

**Prevalence of and factors associated with post-COVID-19 condition in the 12 months following the diagnosis of COVID-19 in adults followed in general practices in Germany**

**Running title:** Post-COVID-19 condition in Germany

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8  
9 **Key points**

10 This retrospective cohort study included 51,630 adults diagnosed with COVID-19 in 855  
11 general practices in Germany. The prevalence of post-COVID-19 condition was 8.3% in  
12 the 12 months following the diagnosis of COVID-19. Age >30 years, female sex and  
13 several comorbidities were positively and significantly associated with post-COVID-19  
14 condition.

15

## Abstract

**Background:** Little is known about the epidemiology of post-coronavirus disease 2019 (COVID-19) condition (PCC) in primary care practices. Therefore, this study aimed to investigate the prevalence of and the factors associated with PCC in the 12 months following the diagnosis of COVID-19 in patients followed in general practices in Germany.

**Methods:** This retrospective cohort study included adults aged  $\geq 18$  years who were diagnosed for the first time with COVID-19 (index date) in one of 855 general practices in Germany between October 2020 and August 2021 (Disease Analyzer database; IQVIA). The outcome was the occurrence of PCC 91 to 365 days after the index date. Covariates included age, sex, and comorbidities documented in the 12 months prior to the index date. The association between covariates and PCC was assessed using a multivariable logistic regression model.

**Results:** There were 51,630 patients included in this study (mean [SD] age 47.1 [19.8] years; 54.3% women). The prevalence of PCC was 8.3%. Age  $>30$  years (ORs ranging from 1.40 for 31-45 years to 2.10 for 46-60 years) and female sex (OR=1.23) were positively and significantly associated with PCC compared with age 18-30 years and male sex, respectively. There was also a significant relationship of PCC with asthma (OR=1.38), reaction to severe stress, and adjustment disorders (OR=1.24), and somatoform disorders (OR=1.23).

**Conclusions:** PCC was found in the 12 months following the diagnosis of COVID-19 in around 8% of adults from general practices in Germany. More data from other settings are warranted to confirm these findings.

**Keywords:** post-COVID-19 condition; prevalence; associated factors; Germany; retrospective cohort study

## 1 Introduction

2  
3 Coronavirus disease 2019 (COVID-19) is a viral disorder caused by the severe acute  
4 respiratory syndrome coronavirus 2 (SARS-CoV-2) [1]. COVID-19 is a systemic  
5 condition with a wide range of symptoms of pulmonary (e.g., cough, dyspnea, and  
6 sputum production) and extra-pulmonary nature (e.g., diarrhea, abnormal heart rhythm,  
7 and headache) [2]. As of June 3, 2022, more than 528 million positive cases have been  
8 reported in the world, while the number of related deaths is over 6.2 million [3]. In  
9 Germany, around 26.5 million people have been diagnosed with COVID-19, and  
10 139,300 have died from the disorder. Meanwhile, almost 12 billion vaccine doses have  
11 been administered worldwide. Given the high prevalence of past history of COVID-19 in  
12 the general population, it is crucial to better understand the long-term effects of this  
13 disease on health.

14  
15 A growing body of literature has shown that symptoms persist for at least several months  
16 in a substantial proportion of people affected by the SARS-CoV-2 [4–15]. For example, a  
17 study of 150 patients with noncritical COVID-19 from France revealed that 66% of them  
18 were still symptomatic two months after symptom onset [5]. Several factors were found  
19 to be positively associated with the persistence of symptoms, and these factors were  
20 age 40-59 years (versus <30 years), and abnormal auscultation and hospital admission  
21 at symptom onset. In another cohort, including 410 symptomatic individuals who tested  
22 positive for SARS-CoV-2 in university hospitals in Switzerland, it was showed that the  
23 prevalence of symptoms seven to nine months after the diagnosis of COVID-19 was  
24 39.0%, and that the three most frequent symptoms were fatigue (20.7%), loss of smell or

