

Supplementary Table 1. ICD-10 codes selected for analysis

LP	ICD	ICD-10 name
1	D22	Pigmented moles
2	D50	Iron deficiency anemia
3	D51	Vitamin B12 deficiency anemia
4	D64	Other anemias
5	E03	Hypothyroidism of other etiology
6	E04	Non-toxic goiter
7	E11	Type 2 diabetes
8	E16	Other hypoglycemia
9	E55	Vitamin D deficiency
10	E66	Obesity
11	E74	Other carbohydrate metabolism disorders
12	E78	Lipoprotein metabolism disorders and other lipidemias
13	E79	Disorders of purine and pyridine metabolism
14	E83	Mineral metabolism disorders
15	E84	Polycystic fibrosis
16	E87	Other water and electrolyte imbalances
17	E88	Other metabolic disorders
18	F03	Unspecified dementia
19	F06	Other mental disorders caused by brain damage or dysfunction and physical illness
20	F33	Recurrent depressive disorders
21	F41	Generalized anxiety disorder
22	F48	Other neurotic disorders
23	F51	Sleep breathing disorders
24	G45	Transient ischemic attacks and related syndromes
25	G47	Sleep disorders
26	G50	Trigeminal neuralgia
27	G62	Other polyneuropathies
28	G98	Other nervous system disorders
29	H90	Conductive and sensorineural hearing impairment
30	I49	Other heart rhythm disorders
31	I50	Heart failure
32	I70	Atherosclerosis
33	I83	Varicose veins of the lower limbs
34	I87	Other venous pathologies
35	J84	Other interstitial lung diseases
36	J98	Other respiratory distress syndromes
37	K21	Gastroesophageal reflux disease (GERD)
38	K52	Other non-infectious gastroenteritis and colitis
39	K57	Diverticular disease
40	K59	Other functional bowel disorders

Supplementary Table 1. Cont.

LP	ICD	ICD-10 name
41	K63	Other intestinal diseases
42	K76	Other liver diseases
43	L30	Other forms of dermatitis
44	L40	Psoriasis
45	M10	Gout
46	M15	Polyarticular degeneration
47	M16	Coxarthrosis
48	M17	Gonarthrosis of the knee
49	M19	Other joint degeneration
50	M23	Internal damage to the knee joint
51	M25	Other joint diseases, not elsewhere classified
52	M47	Degenerative changes in the spine
53	M51	Lumbar discopathy
54	M54	Sciatica
55	N18	Chronic renal failure
56	N31	Neuromuscular bladder dysfunction, not elsewhere classified
57	N40	Prostatic hyperplasia
58	R05	Cough
59	R19	Other symptoms and ailments related to the digestive tract and abdominal cavity
60	R29	Other symptoms and signs related to the nervous and musculoskeletal systems
61	R32	Urinary incontinence, unspecified
62	R53	Malaise and fatigue
63	R68	Other symptoms and general ailments
64	R73	increased blood glucose levels
65	R79	Abnormal blood test results, no diagnosis
66	R91	Abnormal results of diagnostic lung imaging tests
67	T78	Anaphylactic shock due to food reaction

