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Caring for Long Covid patients in primary healthcare: a cross-sectional study on general practitioners' knowledge, perception and experience in Belgium and Malta

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Abstract

Background At least 10% of Covid-19 recovered individuals experience persistent symptoms (Long Covid). Primary healthcare and general practitioners (GPs) are at the forefront in their care. In this study, GPs' knowledge, perceptions and experiences with Long Covid, and the definition used in two countries, are investigated to provide insight into GPs' care for Long Covid patients at a cross-country level.

Methods A cross-sectional study targeted towards GPs was conducted in Belgium and Malta during spring and early summer 2022. An online survey consisting of 15 questions on Long Covid was disseminated. Additionally, country-specific practice and demographic characteristics were collected. Descriptive and logistic regression analyses were performed.

Results A total of 150 GPs (Belgium = 105; Malta = 45) responded. Female GPs represented 58.0%, median age was 49 years (IQR: 37–61). Concerning GPs' knowledge and perception on Long Covid, in both countries, most GPs reported insufficient scientific knowledge and information on Long Covid diagnosis and treatment. Access to educational material was limited and an awareness-rising campaign on Long Covid was deemed necessary. Moreover, two out of three GPs stated that Long Covid patients were not well followed up by primary healthcare in mid-2022. For diagnosing Long Covid, 54.7% required a positive Covid-19 test, more often among Belgian GPs than Maltese (64.3% vs. 45.2%, $p = 0.036$). To assess Long Covid, GPs mainly applied diagnostic criteria by themselves (47.3%) in combination with persistent symptoms (4 weeks to 5 months). Most GPs had experience with Long Covid patients in their practice, regardless of practice type and GPs' country, sex or age ($p = 0.353$; $p = 0.241$; $p = 0.194$; $p = 0.058$). Although most GPs (94.7%) stated that Long Covid patients should follow multidisciplinary approach, 48.3% reported providing care for these patients themselves or with GP colleagues and only 29.8% by multidisciplinary cooperation.

Conclusions GPs frequently provide (multidisciplinary) care to Long Covid patients and GPs' care showed similarities at cross-country level. Although GPs perceive lack of scientific knowledge and educational material on Long Covid,

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similar diagnostic criteria among GPs were noted. Uniform evidence-based guidelines, scientific support and training for GP across Europe must be a priority to enhance their treatment approach to Long Covid.

Keywords Covid-19, Long Covid, primary healthcare, general practitioners, public health, Belgium, Malta

Background

Recent evidence suggests that at least 10% of Covid-19 infected people experience debilitating symptoms lasting much longer than expected. Long Covid (also referred to as post-acute sequelae of COVID-19) leads to an impaired quality of life for millions of people worldwide [1]. Over the past pandemic years, a wide variety of definitions for Long Covid have been proposed internationally and the main challenge in case definition remains in defining "persistence" [2, 3]. This variability in definitions has challenged the clinical management of Long Covid across Europe, different diagnostic definitions have been used among healthcare professionals as over the years [4].

The Covid-19 pandemic had a strong impact on primary healthcare with general practitioners (GPs) being challenged with new practices such as remote consultations, taking up additional responsibilities during the Covid-19 vaccination campaigns and caring for patients with Covid-19 and long-term Covid-19-related symptoms [5–7]. As the number of Long Covid cases is increasing, primary care is at the forefront in caring for these Long Covid patients with GPs taking up a key position [8, 9].

From a European perspective, it is important to establish whether there are differences in GPs' approaches to Long Covid both at national and cross-country levels. In this study, we investigate the cross-country level in two small European countries with similar primary care setup, i.e. Belgium and Malta, where free GP choice is the norm [10]. Belgium, located in North-western Europe and serving as a transit country, is compared to Malta, an isolated island in the Southern Europe [11]. Results on GPs' approaches to Long Covid at national level are available in separate publications for Belgium and Malta [12–14].

Moreover, as of early 2022, Long Covid research has mainly focussed on clinical settings and hospitalized patients [15], only a minority of studies target Long Covid in primary care settings. Since most Long Covid cases occur in non-hospitalized patients with mild acute Covid-19 infection [1], it is crucial to investigate Long Covid in primary healthcare. During the study period (spring-summer 2022), no widely accepted definition or evidence-based clinical guidelines for Long Covid were available in primary healthcare. Therefore, to identify the definition and diagnostic criteria used by GPs in general practice, we chose not to include a case definition at the onset of our study.

This study investigates the knowledge, perceptions and experiences of GPs regarding Long Covid, as well as identifies the definition and diagnostic criteria being used by GPs in two countries, i.e. Belgium and Malta. Comparative analyses assess whether there are differences in GPs' approaches to Long Covid at the cross-country level.