1 taste (16.8%) and dyspnea (11.7%) [9]. These findings were corroborated in a systemic  
2 review and meta-analysis of 50 studies, as the prevalence of post-COVID-19 condition  
3 30 days to 12 months after COVID-19 was 54% in hospitalized individuals and 34% in  
4 non-hospitalized individuals [6]. Although these studies have advanced the field, they  
5 display several limitations that need to be acknowledged. First, the majority of the  
6 previous studies had small sample sizes (i.e., less than 1,000 participants were  
7 included), potentially undermining the generalizability of their findings [5,9–13,15].  
8 Second, data were predominantly obtained from hospital settings [4,5,8–12], and thus  
9 little is known about the occurrence of persistent symptoms in primary care practices,  
10 where the majority of patients with COVID-19 have been followed. Third, a substantial  
11 proportion of these studies were conducted in 2020 [4,5,9,10,12,15], prior to the start of  
12 the COVID-19 vaccination campaign in late 2020 and early 2021 [16]. As COVID-19  
13 vaccination might, at least partially, protect against the persistence of symptoms [17],  
14 the prevalence of post-COVID-19 condition might have decreased over time since the  
15 beginning of the pandemic. Fourth, multiple definitions of persistent symptoms were  
16 considered based on different time points (e.g., two [5], six [10], and 12 months [11])  
17 and, to the best of the authors' knowledge, none of these studies used the definition of  
18 post-COVID-19 condition provided by the World Health Organization [18], which may  
19 have facilitated the comparison of their results. Based on this definition, post-COVID-19  
20 condition includes a wide range of symptoms (e.g., abdominal pain, anxiety and cough)  
21 frequently occurring at least three months after the onset of initial symptoms, usually  
22 lasting at least two months, and not explained by a differential diagnosis. Persistent  
23 COVID-19 symptoms do not necessarily translate into post-COVID-19 symptoms,  
24 especially if they last only a few days or weeks and if they do not have a deleterious

1 impact on daily living. In this context, more data are urgently needed on post-COVID-19  
2 condition in people previously diagnosed with COVID-19.

3  
4 Therefore, the goal of this retrospective cohort study was to investigate the prevalence  
5 of and the factors associated with post-COVID-19 condition in the 12 months following  
6 the diagnosis of COVID-19 in patients followed in general practices in Germany between  
7 October 2020 and November 2021.

## 8 9 **Methods**

### 10 11 *Database*

12 The present retrospective cohort study used data from the Disease Analyzer database  
13 (IQVIA). This database has already been described in the literature [19]. Briefly, the  
14 Disease Analyzer database includes demographic, diagnosis and prescription data  
15 obtained in general and specialized practices in Germany. Data are collected from the  
16 computer systems of these practices, anonymized and sent to IQVIA on a regular basis.  
17 Diagnosis data are coded using the International Classification of Diseases, 10th  
18 revision (ICD-10), while prescription data are coded using the Anatomical Classification  
19 of Pharmaceutical Products of the European Pharmaceutical Marketing Research  
20 Association (EphMRA). The quality of the data is assessed based on several criteria  
21 (e.g., completeness of information and linkage between diagnoses and prescriptions).  
22 General and specialized practices to include in the Disease Analyzer database are  
23 selected using multiple factors such as physician's age, specialty group, community size

category, and German federal state. Finally, around 3% of all primary care practices in Germany are included in the database.

#### *Study population*

This study included adults aged  $\geq 18$  years who were diagnosed for the first time with COVID-19 (ICD-10: U07.1 [COVID-19, virus identified] or U08.9 [personal history of COVID-19, unspecified]) in one of 855 general practices in Germany between October 2020 and August 2021. Only general practices having used at least once the ICD-10 code U09.9 (post-COVID-19 condition, unspecified) were considered for the analyses. The index date was defined as the visit date on which COVID-19 was diagnosed for the first time. Participants were followed up for a maximum of 12 months until November 2021 (end of database). Less than 25% of patients were followed up for only a few weeks, and this short follow-up is likely explained by the fact that these people fully recovered from COVID-19 and stopped consulting their general practitioner. Finally, the flow diagram of study patients is displayed in **Figure 1**.

