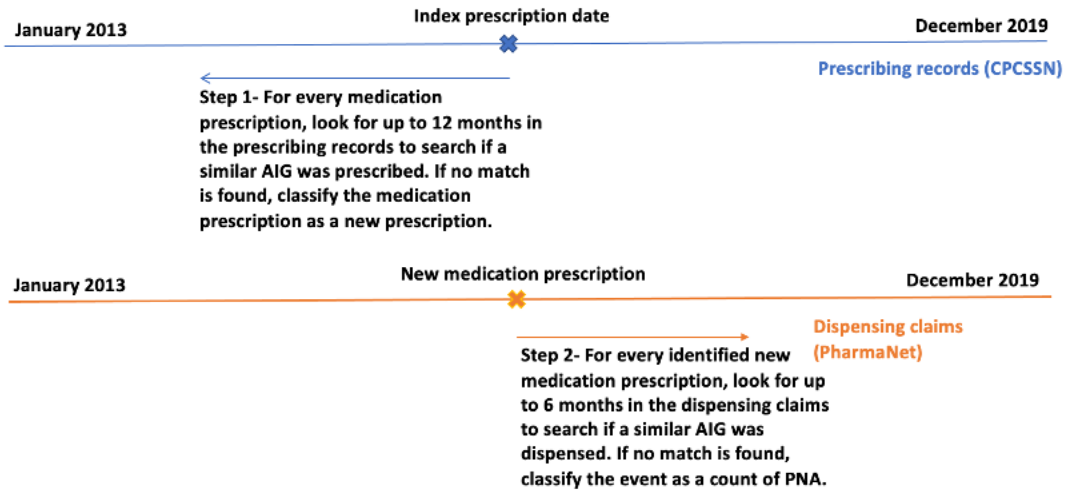
Prevalence and predictors of primary non-adherence to medications prescribed in primary care

List of figures and tables

Appendices

Figure S1. Scheme illustrating the definition and characterization of primary non-adherence (PNA) in our study



Medications were identified by the first seven digits of the active ingredient code (AIG), with the first five digits specifying the number of active ingredients and the next two digits identifying the unique groups of active ingredients(s). The seven-digit AIG level can capture the generic and brand names of a medication prescription.

Table S1. Two-by-two tables of PNA rates across patient-provider sex concordant and discordant dyads

	Primary care provider male			Primary care provider female		
	Number of new prescriptions (%)	Number of unfilled prescriptions (PNA%)	p-value*	Number of new prescriptions (%)	Number of unfilled prescriptions (PNA%)	p-value*
Patient sex	**N=80,686**	**12,159 (15.1)**	**0.01**	**N= 69,879**	**13,490(19.3)**	**<0.001**
female	42,051(52.1)	6,483(15.4)		53,801(77.0)	10,174(18.9)	
male	38,419(47.6)	5,641(14.7)		15,984(22.9)	3,305(20.7)	
unknown	216(0.3)	35(16.2)		94(0.1)	11(11.7)	

*Chi-square test for categorical variables

Table S2. Distribution of PNA by select pharmacological subgroups

Pharmacological subgroups	ATC 3rd level	Total number of new prescriptions N (%)	Number of new prescriptions unfilled	PNA (%)
Drugs Used in Diabetes	A10	2,756(1.8)	379	13.8
Antihypertensives	C02	174(0.1)	19	10.9
Diuretics	C03	3,329(2.1)	304	9.4
Beta blocking agents	C07	2,217(1.5)	149	6.7
Calcium channel blockers	C08	2,019(1.3)	146	7.2
ACE/ARBs	C09	5,726(3.8)	489	8.5
Lipid modifying agents	C10	4,636(3.1)	320	6.9
Topical corticosteroids (dermatological preparations)	D07	6,415(4.3)	2,250	35.1
Hormonal contraceptives	G03	8,346(5.5)	1,173	14.1
Antibacterials	J01	16,895(11.2)	3,239	19.2
Antivirals	J05	2,600(1.7)	418	16.1
Analgesics	N02	7,462(5.0)	990	13.3
Antiepileptics	N03	2,683(1.8)	285	10.6
Anti-Parkinson Drugs	N04	208(0.1)	21	10.1
Psycholeptics	N05	6,501(4.3)	685	10.5
Psychoanaleptics	N06	10,513(7.0)	1,395	13.3
Nasal preparations	R01	4,448(3.0)	922	20.7
Cough and cold	R05	593 (0.4)	119	20.1
Antihistamines	R06	994(0.7)	233	23.4

Table S3. Distribution of Primary non-adherence by number of prescriptions written in the past 12 months.