Methods

Study design and study population

During 2021, various research initiatives related to Long Covid were launched in Belgium with their main focus on patients' (unmet) needs [16–19] and clinical trials for management and treatment of Long Covid [20]. The limited information on the perspective of healthcare providers in early 2022 was countered by this cross-country study on Long Covid.

A cross-sectional study targeted towards GPs was conducted in two European countries, i.e. Belgium and Malta. During spring and early summer 2022, all Belgian and Maltese GPs were invited to participate in this study.

Data collection and study period

An online anonymous questionnaire was formulated following scientific literature on Long Covid at beginning of 2022. Study outcomes of the (at that time) existing Belgian studies were examined and integrated where appropriate for this study. The survey was validated in February 2022 by a panel of experts consisting of members of the steering committee of the Belgian Sentinel GPs (SGP) network [21] and experts of the Belgian National Public Health Institute (Sciensano). The survey was originally created in Dutch and French to be disseminated in Belgium and was translated in English to be disseminated in Malta. The English version of the questionnaire is available in a supplementary file (Additional file 1).

The survey included 15 (ordinal, open-ended or multiple choice) questions and addressed topics on (1) scientific knowledge and perception on Long Covid, (2) criteria implemented by GPs to make a Long Covid diagnosis as well as (3) GPs personal experience on Long Covid care. A case definition for Long Covid was not included, as there was no consensus in general practice at the timing of the study. To characterize GPs, country-specific practice characteristics (practice region, practice type or primary care setting) and demographic characteristics (sex, age) were collected. No identifiable or personal data was collected.

The survey was a one-off questionnaire and was built in LimeSurvey. An email containing information about this

study and providing a URL to the electronic survey was sent to all GPs in both countries, along with a reminder. LimeSurvey was used as the online platform for the survey data collection and it restricted each participant to access and participate only once. Participants were informed that they could opt out of the questionnaire at any time, but if they chose to participate, they would be providing their informed consent. Only participants who agreed to these terms and chose to proceed to the questionnaire gained access to the questions.

All Belgian and Maltese GPs were invited to participate in this study on a voluntary basis. In Belgium, as the Belgian SGP network has a population coverage of 1.02% in 2022 [22], invitations were first sent to the sentinel GPs ($N=84$). To address the over representativity of older GPs in the SGP network [22], all Belgian GPs were invited to participate by mentioning our study in the newsletters of the Belgian GPs associations (Domus Medica and SSMG) ($N\sim10000$). In Malta, a total of 203 GPs are registered members of the Malta Family Medicine College, which is the Maltese GPs association. For this study, these members were considered to representative for all practicing GPs in Malta, including those working in the state's primary healthcare and those in the private sector. These 203 Maltese GPs were invited to participate to our study.

The survey was launched among the Belgian SGP network from 25th February to 25th March 2022. To increase representativity of the responses, the survey was also disseminated one month later (from 25th April to 20th May 2022) through the newsletters of the Belgian GPs associations (Domus Medica and SSMG). In Malta, the questionnaire was disseminated to GPs working in both state and private primary healthcare sectors between 6th June till 12th July 2022. The survey link was disseminated through the Department of Primary Health Care within the Maltese Ministry of Health and the Malta Family Medicine College after obtaining the necessary permissions.

Data management

Survey responses were collected through LimeSurvey and data was automatically stored on a secured server managed by Sciensano. Once the data collection was finished, data was converted into a spreadsheet database. The study was conducted in agreement with the regulations on privacy and data collection and treatment. A data transfer agreement (DTA) between the University of Malta and Sciensano was approved (UM Ref: 2022 189 UM SCNO).

To facilitate cross-country analysis, some variables were recoded. Malta's primary care setting was transformed into an overall practice type variable with "Health centres / both Health centres and Private clinics" into "Multidisciplinary group practice" and "Private clinics" into "solo practice". For comparative analyses, response options on the question "whether a positive Covid-19 test is required" were recoded into binary variables "Yes" versus "No", excluding missing answers. Variables with the following response options "Yes, absolutely", "Yes, moderately", "No, not really" and "No, not at all" were transformed into binary variables with "Yes-options" into "Yes" and "No-options" into "No" for logistic regression analyses. When using GPs' age as continuous variable in the logistic regression models, age was transformed into a z-scored age variable after imputation of one missing value for Malta (imputed by responding Malta GPs' mean age).

