Appendix 3: Sensitivity analysis

Table 1S: Characteristics of PEM physicians who are in the most unvaccinated patient group with the largest number of unvaccinated patients (top 10%), compared to the remaining 90% of PEM physicians

Characteristic		Top 10th percentile N=905 N (%)	Rest 90% N=8,154 N (%)	TOTAL N=9,059 N (%)	Standardized Difference
Sex	Male	643 (71.0%)	3,862 (47.4%)	4,505 (49.7%)	0.50
	Female	262 (29.0%)	4,292 (52.6%)	4,554 (50.3%)	0.50
Training	Outside Canada	426 (52.1%)	1,693 (28.4%)	2,119 (31.3%)	0.50
	Canada	392 (47.9%)	4,262 (71.6%)	4,654 (68.7%)	0.50
Physician age	Median (IQR)	56 (49-64)	49 (39-59)	50 (40-60)	0.55
Enrollment model	EFFS	463 (51.2%)	2,287 (28.0%)	2,750 (30.4%)	0.49
	CAP	280 (30.9%)	2,893 (35.5%)	3,173 (35.0%)	0.10
	FHT	158 (17.5%)	2,876 (35.3%)	3,034 (33.5%)	0.41
	OGP	<=5	98 (1.2%)	102 (1.1%)	0.08
Physician RIO index	Urban [0-9]	727 (81.0%)	5,892 (75.2%)	6,619 (75.8%)	0.14
	Small town [10-39]	139 (15.5%)	1,359 (17.3%)	1,498 (17.2%)	0.05
	Rural [40+]	32 (3.6%)	582 (7.4%)	614 (7.0%)	0.17
Rostered patients	Median (IQR)	1,968 (1,649-2,395)	939 (657-1,266)	1,000 (691-1,386)	2.10
2+ vaccine doses	Median (IQR)	79 (74-83)	87 (84-90)	86 (83-90)	1.59
1 vaccine dose	Median (IQR)				

EFFS - Enhanced-Fee-For Service
CAP- Capitation
FHT - Family Health Team
OGP - Other primary care model

Table 2S: Characteristics of unvaccinated rostered patients aged 12 years and older whose PEM physicians are in the most unvaccinated patient group (top 10%), compared to the remaining 90% of PEM physicians

Characteristics		Top 10th percentile	Rest 90%	TOTAL	Standardized Diff
		N=1,905,237	N=7,862,083	N=9,767,320	
Demographic					
Age	Mean ± SD	45.7 ± 19.7	48.7 ± 20.3	48.1 ± 20.2	0.15
	Median (IQR)	45 (30-61)	49 (32-64)	48 (32-64)	0.2
Patient age	12-19	208,340 (10.9%)	692,190 (8.8%)	900,530 (9.2%)	0.07
	20-34	412,549 (21.7%)	1,550,036 (19.7%)	1,962,585 (20.1%)	0.05
	35-64	918,130 (48.2%)	3,678,232 (46.8%)	4,596,362 (47.1%)	0.03
	65+	366,218 (19.2%)	1,941,625 (24.7%)	2,307,843 (23.6%)	0.13
Sex	Male	922,780 (48.4%)	3,684,929 (46.9%)	4,607,709 (47.2%)	0.03
	Female	982,457 (51.6%)	4,177,154 (53.1%)	5,159,611 (52.8%)	0.03
Immigrated in last 10 years	Yes	163,896 (8.6%)	318,058 (4.0%)	481,954 (4.9%)	0.19
Marginalization Index					
Instability Quintile	[1] Lowest	504,011 (26.6%)	1,722,818 (22.1%)	2,226,829 (22.9%)	0.11
	[2]	351,806 (18.6%)	1,568,893 (20.1%)	1,920,699 (19.8%)	0.04
	[3]	331,708 (17.5%)	1,486,401 (19.0%)	1,818,109 (18.7%)	0.04
	[4]	316,451 (16.7%)	1,392,381 (17.8%)	1,708,832 (17.6%)	0.03