Frequency of prescriptions written in the past 12 months	Number of new prescriptions written	Number of new prescriptions that were not filled (PNA)
0	62,715 (41.7)	10,933 (17.4)
1	21,334 (14.2)	3,705 (17.4)
2	14,106 (9.4)	2,569 (18.2)
3	9,520 (6.3)	1,526 (16.0)
4	7,185 (4.8)	1,168 (16.3)
5	5,123 (3.4)	853 (16.7)
6	4,393 (2.9)	729 (16.6)
7	3,302 (2.2.)	535 (16.2)
8	2,894 (1.9)	469 (16.2)
9	2,378 (1.6)	354 (14.9)
10	1,953 (1.3)	291 (14.9)
>=11	15,662 (10.4)	2,517 (16.1)
Total	150,565 (100.0)	25,649 (17.0)

Appendix 1 A. Description of datasets

We used three linked administrative datasets from Population Data BC using unique encoded identifiers, including (a) electronic medical records (EMR) from the BC Canadian Primary Care Sentinel Surveillance Network (BC CPCSSN) database; (b) the BC PharmaNet prescription drug claims database; and (c) Medical Services Plan (MSP) consolidation files. We also used the Health Canada Drug Product Database (DPD) to retrieve medication information such as active ingredient (AIG) codes and the anatomical classification system (ATC). These datasets are further described below

1- The BC CPCSSN practice-based research contributes its de-identified data to Canada's largest national repository of primary care electronic medical records. (1) The architecture and approach of CPCSSN data extraction are described elsewhere. (2) CPCSSN data is used for surveillance and research and is considered moderately representative of the Canadian patient population, with slight skewness to older adults and female patients (3) (4). The prescribing data from the BC CPCSSN recorded all prescriptions issued by CPCSSN prescribers/providers (e.g., family physicians, and nurse practitioners), regardless of whether they were eventually filled. The data included information on providers' and patients' demographic characteristics, primary visit encounters, and medications (i.e., prescription date, drug name, drug identification number (DIN), dosage, form, and other variables).

2- The dispensing claims from PharmaNet included data on prescriptions that patients filled and, as such, constituted a subset of prescriptions written by CPCSSN providers. The PharmaNet claims included information about the patient, medication, drug cost, drug

coverage plan and prescription fill date. For both prescribing and dispensing claims datasets, we added fields for AIG codes that had been linked, by DIN, from the Health Canada Drug product database (5). Medications were identified by the first seven digits of the active ingredient code, which specify the number of active ingredients and the unique groups of active ingredients(s). (5) The first seven digits of the AIG would capture the generic and brand names of a medication prescription.

3- Finally, we used the MSP consolidation files to obtain patient sociodemographic characteristics such as age, biological sex, neighbourhood income quintile, and registration status with the provincial medical services plan.

Appendix 1B. Covariance parameters test results and calculation of the conditional correlation coefficients of the hierarchical logistic regression model for the overall study cohort

	Covariance parameter estimates			
Covariance parameter	Subject	Estimate	Standard error	p-value
Intercept	Provider	0.005	0.001	0.0002
Intercept	Patient(provider)	0.014	0.0005	<.0001
Residual		0.128	0.0006	<.0001

In *SAS Proc Glimmix*, the *COVTEST* statement generate hypothesis tests for the variance and covariance components in a hierarchical logistic regression model.
The test of covariance parameter (*COVTEST)* indicated that both the prescriber-level random intercept (p=0.0002) and the patient-level random intercept (p<0.0001) were needed. The correlation between the responses in the same level-3 cluster, but different level-2 cluster is 0.005/ (0.005+0.014+0.128) =0.03
The correlation between the responses in the same level-2 cluster, but different level-1 cluster is (0.005+0.014)/ (0.005+0.014+0.128) =0.13.
Of the total variability in PNA that is not observed by the covariates, 3% could be accounted for by unobserved prescriber-specific attributes, and 13% could be accounted for by unobserved patient-specific characteristics (6).

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