Statistical analyses

In the descriptive analyses, data are presented as absolute numbers and percentages for binary and categorical variables, and as median with interquartile interval (IQR) for continuous variables. Descriptive analyses of all variables were evaluated with Pearson's chi square test or Fisher's exact test. Mean values were compared by Student's T-test. To investigate cross-country differences, GPs' knowledge and perception on Long Covid was studied through univariable and multivariable (adjusted for GPs' sex and age) logistic regression and GPs' experience with Long Covid patients was examined through univariable logistic regression. Odds ratios (OR) and 95% confidence intervals (95% CI) were reported. A p-value of <0.05 was considered statistically significant. All descriptive and comparative analyses were performed using the Stata software version 16.

Results

The electronic survey was completed by a total of 150 GPs (105 GPs and 45 GPs respectively for Belgium and Malta). The overall response rate for Belgium was 1,04% with 57,1% (48/84) response among the sentinel GPs (belonging to the SGP network) and 0.6% (57/10109) response among non-sentinel GPs. Although the overall response rate for Belgium was only 1,04%, a detailed examination showed that Belgian respondents to the Long Covid survey are representative of all Belgian GPs in terms of region and age, but not sex (male responders 41.9% vs. 53.2%, $p=0.02$) (see Additional file 2). For Malta, 22% (45/203) of the Malta Family Medicine College members responded to the survey which corresponds to the general response rate achieved among Maltese doctors [23].

In Belgium, GPs were well distributed across practice types with most responders working in a group practice of more than two GPs (41.0%). In Malta, the majority of responding GPs worked within state's primary health centres (64.4%). Female GPs represented 58.0% and median age was 49 years old (IQR: 37–61) (Table 1).

Table 1 Characteristics of responders by country

	Total	Belgium	Malta	*p*-value
	N (%)	*N* (%)	*N* (%)	
	N = 150	*N* = 105	*N* = 45	
Primary care setting				n.a.
Health Centres			29 (64.4%)	
Private clinics			14 (31.1%)	
Both Health Centres and Private clinics			2 (4.4%)	
Practice type				0.000*
Solo practice	43 (28.7%)	29 (27.6%)	14 (31.1%)	
Duo practice	17 (11.3%)	17 (16.2%)	0 (0.0%)	
Group practice > 2GPs	43 (28.7%)	43 (41.0%)	0 (0.0%)	
Multidisciplinary group practice	47 (31.3%)	16 (15.2%)	31 (68.9%)	
Sex				0.971
Female	87 (58.0%)	61 (58.1%)	26 (57.8%)	
Male	63 (42.0%)	44 (41.9%)	19 (42.2%)	
Age (years)				0.127
25–39 years	46 (30.7%)	29 (27.6%)	17 (37.8%)	
40–54 years	42 (28.0%)	27 (25.7%)	15 (33.3%)	
>=55 years	62 (41.3%)	49 (46.7%)	13 (28.9%)	
Median (IQR)	49 (37–61)	53 (38–63)	48 (35–56)	0.012*

IQR = interquartile range; n.a.= not applicable; *$p < 0.05$

Among the responding GPs, no differences in sex were observed between Belgium and Malta. Female GPs were mainly working in non-solo practices ($p = 0.011$), this was similar for both countries (Belgium: $p = 0.091$; Malta:

