

Additional file 1. Overview of variables considered as candidate predictors

Parameter	Underlying registrations, if applicable	Codes, if applicable		Data source
		ICPC	ATC	
Demographics				
Age (years)				JGPN
Sex (male, female)				JGPN
Frailty index	Algorithm based on ICPC codes (Drubbel et al., 2013)			JGPN
Use of medical care				
Number of GP consultations ≤12 months				JGPN
Hospitalization ≤12 months				DHD
Vaccination status				
Pneumococcal conjugate vaccine	Immunisation/preventive medicine of airways	R44	J07BB02 (<5 years)	JGPN
Influenza vaccine	Immunisation/preventive medicine of airways	R44	J07AL01 (<1 year)	JGPN
Comorbidities: CVD				
Aortic aneurysm	Aortic aneurysm	K99.01		JGPN
Atrial fibrillation	Atrial fibrillation/flutter	K78		JGPN
Cardiomyopathy	Cardiomyopathy	K84.03		JGPN
Cerebrovascular disease	CVA TIA	K90 K89		JGPN
Coronary artery disease	Angina pectoris Other chronic/ischemic heart disease	K74 K76		JGPN
Heart failure	Decompensatio cordis	K77		JGPN
Myocardial infarction	Acute myocardial infarction	K75		JGPN
Other arrhythmias	Paroxysmal tachycardia Sick sinus syndrome Wolff-Parkinson-White syndrome Atrioventricular block Long QT-syndrome Presence of pacemaker/ICD	K79 K80.03 K84.01 K84.02 K84.07 A89.01		JGPN
Pregnancy related CVD	Deep vein thrombosis in pregnancy Postpartum thrombosis	W77.03 W99.03		JGPN
Thrombo-embolic disease	Pulmonary embolism Thrombophlebitis/ phlebothrombosis	K93 K94		JGPN

Valve disease	Acute rheumatic fever Non-rheumatic valve disease	K71 K83		JGPN
Other comorbidities				
Smoking status	Algorithm for text mining (Boer et al., 2022)			JGPN
Family history of CVD	Family history of CVD	A29.01		JGPN
Hypertension	High blood pressure Primary hypertension with organ damage Secondary hypertension/organ damage	K85 K86 K87		JGPN
Atherosclerosis	Atherosclerosis	K91		JGPN
Intermittent claudication	Intermittent claudication	K92.01		JGPN
Rheumatoid arthritis	Rheumatoid arthritis	L88.01		JGPN
History of pneumonia	Pneumonia	R81		JGPN
COPD	Emphysema/COPD Chronic bronchitis/bronchiectasis	R95 R91		JGPN
Asthma	Asthma	R96		JGPN
Allergic rhinitis	Allergic rhinitis	R97		JGPN
Adipositas	Adipositas Obesity	T82 T83		JGPN
Diabetes mellitus	Diabetes mellitus type 1 and 2	T90		JGPN
Disorders of fat metabolism	Disorders of fat metabolism	T93		JGPN
Renal dysfunction	Renal dysfunction/insufficiency	U99.01		JGPN
Pregnancy related CVD risk factors	Pre-eclampsia Gestational diabetes	W81 W84.02		JGPN
Premature menopause	Premature menopause	T99.07		JGPN
Coagulation disorders	Purpura/coagulation disorder/abnormal thrombocytes	B83		JGPN
PCOS	PCOS	T99.06		JGPN
Dementia	Cognitive disorders Dementia	P20 P70		JGPN
Thyroid disease	Hyperthyroidism/thyrototoxicosis Hypothyroidism/myxoedema	T85 T86		JGPN
IBD	Ulcerative colitis/Crohn's disease	D94		JGPN
HIV infection	HIV-infection	B90		JGPN
Viral hepatitis	Viral hepatitis	D72		JGPN
Cirrhosis	Cirrhosis/other liver disease	D97		JGPN
Skin ulcer	Ulcer cruris/decubitus/chronic ulcer	S97		JGPN
Gastrointestinal ulcer	Ulcer duodeni	D85		JGPN

	Ulcer pepticum	D86		
Paralysis	Paralysis	N18		JGPN
Hip fracture	Fratcure of collum femoris	L75.01		JGPN
Oncology				
Hematologic cancer	Hodgkin lymphoma	B72.01		JGPN
	Non-Hodgkin lymphoma	B72.02		
	Leukaemia	B73		
	Hematologic/lymphatic malignancy NOS	B74		
	Benign hematologic/lymphatic Neoplasm	B75		
Digestive tract cancer	Stomach malignancy	D74		JGPN
	Colon/rectum malignancy	D75		
	Pancreatic malignancy	D76		
	Digestive tract malignancies NOS	D77		
Pulmonary cancer	Malignancy of bronchus/lung	R84		JGPN
	Other airway malignancy	R85		
Skin cancer	Malignancy skin/subcutis	S77		JGPN
Urological cancer	Malignancy of kidney	U75		JGPN
	Malignancy of bladder	U76		
	Other malignancy of urinary tract	U77		
	Malignancy prostate	Y77		
	Other urologic malignancy	Y78		
Gynaecological cancer	Malignancy of cervix uteri	X75		JGPN
	Malignancy of breast (female)	X76		
	Other gynaecological malignancies	X77		
Other malignancies	Malignancy of unknown primary origin	A79		JGPN
	Malignancy of eye/adnexa	F74.01		
	Malignancy of ear	H75.01		
	Cardiovascular malignancy	K72.01		
	Musculoskeletal malignancy	L71.01		
	Neurologic malignancy	N74		
	Malignancy of thyroid	T71		
Recent laboratory tests and measurements (timeframe in months prior to LRTI-episode)				
Body mass index (kg/m²)	<12 months			JGPN
eGFR (ml/min/1,73 m²)	<12 months			JGPN
Haemoglobin (mmol/l)	<3 months			JGPN
Leukocytes (x10 ⁹ /L)	<6 months			JGPN

