7)	99.9 (99.9, 99.9)	99.6 (99.6, 99.7)	99.4 (99.3, 99.4)
PPV	92.5 (91.7, 93.4)	89.6 (87.7, 91.5)	90.6 (89.8, 91.5)	90.2 (89.6, 90.8)
NPV	99.4 (99.4, 99.5)	99.8 (99.7, 99.8)	98.5 (98.4, 98.5)	98.2 (98.1, 98.3)
All				
Sensitivity	88.9 (87.3, 90.5)	79.6 (76.0, 83.1)	73.3 (71.7, 74.8)	78.2 (77.0, 79.4)
Specificity	99.2 (99.1, 99.3)	99.5 (99.5, 99.6)	99.2 (99.2, 99.3)	99.3 (99.3, 99.4)
PPV	81.3 (79.5, 83.0)	62.3 (59.1, 65.5)	84.2 (82.9, 85.5)	88.3 (87.4, 89.2)
NPV	99.6 (99.5, 99.6)	99.8 (99.8, 99.8)	98.5 (98.5, 98.6)	98.6 (98.5, 98.7)

Abbreviations: Q: quarter; PV: Positive predictive value; NPV: Negative predictive value

Table S14. Sensitivity analyses of validation estimates (95% confidence intervals) for the inpatient cohort: positive test no more than 14 days before admission date or 14 days after admission date

Measure	Q1 (Apr 2020 – Jun 2020)	Q2 (Jul 2020 – Sept 2020)	Q3 (Oct 2020 – Dec 2020)	Q4 (Jan 2021 – Mar 2021)
British Columbia				
Sensitivity	90.1 (86.9, 93.2)	65.2 (59.9, 70.6)	64.0 (62.1, 65.9)	63.8 (62.2, 65.4)
Specificity	97.7 (97.5, 97.9)	97.9 (97.7, 98.1)	98.9 (98.8, 99.0)	99.6 (99.6, 99.7)
PPV	35.5 (32.3, 38.7)	26.2 (23.1, 29.3)	77.2 (75.4, 79.0)	90.3 (89.1, 91.5)
NPV	99.9 (99.8, 99.9)	99.6 (99.5, 99.7)	98.0 (97.8, 98.1)	97.9 (97.8, 98.1)
Manitoba				
Sensitivity	83.3 (66.1, 100)	71.1(62.1, 80.2)	69.0 (66.8, 71.2)	60.3 (56.9, 63.8)
Specificity	99.4 (99.2, 99.6)	99.1 (98.9, 99.3)	98.4 (98.2, 98.6)	99.6 (99.5, 99.7)
PPV	28.9 (16.5, 41.2)	48.6 (40.4, 56.8)	85.4 (83.5, 87.2)	87.7 (84.9, 90.5)
NPV	100.0 (99.9, 100)	99.6 (99.5, 99.8)	95.9 (95.6, 96.2)	98.1 (97.9, 98.3)
Ontario				
Sensitivity	88.5 (87.5, 89.4)	76.4 (73.9, 78.9)	69.4 (68.3, 70.5)	76.5 (75.8, 77.3)
Specificity	99.7 (99.7, 99.8)	99.9 (99.9, 99.9)	99.8 (99.7, 99.8)	99.5 (99.4, 99.5)
PPV	94.0 (93.2, 94.7)	87.8 (85.7, 89.9)	93.7 (93.0, 94.4)	91.8 (91.2, 92.3)
NPV	99.4 (99.4, 99.5)	99.8 (99.7, 99.8)	98.5 (98.4, 98.5)	98.2 (98.1, 98.3)
All				
Sensitivity	88.6 (86.9, 90.2)	73.8 (69.9, 77.6)	68.1 (66.5, 69.6)	72.9 (71.7, 74.1)
Specificity	99.3 (99.2, 99.4)	99.5 (99.4, 99.6)	99.5 (99.4, 99.5)	99.5 (99.5, 99.6)
PPV	82.6 (80.8, 84.3)	59.8 (56.6, 63.1)	88.1 (87.0, 89.3)	91.3 (90.5, 92.1)
NPV	99.6 (99.5, 99.6)	99.7 (99.7, 99.8)	98.2 (98.1, 98.2)	98.1 (98.0, 98.2)

Abbreviations: Q: quarter; PV: Positive predictive value; NPV: Negative predictive value

Table S15. Sensitivity analyses of validation estimates (95% confidence intervals) for the emergency department (ED) cohort: 5 days before or after specimen collection date