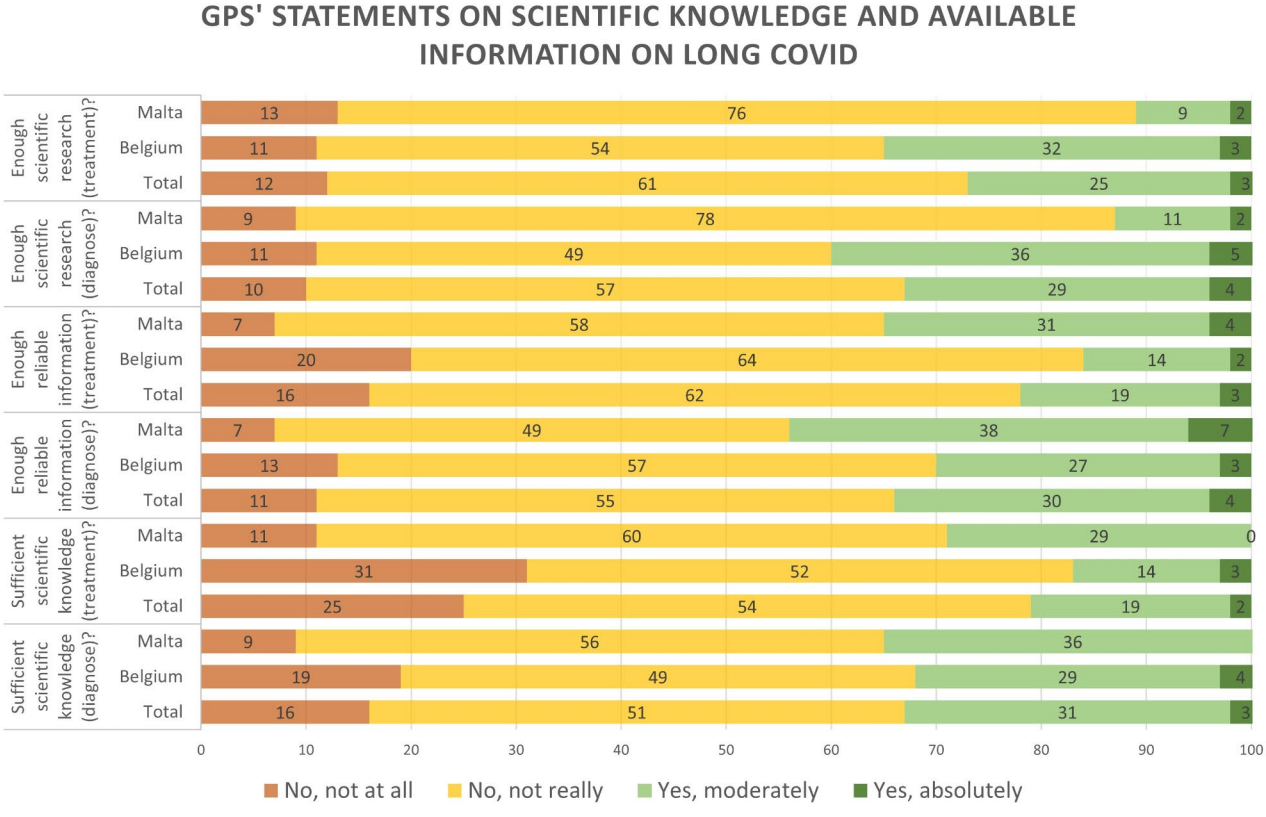

Fig. 1 GPs' statements on scientific knowledge and available information on Long Covid by country

Table 2 GPs' knowledge and perception on Long Covid by country (univariable and multivariable logistic regression)

		Univariable analysis			Multivariable analysis#		
		OR	**[95% CI]**	***p*-value**	**OR**	**[95% CI]**	***p*-value**
Statements on scientific knowledge and available information on Long Covid							
Sufficient scientific knowledge (diagnose)							
Country	Belgium	Ref.		0.706			
	Malta	1.15	[0.55;2.40]				
Sufficient scientific knowledge (treatment)							
Country	Belgium	Ref.		0.107			
	Malta	1.96	[0.86;4.46]				
Enough reliable information (diagnose)							
Country	Belgium	Ref.		0.079			
	Malta	1.91	[0.93;3.93]				
Enough reliable information (treatment)							
Country	Belgium	Ref.		0.010*	Ref.		0.016*
	Malta	2.85	[1.28;6.36]		2.77	[1.21;6.34]	
Enough scientific research (diagnose)							
Country	Belgium	Ref.		0.002*	Ref.		0.002*
	Malta	0.22	[0.09;0.57]		0.22	[0.08;0.58]	
Enough scientific research (treatment)							
Country	Belgium	Ref.		0.006*	Ref.		0.008*
	Malta	0.24	[0.09;0.66]		0.25	[0.09;0.69]	
Statements on educational material and awareness campaigns							
Enough accessible educational material (diagnose)							
Country	Belgium	Ref.		0.056			
	Malta	2.26	[0.98;5.21]				
Enough accessible educational material (treatment)							
Country	Belgium	Ref.		0.035*	Ref.		0.012*
	Malta	2.57	[1.07;6.20]		3.45	[1.31;9.07]	
Awareness-raising campaign							
Country	Belgium	Ref.		0.015*	Ref.		0.013*
	Malta	6.37	[1.44;28.24]		6.81	[1.49;31.12]	
Awareness-raising campaign for patients							
Country	Belgium	Ref.		0.003*	Ref.		0.005*
	Malta	4.73	[1.72;12.99]		4.50	[1.58;12.77]	
Enough media attention							
Country	Belgium	Ref.		0.023*	Ref.		0.022*
	Malta	0.42	[0.20;0.89]		0.41	[0.19;0.88]	
Statements on care and follow-up for Long Covid patients in primary care							
Long Covid patients are currently well followed up							
Country	Belgium	Ref.		0.579			
	Malta	1.23	[0.60;2.51]				
A multidisciplinary approach is necessary							
Country	Belgium	Ref.		0.291			
	Malta	3.14	[0.38;26.32]				
Scientific information disseminated corresponds to practice							
Country	Belgium	Ref.		0.046*	Ref.		0.041*
	Malta	0.39	[0.16;0.98]		0.37	[0.14;0.96]	

*$p<0.05$; # model adjusted for GPs' sex and age

$p=0.008$). The mean age of Belgian GPs that answered the survey was slightly higher than that of the Maltese GPs (51 vs. 45 years, $p=0.012$). GPs aged 55 or older were mainly working in solo practices ($p=0.000$), this was the case for both countries (Belgium: $p=0.000$; Malta: $p=0.013$).