#### *Study outcome*

The outcome of the study was the occurrence of post-COVID-19 condition (ICD-10: U09.9) 91 to 365 days after the index date. Post-COVID-19 condition diagnosed in the first 90 days following the index date was not included in the analyses, as it is suggested that this disorder occurs several months after the initial diagnosis of COVID-19 [18]. For a minority of patients diagnosed with post-COVID-19 condition, symptoms were documented at diagnosis using ICD-10 codes. These symptoms were malaise and fatigue (ICD-10: R53 and G93.3), abnormalities of breathing (ICD-10: R06),

disturbances of smell and taste (ICD-10: R43), and symptoms involving cognitive functions and awareness (ICD-10: R41.8).

#### *Study covariates*

Covariates included age, sex, and comorbidities present in at least 3% of the population in the 12 months prior to the index date. These comorbidities included lipid metabolism disorder (ICD-10: E78), diseases of esophagus, stomach and duodenum (ICD-10: K20-K31), thyroid gland disorders (ICD-10: E00-E07), hypertension (ICD-10: I10), depression (ICD-10: F32 and F33), osteoarthritis (ICD-10: M15-M19), reaction to severe stress, and adjustment disorders (ICD-10: F43), somatoform disorders (ICD-10: F45), overweight and obesity (ICD-10: E66), diabetes mellitus (ICD-10: E10-E14), chronic sinusitis (ICD-10: J32), sleep disorders (ICD-10: G47), asthma (ICD-10: J45), shoulder lesions (ICD-10: M75), chronic obstructive pulmonary disease (ICD-10: J44), vasomotor and allergic rhinitis (ICD-10: J30), heart disease (ICD-10: I20-I25, I48 and I50), spondylosis (ICD-10: M47), varicose veins (ICD-10: I83, I85 and I86), mononeuropathies (ICD-10: G56-G59), anxiety disorders (ICD-10: F41), migraine (ICD-10: G43), iron deficiency anemia (ICD-10: D50), vitamin D deficiency (ICD-10: E55), cancer (ICD-10: C00-C97), purine and pyrimidine metabolism disorder (ICD-10: E79), chronic kidney disease and kidney failure (ICD-10: N18 and N19), and nicotine dependence (ICD-10: F17).

#### *Statistical analyses*

Demographic and clinical characteristics of study participants were described using proportions for all variables except continuous age (mean [standard deviation]). In addition, the prevalence of post-COVID-19 condition in the 12 months following the



diagnosis of COVID-19 was studied in the overall sample. As participants were not followed up for an entire year, the prevalence of post-COVID-19 condition was estimated as a cumulative incidence using the Kaplan-Meier method. Finally, the association between predefined variables (i.e., age, sex and comorbidities) and post-COVID-19 condition was studied in a multivariable logistic regression model. The results of the logistic regression analysis are displayed as odds ratios (ORs) and 95% confidence intervals (CIs). Given that the size of the study sample was large, p-values<0.001 were considered statistically significant. All analyses were conducted with SAS 9.4.

## Results

This study included 51,630 patients diagnosed with COVID-19 in 855 general practices in Germany between October 2020 and August 2021. Mean (standard deviation) age was 47.1 (19.8) years, while 54.3% were women (**Table 1**). The three most frequent comorbidities diagnosed in the 12 months prior to the diagnosis of COVID-19 were lipid metabolism disorder (29.0%), diseases of esophagus, stomach and duodenum (26.5%), and thyroid gland disorders (20.9%). Mean (standard deviation) follow-up was 188 (120) days. The prevalence of post-COVID-19 condition was 8.3% in the overall sample. Post-COVID-19 symptoms were documented at diagnosis in 32.6% of patients with post-COVID-19 condition. Most frequent symptoms were malaise and fatigue (69.0%), abnormalities of breathing (21.0%), disturbances of smell and taste (6.0%), and symptoms involving cognitive functions and awareness (4.0%). The results of the multivariable logistic regression analysis are shown in **Table 2**. Age >30 years (age group 18-30 years: reference; OR ranging from 1.40 [95% CI: 1.20-1.64] for the age