	[5] Highest	389,574 (20.6%)	1,639,846 (21.0%)	2,029,420 (20.9%)	0.01
Deprivation Quintile	[1] Lowest	349,659 (18.5%)	1,991,292 (25.5%)	2,340,951 (24.1%)	0.17
	[2]	380,128 (20.1%)	1,747,585 (22.4%)	2,127,713 (21.9%)	0.06
	[3]	383,098 (20.2%)	1,497,273 (19.2%)	1,880,371 (19.4%)	0.03
	[4]	374,379 (19.8%)	1,348,792 (17.3%)	1,723,171 (17.8%)	0.06
	[5] Highest	406,286 (21.5%)	1,225,397 (15.7%)	1,631,683 (16.8%)	0.15
Dependency Quintile	[1] Lowest	590,564 (31.2%)	2,027,772 (26.0%)	2,618,336 (27.0%)	0.12
	[2]	398,204 (21.0%)	1,550,951 (19.9%)	1,949,155 (20.1%)	0.03
	[3]	321,683 (17.0%)	1,376,259 (17.6%)	1,697,942 (17.5%)	0.02
	[4]	303,914 (16.0%)	1,344,899 (17.2%)	1,648,813 (17.0%)	0.03
	[5] Highest	279,185 (14.7%)	1,510,458 (19.3%)	1,789,643 (18.4%)	0.12
Ethnic Diversity Quintile	[1] Lowest	225,599 (11.9%)	1,354,516 (17.3%)	1,580,115 (16.3%)	0.15
	[2]	265,513 (14.0%)	1,401,585 (17.9%)	1,667,098 (17.2%)	0.11
	[3]	274,296 (14.5%)	1,483,996 (19.0%)	1,758,292 (18.1%)	0.12
	[4]	365,453 (19.3%)	1,669,028 (21.4%)	2,034,481 (21.0%)	0.05

	[5] Highest	762,689 (40.3%)	1,901,214 (24.3%)	2,663,903 (27.5%)	0.35
Income quintile	[1] Lowest oncome	401,559 (21.1%)	1,310,551 (16.7%)	1,712,110 (17.6%)	0.11
	[2]	399,445 (21.0%)	1,475,992 (18.8%)	1,875,437 (19.2%)	0.06
	[3]	416,391 (21.9%)	1,581,613 (20.2%)	1,998,004 (20.5%)	0.04
	[4]	372,371 (19.6%)	1,689,718 (21.5%)	2,062,089 (21.2%)	0.05
	[5] Highest income	310,702 (16.3%)	1,785,385 (22.8%)	2,096,087 (21.5%)	0.16
Comorbidity (ACG)	No/low comorbidity [0-4]	1,013,968 (53.2%)	4,205,456 (53.5%)	5,219,424 (53.4%)	0.01
	Moderate comorbidity [5-9]	672,175 (35.3%)	2,765,432 (35.2%)	3,437,607 (35.2%)	0.00
	High comorbidity [10+]	219,094 (11.5%)	891,195 (11.3%)	1,110,289 (11.4%)	0.01
Patient care and quality of care measures					
Continuity of care in last 2 years	Median (IQR)	97 (76-100)	94 (75-100)	94 (75-100)	0.05
Any virtual visits (telephone) in last 6 months	Yes	904,697 (47.5%)	3,820,674 (48.6%)	4,725,371 (48.4%)	0.02
Any in-person visits (office) in last 8 months	Yes	1,034,227 (54.3%)	4,169,450 (53.0%)	5,203,677 (53.3%)	0.0
Any colorectal cancer screening for patients aged 50-74 years	Yes	377,214 (56.3%)	1,957,864 (64.2%)	2,335,078 (62.8%)	0.16

At least 1 pap test for women aged 21-69 years in last 42 months	Yes	326,533 (44.5%)	1,504,522 (49.6%)	1,831,055 (48.6%)	0.04
At least 1 cholesterol (LDL) test for diabetic patients in last 2 years	Yes	191,937 (81.6%)	739,881 (79.9%)	931,818 (80.3%)	0.04
At least 3 HbA1c tests for diabetic patients in last 2 years	Yes	150,029 (63.8%)	605,841 (65.5%)	755,870 (65.1%)	0.03
COVID-19 Vaccination					
Percent fully vaccinated (2+ doses) by age group on Nov 2nd 2021	12-17	114,309 (72.3%)	410,281 (79.8%)	524,590 (78.0%)	0.18
	18-39	461,758 (74.5%)	1,846,824 (80.0%)	2,308,582 (78.9%)	0.13
	40-64	625,629 (82.2%)	2,705,865 (87.3%)	3,331,494 (86.3%)	0.14
	65-79	241,837 (86.6%)	1,325,631 (92.0%)	1,567,468 (91.1%)	0.18
	80+	74,332 (85.6%)	458,924 (91.7%)	533,256 (90.8%)	0.19
	Total (12+)	1,517,865 (79.7%)	6,747,525 (85.8%)	8,265,390 (84.6%)	0.16

Note: Some of the variable specific totals will not add up to overall total because of inclusion-exclusion criteria and/or missing data

Table S3: Three random effects logistic models describing the association between characteristics of patients and physicians being unvaccinated, within physicians who had the highest percentage of unvaccinated patients (top 10th percentile) versus the rest 90%, and all physicians