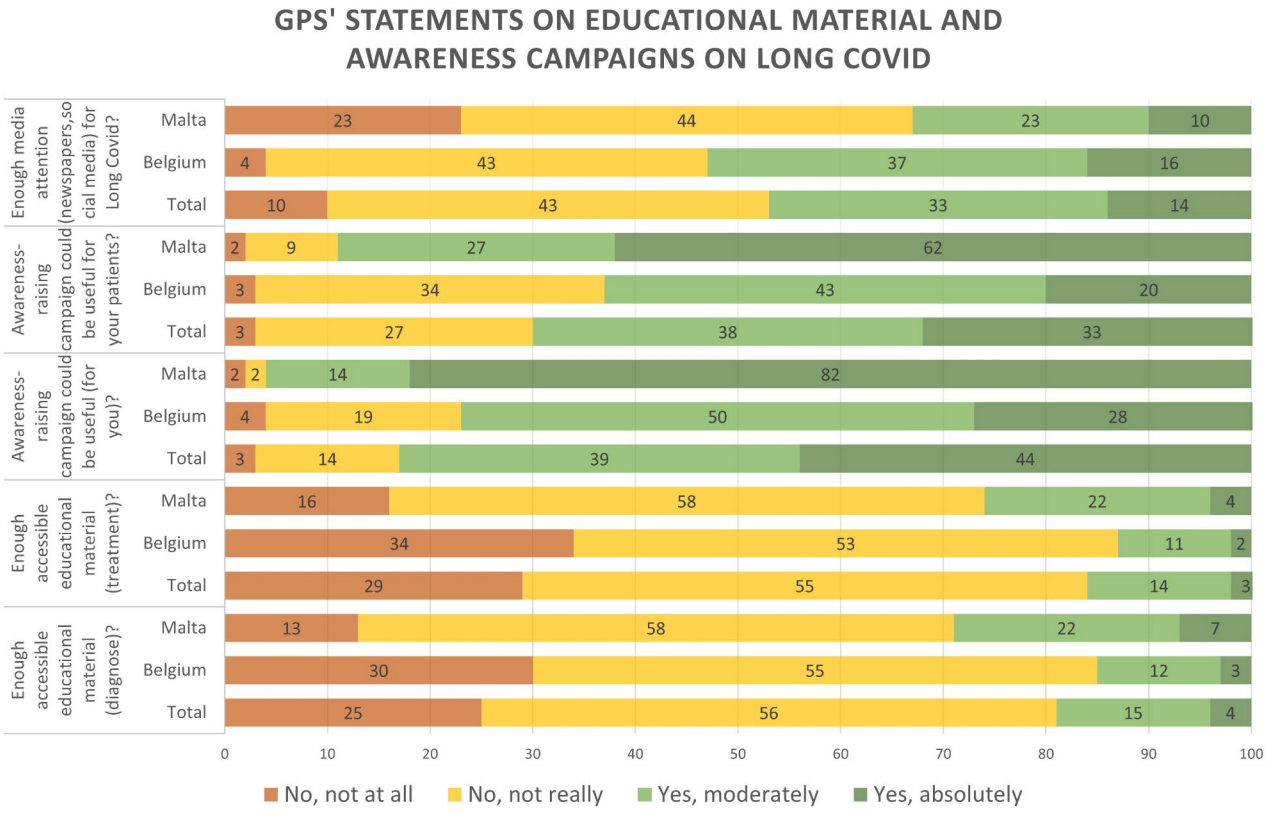

Fig. 2 GPs' statements on educational material and awareness campaigns on Long Covid by country

Long Covid awareness: knowledge and perception of general practitioners

Concerning GPs' knowledge and perception on Long Covid, the corresponding numbers and *p*-values can be found in a supplementary table (Additional file 3) and the output of the logistic regression models is presented in Table 2.