group 31-45 years to 2.10 [95% CI: 1.81-2.45] for the age group 46-60 years) and female sex (male sex: reference; OR=1.23 [95% CI: 1.16-1.33]) were positively and significantly associated with post-COVID-19 condition. In terms of comorbidities, there was a significant relationship of asthma (OR=1.38 [95% CI: 1.19-1.59]), reaction to severe stress, and adjustment disorders (OR=1.24 [95% CI: 1.10-1.41]), and somatoform disorders (OR=1.23 [95% CI: 1.07-1.40]) with post-COVID-19 condition.

## Discussion

### *Main findings*

This retrospective cohort study, including more than 51,600 adults with COVID-19 followed in general practices in Germany between October 2020 and November 2021, revealed that 8.3% developed post-COVID-19 condition in the 12 months following the diagnosis of COVID-19. Age >30 years, female sex and several comorbidities (i.e., asthma, reaction to severe stress, and adjustment disorders, and somatoform disorders) were positively and significantly associated with post-COVID-19 condition. To the best of the authors' knowledge, this is one of the largest studies investigating the prevalence of post-COVID-19 condition in adults, while it is one of the first studies using data obtained in primary care practices.

### *Interpretation of findings*

A substantial body of literature has focused on the persistence of COVID-19 symptoms in adults previously diagnosed with COVID-19 [4–15]. One study of 968 patients diagnosed with COVID-19 in France showed that 85% of those symptomatic at two

1 months had persistent symptoms at one year [13]. In another sample of 3,135 non-  
2 institutionalized adults being tested for SARS-CoV-2 in the United States, the  
3 prevalence of persistent symptoms (i.e., symptoms lasting more than four weeks) was  
4 65.9% in those with a positive test and 42.9% in those with a negative test [14].  
5 Moreover, a study, including 47,780 individuals hospitalized for COVID-19 and 47,780  
6 controls from the general population in the United Kingdom, found that rates of  
7 respiratory disease, cardiovascular disease, and diabetes were higher in the group with  
8 than the group without COVID-19, and this increase was particularly important in people  
9 aged <70 years and in ethnic minority groups [4]. It was observed in a fourth cohort,  
10 including 96 COVID-19 patients from Germany, that 77.1% of them had persistent  
11 symptoms 12 months after the diagnosis of COVID-19 [11]. It is important to note that  
12 the prevalence of these persistent symptoms is higher than the prevalence of post-  
13 COVID-19 condition reported in the present study. Persistent symptoms (e.g., fatigue,  
14 dyspnea, and cough) do not necessarily translate into post-COVID-19 condition if these  
15 symptoms last only a few weeks or if they do not have a significant impact on activities  
16 of daily living [18]. Besides, the majority of previous studies were conducted in hospital  
17 settings [4,5,8–12], and participants included in these studies may have displayed more  
18 severe initial COVID-19 symptoms than those from general practices who were included  
19 in this German study, with severe initial COVID-19 symptoms being a risk factor for  
20 subsequent persistent symptoms [20–22].

21  
22 Age >30 years, female sex and three comorbidities (i.e., asthma, reaction to severe  
23 stress, and adjustment disorders, and somatoform disorders) were further found to be  
24 positively and significantly associated with post-COVID-19 condition. In terms of age,