Supplementary Table 2. Critical analysis and synthesis of the literature

Aspect	Strengths	Weaknesses
Prevalence and symptomatology of long COVID	Multiple large-scale studies provide robust evidence of a high prevalence of chronic COVID symptoms in primary care populations, including fatigue, cognitive difficulties, and respiratory symptoms, with consistent findings across cohorts and geographic regions (Ose et al., 2024; Oliveira et al., 2023). The inclusion of comparison groups in some studies strengthened the validity of the associations between COVID-19 infection and chronic symptoms (Ose et al., 2024).	Prevalence estimates vary considerably due to differences in study designs, populations, and symptom definitions, leading to heterogeneity that complicates synthesis (Montenegro et al., 2022; Lesser and Temple, 2023). Many studies rely on self-reported symptoms, which may introduce recall bias and overestimation (Jones et al., 2021). The overlap of chronic COVID symptoms with common ailments in primary care challenges diagnostic specificity and clarity (Ose et al., 2024).
Diagnostic and coding challenges in primary care	Innovative use of electronic health records (EDM/EHR) and natural language processing methods has enhanced the capture of symptoms beyond the coded data, allowing identification of a broader spectrum of symptoms and improving case identification (Shah et al., 2023) (Henderson et al., 2023). Development of phenotypes and coding frameworks facilitates standardized identification of long COVID cases in primary care (Mayer et al., 2022).	Underregistration and inconsistent use of diagnostic codes for chronic COVID in primary care limits accurate epidemiological assessment (Henderson et al., 2023; Walker et al., 2021). Variability in clinician awareness and coding practices introduces bias and heterogeneity (Hendrix et al., 2024). The lack of universally accepted diagnostic criteria and reliance on subjective symptom reporting complicate definitive diagnosis (Shah et al., 2023).
Impact on healthcare utilization and resource needs	Cohort analyses show increased utilization of primary and secondary care among long-term COVID patients, highlighting the significant burden on healthcare systems and the importance of resource planning (Mu et al., 2024; Lin et al., 2023; Murch et al., 2022; Strumann et al., 2023). Studies quantify increased levels of consultation, testing, and associated costs, informing the development of health services (Lin et al., 2023).	Some studies focus primarily on hospitalized cohorts, limiting applicability to non-hospitalized primary care populations (Romero-Duarte et al., 2021). Short follow-up times and retrospective designs may underestimate long-term healthcare requirements (Skyrud et al., 2021). Healthcare utilization data often lack granularity in terms of symptom severity and functional impact (Shah et al., 2023).
Patient experiences and psychosocial impact	Qualitative research provides rich insights into patient experiences, revealing challenges in accessing care, feelings of slowing down, and the psychosocial burden of long COVID (Gardner et al., 2024; Gardner et al., 2023; Schmachtenberg et al., 2023). Research highlights the importance of empathetic communication and coordinated care in primary care settings (Pavlic et al., 2023; Skilbeck et al., 2023).	Qualitative studies often have small, unrepresentative samples, limiting generalizability (Gardner et al., 2024; Skilbeck et al., 2023). There is little longitudinal data capturing the evolving experiences of PCS patients over time. The subjective nature of patient reports may be influenced by healthcare system factors and individual expectations (Gardner et al., 2023).
Management strategies and clinical guidelines	Emerging frameworks and guidelines advocate for holistic, multidisciplinary approaches tailored to the complex symptomatology of long-term COVID, with primary care providers playing a central role (Ahmad et al., 2024; Brode and Melamed, 2024; Prusinski et al., 2024; Dietz and Brondstater, 2024; Nurek et al., 2021; Perumal et al., 2023). Evidence supports individualized rehabilitation, symptom management, and integration with specialized treatment (Schrimpf et al., 2022; Bachmeier and Akker, 2023).	Evidence-based treatment options remain limited, with many recommendations based on expert opinion or extrapolated from similar conditions (Ahmad et al., 2024; Schrimpf et al., 2022; Dietz and Brondstater, 2024). Variability in guideline adoption and lack of standardized care pathways contribute to inconsistent management (Bachmeier and Akker, 2023). The risk of symptom recurrence with some interventions, such as inappropriate physical activity, highlights the need for careful, personalized care (Schrimpf et al., 2022).

Supplementary Table 2. Cont.

Aspect	Strengths	Weaknesses
Risk factors and demographic variability	Research identifies consistent risk factors for chronic COVID; female sex, older age, comorbidities, and socioeconomic factors increase risk, aiding risk stratification and targeted care (Gardner et al., 2023; Jones et al., 2021; Thompson et al., 2021; Lenz et al., 2023). Some studies highlight disparities affecting underrepresented minorities and vulnerable (Gardner et al., 2023; Sweis et al., 2024; Berger et al., 2021).	There are conflicting findings regarding the impact of socioeconomic deprivation and ethnicity, with some studies reporting lower diagnosis rates in deprived areas likely due to barriers to accessing healthcare (Shah et al., 2023; Thompson et al., 2021). Many studies lack sufficient diversity or do not fully adjust for confounding factors, limiting conclusions about health inequalities (Gardner et al., 2023; Jones et al., 2021).
Methodological rigor and data quality	Several studies use large, population-based cohorts with matched controls and advanced statistical methods, increasing robustness (Ose et al., 2024; Mu et al., 2024; Lin et al., 2023). The use of mixed methods, combining quantitative and qualitative data, enriches understanding (Gardner et al., 2024; Gardner et al., 2023).	Many studies are cross-sectional or retrospective, limiting causal inference and temporal understanding (Ose et al., 2024; Abel et al., 2021). Reliance on self-reported data and electronic records with incomplete coding limits the strength of inference (Shah et al., 2023; Jones et al., 2021). Limited duration of follow-up and changing pandemic contexts (variants, vaccinations) affect the comparability and validity of study findings (Shah et al., 2023; Sedgley et al., 2023).