GPs' statement on scientific knowledge and available information on Long Covid is presented by country in Fig. 1. In both countries, most GPs reported insufficient scientific knowledge on Long Covid diagnosis (66.7%, $p=0.706$) and treatment (79.3%, $p=0.107$). In addition, a lack of reliable information on Long Covid diagnosis (66.0%, $p=0.079$) and treatment (78.0%, $p=0.010$) and insufficient scientific Long Covid research on diagnosis (67.3%, $p=0.002$) and treatment (72.6%, $p=0.006$) was reported. Compared to Belgian GPs, Maltese GPs were more negative about the availability of sufficient scientific research (for diagnosis: adjusted OR=0.22; 95% CI [0.08;0.58]; for treatment: aOR=0.25; 95%CI [0.09;0.69]) but Maltese GPs were more positive about the availability of reliable information on Long Covid treatment (aOR=2.77; 95%CI [1.21;6.34]).

Figure 2 shows GPs' perception on educational material and awareness campaigns on Long Covid by country. In both countries, most GPs felt that accessibility to educational material on Long Covid diagnosis (80.6%, $p=0.056$) and treatment (83.3%, $p=0.035$) was limited. However, Maltese GPs were more positive about available educational material on Long Covid treatment than Belgian responders (aOR=3.45; 95%CI [1.31;9.07]). GPs in both countries were favourable for an awareness-rising campaign targeting healthcare professionals (82.6%, $p=0.015$) and patients (70.7%, $p=0.003$), especially in Malta (for GPs: aOR=6.81; 95%CI [1.49;31.12]; for patients: aOR=4.50; 95%CI [1.58;12.77]). Almost half of responding GPs (46.7%, $p=0.023$) expressed that there was enough media attention for Long Covid (through newspapers, social media, etc.), but Maltese GPs were more negative towards this statement (aOR=0.41; 95%CI [0.19;0.88]).

Regarding GPs' perception on care and follow-up for Long Covid patients in primary healthcare (Fig. 3), about two in three GPs in both countries (63.3%, $p=0.579$) stated that Long Covid patients were not well followed up within primary care. In both countries, half of GPs reported ($p=0.046$) that the scientific information disseminated on Long Covid corresponds to what they experienced in practice, with Maltese GPs being more