BNP or NT-proBNP (pmol/l)	<6 months			JGPN
HbA1c (mmol/mole)	<6 months			JGPN
TSH (mU/l)	<3 months			JGPN
D-dimer (mg/l)	<3 months			JGPN
LDL (mmol/l)	<6 months			JGPN
Measurements linked to LRTI-related episode				
Oxygen saturation (%)				JGPN
Respiratory rate (/min)				JGPN
Heart rate (/min)				JGPN
Systolic blood pressure (mmHg)				JGPN
Diastolic blood pressure (mmHg)				JGPN
Body temperature (°C)				JGPN
C-reactive protein (mg/ml)				JGPN
Chronic use of medication^a				
Recent antibiotic use	Within 1 month prior to LRTI episode		J01	JGPN
Platelet aggregation inhibitors	platelet aggregation inhibitors		B01AC	JGPN
Other anticoagulants	Vitamin K antagonists Dalteparin Enoxaparin Nadroparin Tinzaparin Dabigatran Direct factor Xa inhibitors Fondaparinux		B01AA B01AB04 B01AB05 B01AB06 B01AB10 B01AE07 B01AF B01AX05	JGPN
Diuretics	Diuretics		C03	JGPN
Beta blockers	Beta blockers		C07A	JGPN
Cardioselective beta blockers	Cardioselective beta blockers		C07AB	JGPN
Calcium channel blockers	Calcium channel blockers		C08	JGPN
ACE-inhibitors	ACE-inhibitors, plain ACE-inhibitors, combinations		C09A C09B	JGPN
ARBs	Angiotensin II receptor blockers, plain Angiotensin II receptor blockers, combinations		C09C C09D	JGPN
Nitrates	Isosorbidedimonitrate		C01DA14	JGPN

	Isosorbidedinitrate Nitroglycerin		C01DA08 C01DA02	
Lipid-lowering medication	Lipid-lowering agents		C10A	JGPN
Digoxin	Digoxin		C01AA05	JGPN
Flecainide	Flecainide		C01BC04	JGPN
Immunosuppressive drugs	Systemic glucocorticoids Predniso(lo)n ≥7.5mg/day Immunosuppressants		H02AB L04A	JGPN
Benzodiazepines	Benzodiazepines		N05CD + N05CF	JGPN
Antidepressants	Antidepressants		N06A	JGPN
Insulin	Insulin and analogs		A10A (- A10AF)	JGPN
Inhalation medication	Long acting beta antagonists (LABA): Formoterol Indacaterol Olodaterol Salmeterol Long acting muscarine antagonists (LAMA): Aclidinium Glycopyrronium Tiotropium Umeclidinium LABA+LAMA: Aclidinium/formoterol Glycopyrronium/formoterol Indacaterol/glycopyrronium Tiotropium/olodaterol Umeclidinium/vilanterol Inhalation corticosteroids (ICS): Beclomethasone Budesonide Fluticasone ICS+LABA: Formoterol/beclomethasone Formoterol/budesonide Salmeterol/fluticasone propionate		R03AC13 R03AC18 R03AC19 R03AC12 R03BB05 R03BB06 R03BB04 R03BB07 R03AL05 R03AL07 R03AL04 R03AL06 R03AL03 R03BA01 R03BA02 R03BA05 R03AK08 R03AK07 R03AK06	JGPN

	Vilanterol/fluticasone furoate		R03AK10	
	ICS+LABA+LAMA			
	Beclomethasone/formoterol/glycopyrronium		R03AL09	
	Fluticasone/umeclidinium/vilanterol		R03AL08	
	Formoterol/glycopyrronium/budesonide		R03AL11	

Abbreviations: CVD, cardiovascular disease; ICPC, International Classification of Primary Care; ATC, anatomical therapeutic chemical; JGPN, Julius General Practitioners' Network; GP, general practitioner; DHD, Dutch Hospital Data; COVID-19, coronavirus disease 2019; CIMS, COVID-vaccination Information and Monitoring System; COPD, chronic obstructive pulmonary disease; PCOS, polycystic ovarium syndrome; NOS, not otherwise specified; IBD, inflammatory bowel disease; HIV, human immunodeficiency virus; LRTI, lower respiratory tract infection; kg, kilogram; m, meter; eGFR, estimated glomerular filtration rate; ml, millilitre; min, minute; mmol, millimole; l, litre; BNP, B-type natriuretic peptide; NT-proBNP, N-terminal (NT)-pro hormone BNP; pmol, picomole; HbA_{1c}, haemoglobin A1c; mU, milliunits; mg, milligram; LDL, low density lipoproteins; mmHg, millimeters of mercury; °C, degrees celcius.

^a Medication was selected only when commonly used in a primary care setting and is based upon guidelines issued by the Dutch College of General Practitioners and the Dutch pharmacotherapeutic compass.