1 people aged >30 years were more likely to be diagnosed with post-COVID-19 condition  
2 than their counterparts aged 18-30 years, and the OR was the highest in the age group  
3 46-60 years. There is some literature suggesting that persistent symptoms tend to be  
4 more prevalent with increasing age. For example, an analysis of data obtained in France  
5 (N=150 patients with noncritical COVID-19) revealed that age 40-59 years was positively  
6 and significantly associated with persistent symptoms 60 days after symptom onset  
7 compared with age <30 years [5]. Another Egyptian study of 172 participants with  
8 COVID-19 predominantly treated at home showed that age was a risk factor for  
9 persistent symptoms after recovery (OR=1.03 [95% CI: 1.01-1.05]) [23]. In a third cohort,  
10 including 807 individuals discharged from hospital after admission for COVID-19 in the  
11 United Kingdom between March 2020 and April 2021, more than 70% of the sample had  
12 not completely recovered from COVID-19 at 12 months, and there was a U-shaped  
13 association between age and the persistence of symptoms, with people aged <50 and  
14 ≥60 years being more likely to report symptoms at 12 months than their counterparts  
15 aged 50-59 years [24]. Severe COVID-19 is more frequent in older than in younger  
16 adults [25], and this could explain why old age favors the persistence of symptoms.  
17 Moreover, the duration of the clearance of SARS-CoV-2 increases with age [26,27], and  
18 the prolonged presence of the virus may be, at least partially, involved in post-COVID-19  
19 condition. The present study also found that women were more likely to be affected by  
20 post-COVID-19 condition than their male counterparts. Although severe COVID-19 is  
21 less frequent in women than in men [28], this finding aligns with the literature highlighting  
22 major sex differences in the persistence of COVID-19 symptoms. In a sample of 599  
23 patients with COVID-19 attending a hospital in Italy, female sex was significantly  
24 associated with post-COVID-19 syndrome compared with male sex (OR=1.55, 95% CI:

1 1.05-2.27) [10]. Similar results were obtained in 1,969 individuals hospitalized for  
2 COVID-19 in Spain, as being a woman resulted in a 2.54-fold increase in the risk of  
3 reporting at least three post-COVID-19 symptoms (95% CI: 1.67-3.87) compared with  
4 being a man [29]. The association between sex and post-COVID-19 condition remains  
5 insufficiently understood, but there may be biological, immunological and psychological  
6 differences between women and men which could play an important role in the sex  
7 differential incidence of post-COVID-19 condition [29]. Finally, three comorbidities (i.e.,  
8 asthma, reaction to severe stress, and adjustment disorders, and somatoform disorders)  
9 were found to be associated with post-COVID-19 condition. The relationship between  
10 asthma and post-COVID-19 condition should be interpreted with caution, as previous  
11 research has obtained opposite findings [8,30]. That being said, patients with asthma  
12 may be more likely to be affected by persistent symptoms of pulmonary nature such as  
13 cough and dyspnea than their counterparts without asthma. Interestingly, the two other  
14 diseases associated with post-COVID-19 condition were psychiatric disorders. Previous  
15 literature has shown that people with mental health disorders are at particular risk for  
16 deleterious COVID-19 outcomes (e.g., hospitalization and mortality) [31,32]. However,  
17 little is known about the effects of prior psychiatric disorders on persistent COVID-19  
18 symptoms. One hypothesis is that individuals with a history of mental health conditions  
19 are more likely to develop neuropsychiatric sequelae of the COVID-19 than the general  
20 population [33]. Another hypothesis is that dysregulations of the hypothalamic-pituitary-  
21 adrenal axis are frequent in people with psychiatric disorders [34], while these  
22 dysregulations may also be involved in the physiopathology of post-COVID-19 condition  
23 [35,36]. Finally, specifically, somatoform disorders are characterized by physical  
24 symptoms (e.g., back pain, dizziness, and shortness of breath) without an adequate

1 medical explanation, and inaccurate or exaggerated beliefs about such symptoms are  
2 common [37]. Interestingly, a study of 26,823 volunteers from France suggested that  
3 believing in having being infected with SARS-CoV-2 may be a stronger predictor of  
4 persistent physical symptoms than having a positive serology test result [38].