Variable	Label	Top 10th Percentile				Rest 90%				Total			
		Odds Ratio	95% CI Lower	95% CI Upper	P	Odds Ratio	95% CI Lower	95% CI Upper	P	Odds Ratio	95% CI Lower	95% CI Upper	P
Patient age group	a. 12-17	2.409	2.361	2.459	<.0001	2.333	2.312	2.353	<.0001	2.342	2.323	2.361	<.0001
	b. 18-36	2.168	2.135	2.202	<.0001	2.492	2.476	2.509	<.0001	2.440	2.425	2.455	<.0001
	c. 37-65	1.442	1.421	1.462	<.0001	1.562	1.552	1.572	<.0001	1.542	1.533	1.551	<.0001
	d. 66+	1.000	.	.	.	1.000	.	.	.	1.000	.	.	.
Patient sex	a. Female	0.989	0.980	0.999	0.0251	0.957	0.953	0.961	<.0001	0.962	0.958	0.966	<.0001
	b. Male	1.000	.	.	.	1.000	.	.	.	1.000	.	.	.
Patient Income quintile	a. [1] Lowest	1.517	1.490	1.544	<.0001	1.752	1.740	1.764	<.0001	1.718	1.706	1.729	<.0001
	b. [2]	1.311	1.288	1.334	<.0001	1.428	1.419	1.438	<.0001	1.416	1.408	1.425	<.0001
	c. [3]	1.195	1.174	1.217	<.0001	1.267	1.258	1.275	<.0001	1.261	1.254	1.269	<.0001
	d. [4]	1.086	1.067	1.106	<.0001	1.144	1.137	1.152	<.0001	1.139	1.132	1.146	<.0001
	e. [5] Highest	1.000	.	.	.	1.000	.	.	.	1.000	.	.	.
Patient Ethnic Diversity Quintile	a. [1] Lowest	1.000	.	.	.	1.000	.	.	.	1.000	.	.	.
	b. [2]	1.063	1.042	1.084	<.0001	1.007	1.000	1.015	0.0452	1.014	1.007	1.020	<.0001
	c. [3]	1.112	1.088	1.136	<.0001	0.991	0.983	0.999	0.0268	1.005	0.998	1.013	0.1680
	d. [4]	1.145	1.121	1.171	<.0001	1.022	1.013	1.030	<.0001	1.037	1.029	1.045	<.0001
	e. [5] Highest	1.130	1.105	1.156	<.0001	1.007	0.998	1.016	0.1082	1.021	1.012	1.029	<.0001

		Model 1				Model 2				Model 3			
Patient Comorbidity (ACG)	a. No/low comorbidity	1.973	1.939	2.007	<.0001	1.817	1.802	1.831	<.0001	1.844	1.830	1.857	<.0001
	b. Moderate comorbidity	1.112	1.092	1.132	<.0001	1.052	1.043	1.061	<.0001	1.063	1.055	1.071	<.0001
	c. High comorbidity	1.000	.	.	.	1.000	.	.	.	1.000	.	.	.
RIO Score Group - Patient	a. Urban	1.000	.	.	.	1.000	.	.	.	1.000	.	.	.
	b. Small town	1.277	1.252	1.303	<.0001	1.252	1.243	1.262	<.0001	1.257	1.248	1.265	<.0001
	c. Rural	1.332	1.287	1.379	<.0001	1.489	1.472	1.507	<.0001	1.474	1.457	1.490	<.0001
Immigrated in last 10 years	a. Yes	0.969	0.951	0.988	0.0011	0.994	0.985	1.004	0.2450	0.989	0.981	0.998	0.0119
	b. No	1.000	.	.	.	1.000	.	.	.	1.000	.	.	.
Physician age group	a. <45	1.000	.	.	.	1.000	.	.	.	1.000	.	.	.
	b. 45-64	1.015	0.961	1.073	0.5859	1.071	1.054	1.088	<.0001	1.068	1.051	1.084	<.0001
	c. 65-74	1.099	1.025	1.179	0.0083	1.093	1.067	1.121	<.0001	1.098	1.073	1.124	<.0001
	d. 75+	1.124	1.023	1.234	0.0149	1.255	1.194	1.320	<.0001	1.228	1.175	1.283	<.0001
Physician sex	a. Female	1.060	1.013	1.109	0.0118	0.916	0.902	0.929	<.0001	0.927	0.914	0.940	<.0001
	b. Male	1.000	.	.	.	1.000	.	.	.	1.000	.	.	.
Enrolment model	a. CAP	1.000	.	.	.	1.000	.	.	.	1.000	.	.	.
	b. FHT	0.881	0.828	0.939	<.0001	0.965	0.948	0.982	<.0001	0.959	0.943	0.975	<.0001
	c. OGP	0.798	0.660	0.966	0.0205	0.900	0.836	0.968	0.0047	0.880	0.821	0.943	0.0003
	d. EFFS	1.088	1.034	1.146	0.0012	1.138	1.117	1.159	<.0001	1.135	1.116	1.155	<.0001
Physicians with top 10th	a. Top 10th percentile									2.234	2.180	2.288	<.0001

percentile of largest proportions of unvaccinated patients													
	b. Rest 90th percentile (ref)									1.000	.	.	.

ACG= Adjusted clinical group

EFFS - Enhanced-Fee-For Service
CAP- Capitation
FHT - Family Health Team
OGP - Other primary care model