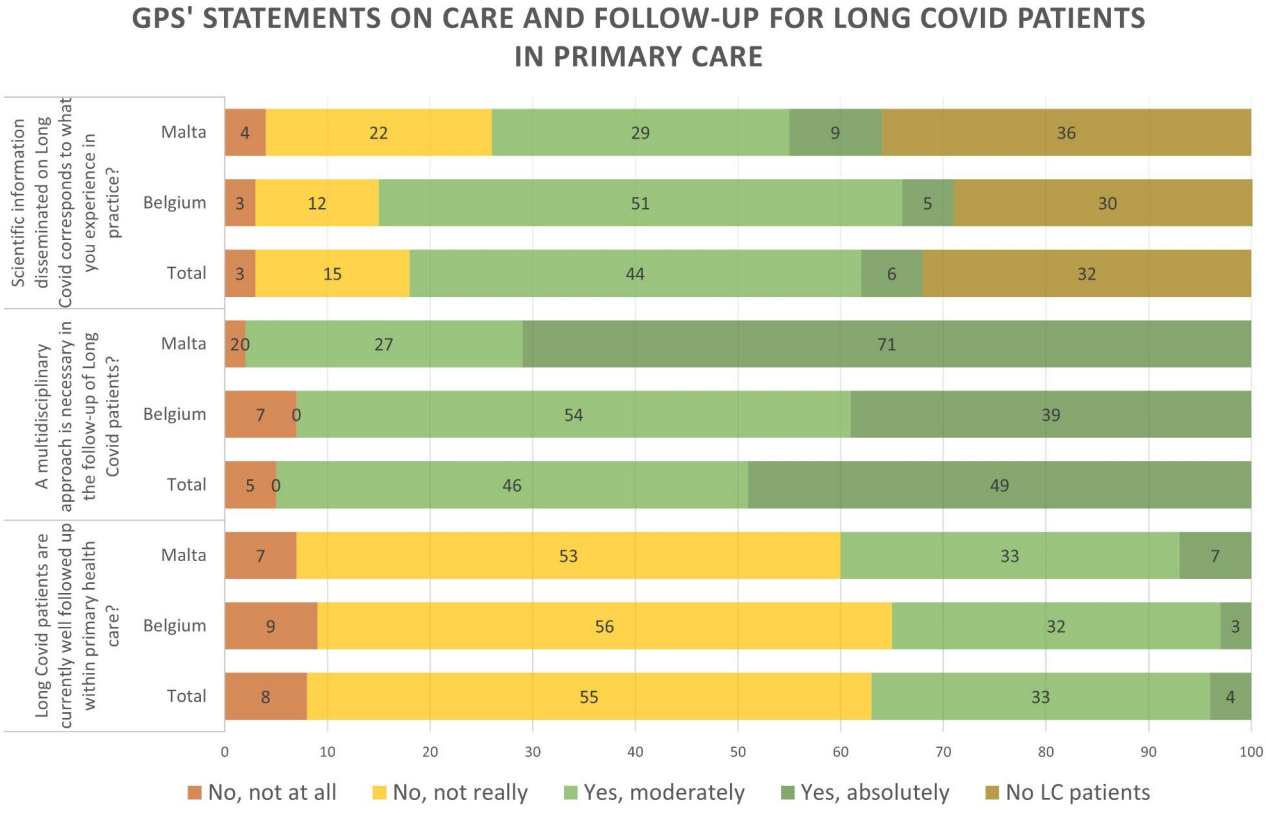

Fig. 3 GPs' statements on care and follow-up for Long Covid patients in primary healthcare by country

Table 3 Criteria implemented by GPs to make a diagnosis of Long Covid by country

Criteria for diagnosing Long Covid	Total	Belgium	Malta	*p*-value
	N (%)	*N* (%)	*N* (%)	
	N = 150	*N* = 105	*N* = 45	
COVID-19 test				0.194
Positive COVID test result must be known	82 (54.7%)	63 (60.0%)	19 (42.2%)	
Positive COVID test not required if symptoms	36 (24.0%)	21 (20.0%)	15 (33.3%)	
Positive COVID test is not required	22 (14.7%)	14 (13.3%)	8 (17.8%)	
I don't know/ no opinion	10 (6.7%)	7 (6.7%)	3 (6.7%)	
Criteria for diagnosing Long Covid				
On the basis of diagnostic criteria (by myself)	71 (47.3%)	48 (45.7%)	23 (51.1%)	0.544
On the basis of diagnostic criteria (specialist)	24 (16.0%)	13 (12.4%)	11 (24.4%)	0.065
Duration of symptoms < 4 weeks	4 (2.7%)	1 (1.0%)	3 (6.7%)	0.081
Duration of symptoms 4 to 12 weeks	45 (30.0%)	30 (28.6%)	15 (33.3%)	0.560
Duration of symptoms 3 to 5 months	51 (34.0%)	33 (31.4%)	18 (40.0%)	0.310
Duration of symptoms more than 6 months	33 (22.0%)	20 (19.1%)	13 (28.9%)	0.182
Referral	8 (5.3%)	3 (2.9%)	5 (11.1%)	0.053

negative about this than Belgian GPs (aOR = 0.37; 95%CI [0.14;0.96]).

GPs' Long Covid criteria

In both countries, most responders (54.7%) reported that a positive Covid-19 test result (PCR or antigen rapid test) is a minimum requirement when speaking about Long Covid complaints. If symptoms are present, 24.0% of GPs stated that a positive Covid-19 test is not required anymore (Table 3). Belgian GPs were more in favour in requiring a positive Covid-19 test result than in Malta (64.3% vs. 45.2%, $p = 0.036$), while Maltese GPs more often relied on symptoms alone than Belgian GPs (35.7% vs. 21.4%, $p = 0.076$).

In both countries, to assess Long Covid in primary healthcare, GPs primarily implemented diagnostic

criteria themselves (47.3%) along with considering the persistence of symptoms (from 4 weeks to 5 months) as shown in Table 3.

60% of GPs (58.1% in Belgium vs. 64.4% in Malta, $p=0.300$) stated that Long Covid should be considered a chronic disease. Additionally, 73.3% of GPs (irrespective of country) considered recommending Long Covid patients to be inoculated by a Covid-19 vaccine or booster.

Caring for Long Covid patients in primary healthcare

The majority (76.0%) of participating GPs (75.2% in Belgium vs. 77.8% in Malta, $p=0.274$) reported to have encountered patients with Long Covid symptoms. Regardless of practice type and GPs' country, sex or age (resp. $p=0.353$; $p=0.241$; $p=0.194$; $p=0.058$), GPs had experience with Long Covid patients in their practice.

In primary healthcare, these Long Covid patients suffered mainly from fatigue (93.9%), breathing difficulties (73.5%), concentration and memory problems (68.4%) and impairment in daily functioning (60.2%) (Fig. 4). Between Belgium and Malta, some statistically significant differences were observed among the prevalence of the following reported symptoms: concentration and memory problems (74.7% vs. 54.3%, $p=0.031$), limitation in daily functions (66.7% vs. 45.7%, $p=0.035$) and depression/depressive feelings (22.8% vs. 42.9%, $p=0.029$) (see supplementary table in Additional file 4).