#### 5 6 *Public health implications and directions for future research*

7 Based on the results of this study, post-COVID-19 condition was diagnosed in  
8 approximatively 8% of patients with COVID-19 followed in general practices in Germany.  
9 Persistent symptoms should be regularly assessed by general practitioners in individuals  
10 with a history of COVID-19. Although treatments for post-COVID-19 condition are  
11 limited, the management of this disorder should be multidisciplinary and include, for  
12 example, physical rehabilitation, management of pre-existing comorbidities, and mental  
13 health support [39]. Besides, the status of patients for the vaccination against COVID-19  
14 should be assessed, and, if the status is not complete, vaccine doses may be  
15 administered. Interestingly, the effects of COVID-19 vaccines on post-COVID-19  
16 condition remain insufficiently understood, but some preliminary evidence suggests that  
17 being vaccinated may protect against the persistence of symptoms [17]. In terms of  
18 future research, further data are warranted to confirm or refute these findings in primary  
19 care practices in other countries. Moreover, more studies should be conducted to better  
20 characterize factors predicting post-COVID-19 condition.

## *Strengths and limitations*

The major strengths of this study are the large sample size and the use of data obtained in primary care. Nonetheless, this study also displays limitations that should be acknowledged. First, the diagnosis of post-COVID-19 condition exclusively relied on ICD-10 codes, and more information on symptoms would have allowed more detailed analyses. The ICD-10 code used for post-COVID-19 condition (i.e., U09.9) has been implemented based on the criteria of the World Health Organization (e.g., symptoms present at least three months after the diagnosis of COVID-19, symptoms lasting at least two months, and no alternative diagnosis to explain the symptoms), and it was not possible to verify how frequently these criteria were met. Second, there was no data on the severity of the SARS-CoV-2 infection, the type of SARS-CoV-2 variant, and the possible administration of vaccine doses prior to or after the diagnosis of COVID-19. As these variables may be associated with post-COVID-19 condition, this lack of information may have biased the inferential analyses. Third, it is possible that some patients have been diagnosed with post-COVID-19 condition in other practices (e.g., pulmonary and neuropsychiatric), and the prevalence of this disorder may have therefore been underestimated. Fourth, this was a study of retrospective nature, and more prospective studies should investigate the epidemiology of post-COVID-19 condition in the future.

## *Conclusions*

In this study of patients from general practices in Germany, the prevalence of post-COVID-19 condition was around 8% in the 12 months following the diagnosis of COVID-19. Age >30 years, female sex and several comorbidities (i.e., asthma, reaction to

severe stress, and adjustment disorders, and somatoform disorders) were positively and significantly associated with post-COVID-19 condition. Finally, more research is needed to corroborate or refute these settings in other countries, while future research should focus on predictors of post-COVID-19 condition.

### **Potential Conflicts of Interest**

None.

### **Patient Consent Statement**

The database used includes only anonymized data in compliance with the regulations of the applicable data protection laws. German law allows the use of anonymous electronic medical records for research purposes under certain conditions. According to this legislation, it is not necessary to obtain informed consent from patients or approval from a medical ethics committee for this type of observational study that contains no directly identifiable data.

Because patients were only queried as aggregates and no protected health information was available for queries, no Institutional Review Board approval was required for the use of this database or the completion of this study.

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### **Author contributions**

Karel Kostev contributed to the design of the study, performed the statistical analyses, and corrected the manuscript. Lee Smith and Ai Koyanagi corrected the manuscript. Louis Jacob contributed to the design of the study, managed the literature searches, wrote the first draft of the manuscript, and corrected the manuscript. All authors contributed to and have approved the final manuscript.