Measure	Q1 (Apr 2020 – Jun 2020)	Q2 (Jul 2020 – Sept 2020)	Q3 (Oct 2020 – Dec 2020)	Q4 (Jan 2021 – Mar 2021)
British Columbia				
Sensitivity	54.5 (48.6, 60.3)	46.1 (42.6, 49.6)	36.3 (34.8, 37.8)	33.1 (31.6, 34.6)
Specificity	99.9 (99.8, 99.9)	99.8 (99.7, 99.8)	98.8 (98.7, 98.9)	98.7 (98.6, 98.8)
PPV	85.9 (80.7, 91.0)	86.0 (82.6, 89.3)	75.1 (73.2, 77.0)	71.4 (69.3, 73.5)
NPV	99.4 (99.3, 99.5)	98.6 (98.4, 98.7)	94.0 (93.8, 94.3)	93.8 (93.6, 94.1)
Manitoba				
Sensitivity	10.0 (0.0, 23.1)	8.1 (3.9, 12.3)	15.5 (14.1, 17.0)	16.3 (14.0, 18.6)
Specificity	99.9 (99.9, 100.0)	99.9 (99.8, 99.9)	98.2 (98.0, 98.4)	99.2 (99.1, 99.4)
PPV	22.2 (0.0, 49.4)	39.4 (22.7, 56.1)	57.3 (53.5, 61.1)	59.3 (53.5, 65.2)
NPV	99.8 (99.7, 99.9)	98.9 (98.7, 99.0)	88.3 (87.8, 88.8)	94.6 (94.2, 94.9)
Ontario				
Sensitivity	63.1 (61.9, 64.3)	54.4 (52.7, 56.1)	61.1 (60.4, 61.7)	55.7 (55.0, 56.3)
Specificity	99.6 (99.5, 99.6)	99.9 (99.9, 99.9)	99.3 (99.3, 99.3)	98.6 (98.6, 98.7)
PPV	84.2 (83.2, 85.3)	86.5 (85.0, 88.0)	88.4 (87.9, 88.9)	80.1 (79.5, 80.8)
NPV	98.6 (98.6, 98.7)	99.4 (99.4, 99.5)	96.6 (96.6, 96.7)	95.7 (95.6, 95.8)
All				
Sensitivity	62.6 (60.6, 64.6)	51.1 (48.5, 53.7)	53.4 (52.3, 54.4)	51.1 (50.1, 52.2)
Specificity	99.6 (99.6, 99.7)	99.9 (99.9, 99.9)	99.2 (99.1, 99.2)	98.7 (98.6, 98.7)
PPV	84.2 (82.5, 85.9)	85.8 (83.5, 88.1)	85.7 (84.8, 86.5)	79.0 (78.0, 79.9)
NPV	98.8 (98.7, 98.8)	99.3 (99.3, 99.4)	95.8 (95.7, 95.9)	95.4 (95.3, 95.5)

Abbreviations: Q: quarter; PV: Positive predictive value; NPV: Negative predictive value

Table S16. Sensitivity analyses of validation estimates (95% confidence intervals) for the outpatient cohort: 5 days before or after specimen collection date

Measure	Q1 (Apr 2020 – Jun 2020)	Q2 (Jul 2020 – Sept 2020)	Q3 (Oct 2020 – Dec 2020)	Q4 (Jan 2021 – Mar 2021)
British Columbia				
Sensitivity	11.6 (9.9, 13.2)	6.6 (5.9, 7.2)	2.7 (2.5, 2.9)	2.7 (2.5, 2.9)
Specificity	88.5 (88.3, 88.7)	91.7 (91.6, 91.8)	96.9 (96.9, 97.0)	98.3 (98.2, 98.3)
PPV	1.2 (1.0, 1.4)	1.7 (1.5, 1.8)	6.4 (6.0, 6.8)	14.0 (13.3, 14.8)
NPV	98.8 (98.8, 98.9)	97.9 (97.8, 97.9)	92.7 (92.6, 92.7)	90.5 (90.4, 90.6)
Manitoba				
Sensitivity	3.8 (0.0, 8.0)	5.1 (3.7, 6.5)	9.3 (8.8, 9.8)	10.2 (9.2, 11.3)
Specificity	99.5 (99.4, 99.5)	99.8 (99.8, 99.8)	97.2 (97.1, 97.3)	95.4 (95.2, 95.5)
PPV	1.8 (0.0, 3.7)	26.1 (19.7, 32.5)	27.5 (26.1, 29.0)	9.7 (8.7, 10.6)
NPV	99.8 (99.7, 99.8)	98.7 (98.6, 98.7)	90.3 (90.1, 90.4)	95.6 (95.5, 95.8)
Ontario				
Sensitivity	30.0 (29.4, 30.6)	31.4 (30.5, 32.2)	41.3 (41.0, 41.6)	42.4 (42.1, 42.7)
Specificity	92.9 (92.8, 92.9)	93.9 (93.8, 93.9)	93.0 (92.9, 93.0)	94.4 (94.4, 94.5)
PPV	13.6 (13.3, 13.9)	5.8 (5.6, 6.0)	32.1 (31.8, 32.4)	41.5 (41.2, 41.8)
NPV	97.3 (97.2, 97.3)	99.1 (99.1, 99.2)	95.2 (95.1, 95.2)	94.6 (94.6, 94.6)
All				
Sensitivity	28.7 (27.2, 28.9)	30.4 (29.0, 31.8)	37.7 (37.2, 38.2)	41.1 (40.6, 41.6)
Specificity	93.4 (93.3, 93.5)	94.4 (94.3, 94.5)	93.5 (93.4, 93.5)	94.6 (94.5, 94.7)
PPV	11.6 (10.6, 12.5)	6.4 (6.1, 6.7)	32.6 (32.3, 33.0)	41.0 (40.5, 41.4)
NPV	94.7 (94.7, 94.8)	99.1 (99.1, 99.1)	94.7 (94.7, 94.8)	94.6 (94.6, 94.7)

Abbreviations: Q: quarter; PV: Positive predictive value; NPV: Negative predictive value