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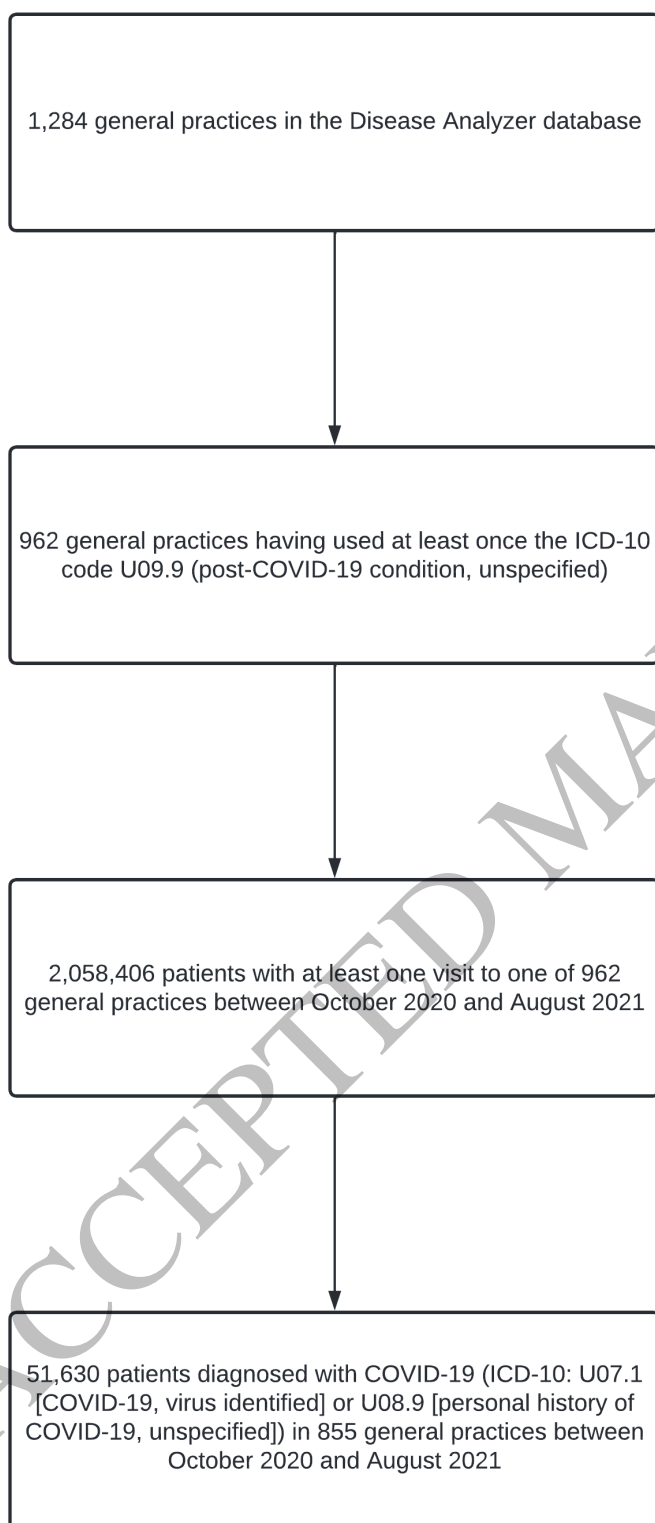
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1

2 **Figure 1.** Flow diagram of study patients

1 **Table 1.** Demographic and clinical characteristics of the study sample

Variable	Patients with COVID-19 (n=51,630)
<b>Age (in years)</b>	
Mean (standard deviation)	47.1 (19.8)
18-30	23.0
31-45	25.0
46-60	28.4
61-70	10.9
>70	12.7
<b>Sex</b>	
Female	54.3
Male	45.7
<b>Comorbidities present in at least 3% of patients in the 12 months prior to the index date</b>	
Lipid metabolism disorder	29.0
Diseases of esophagus, stomach and duodenum	26.5
Thyroid gland disorders	20.9
Hypertension	20.0
Depression	18.6
Osteoarthritis	14.9
Reaction to severe stress, and adjustment disorders	13.6
Somatoform disorders	13.2
Overweight and obesity	11.7
Diabetes mellitus	11.6
Chronic sinusitis	11.4
Sleep disorders	11.3
Asthma	9.6
Shoulder lesions	9.6
Chronic obstructive pulmonary disease	9.2
Vasomotor and allergic rhinitis	8.9
Heart disease	8.3
Spondylosis	8.3
Varicose veins	8.1
Mononeuropathies	7.5
Anxiety disorders	7.2
Migraine	7.1
Iron deficiency anemia	6.4
Vitamin D deficiency	5.9
Cancer	5.7
Purine and pyrimidine metabolism disorder	5.7
Chronic kidney disease and kidney failure	4.5
Nicotine dependence	4.5

2 Data are proportion unless otherwise specified.

3

**Table 2.** Association between predefined variables and post-COVID-19 condition in the 12 months following the diagnosis of COVID-19 in patients followed in general practices in Germany (multivariable logistic regression model)

Variable	Proportion of individuals with post-COVID-19 condition (%)	Adjusted odds ratio (95% confidence interval)	P-value
<b>Total</b>	8.3		
<b>Age (in years)</b>			
18-30	5.0	Reference	
31-45	7.3	1.40 (1.20-1.64)	<0.001
46-60	9.8	2.10 (1.81-2.45)	<0.001
61-70	8.6	1.81 (1.49-2.21)	<0.001
>70	5.6	1.54 (1.23-1.92)	<0.001
<b>Sex</b>			
Female	9.1	1.23 (1.16-1.33)	<0.001
Male	7.4	Reference	
<b>Comorbidities present in at least 3% of patients in the 12 months prior to the index date</b>			
Asthma	11.2	1.38 (1.19-1.59)	<0.001
Reaction to severe stress, and adjustment disorders	11.3	1.24 (1.10-1.41)	<0.001
Somatoform disorders	10.9	1.23 (1.07-1.40)	<0.001
Sleep disorders	11.1	1.21 (1.06-1.39)	0.005
Lipid metabolism disorder	9.2	1.17 (1.04-1.33)	0.009
Osteoarthritis	9.4	1.17 (1.02-1.33)	0.023
Purine and pyrimidine metabolism disorder	9.1	1.17 (0.97-1.42)	0.098
Migraine	10.3	1.16 (0.97-1.36)	0.075
Vitamin D deficiency	11.4	1.15 (0.97-1.37)	0.106
Chronic sinusitis	9.5	1.13 (0.99-1.29)	0.076
Anxiety disorders	11.2	1.13 (0.96-1.33)	0.152
Shoulder lesions	10.8	1.12 (0.97-1.29)	0.116
Mononeuropathies	10.2	1.11 (0.95-1.30)	0.189
Thyroid gland disorders	9.1	1.10 (0.98-1.23)	0.103
Overweight and obesity	8.8	1.09 (0.95-1.26)	0.207
Varicose veins	9.3	1.08 (0.95-1.25)	0.358
Heart disease	7.9	1.08 (0.91-1.28)	0.383

<b>Cancer</b>	8.1	1.02 (0.84-1.24)	0.842
<b>Diseases of esophagus, stomach and duodenum</b>	8.6	1.01 (0.91-1.13)	0.845
<b>Hypertension</b>	7.9	1.01 (0.90-1.14)	0.886
<b>Vasomotor and allergic rhinitis</b>	9.8	1.01 (0.86-1.18)	0.944
<b>Spondylosis</b>	9.0	0.97 (0.82-1.13)	0.658
<b>Nicotine dependence</b>	10.3	0.96 (0.78-1.19)	0.705
<b>Depression</b>	9.1	0.95 (0.84-1.08)	0.433
<b>Chronic kidney disease and kidney failure</b>	7.2	0.94 (0.74-1.19)	0.592
<b>Chronic obstructive pulmonary disease</b>	7.2	0.89 (0.76-1.04)	0.150
<b>Iron deficiency anemia</b>	8.4	0.89 (0.75-1.07)	0.228
<b>Diabetes mellitus</b>	7.0	0.85 (0.73-0.99)	0.048

1 Significant associations are indicated in bold.

2 All variables listed in the table were included in the multivariable logistic regression.

3