Most GPs (94.7%, $p=0.291$) believed that caring for Long Covid patients should follow multidisciplinary approach (Fig. 3; Table 2). However in reality, almost half of GPs (48.3%, $p=0.241$) reported following up with these patients themselves or with GP colleagues, while 29.8% ($p=0.279$) reported doing so through multidisciplinary cooperation, primarily with consultations occurring biweekly or monthly. Care solely provided by another healthcare provider was higher in Malta than in Belgium (37.1% vs. 15.2%, $p=0.009$). Other healthcare professionals involved include mainly pneumologists (81.4%), specialists in physical medicine/rehabilitation (47.5%), physiotherapists (45.8%) and neurologists (30.5%). No cross-country differences were found among these other healthcare professionals involved (Table 4).

Discussion

Main findings

This study provides insight on GPs' approaches to the globally emerging condition of Long Covid by investigating GPs' awareness, experience and the diagnostic criteria used in Belgium and Malta.

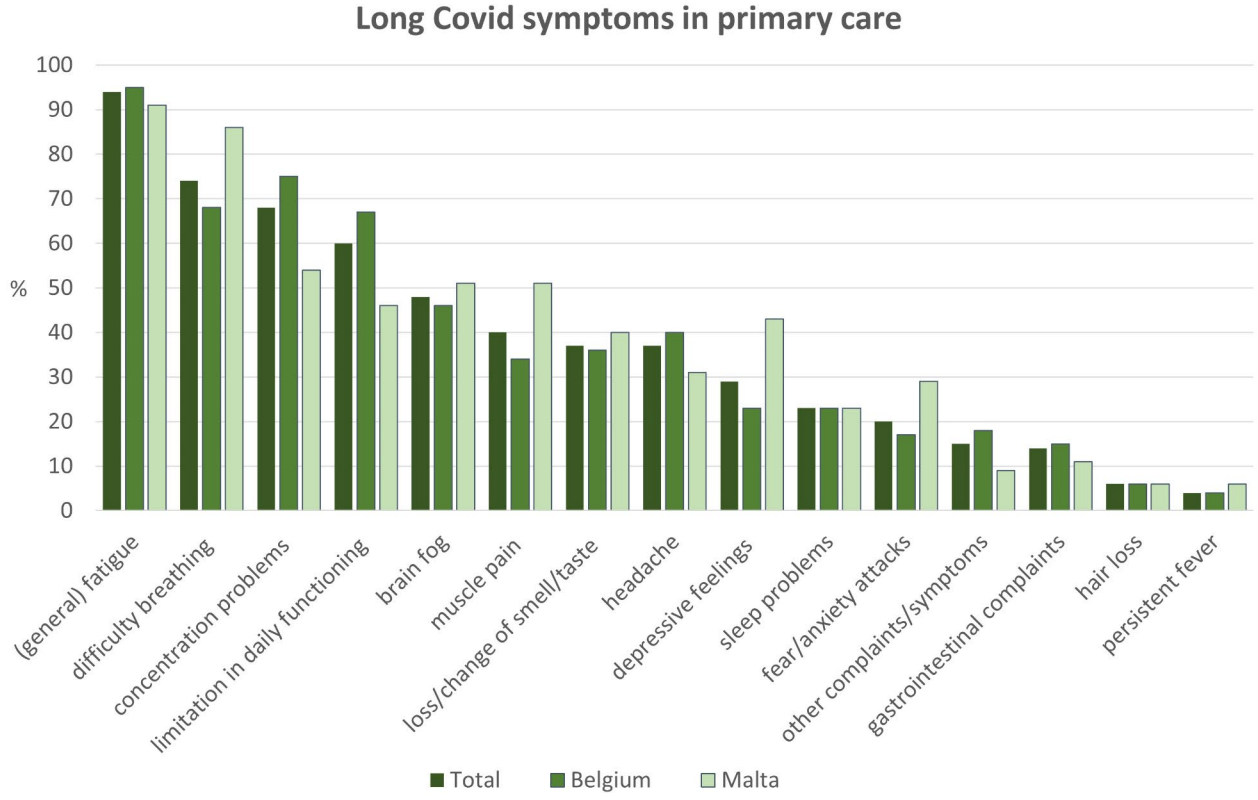

Fig. 4 Long Covid symptoms encountered by GPs in primary healthcare by country

Table 4 Care for Long Covid patients by other healthcare professions or multidisciplinary care by country

Care by another healthcare provider / multidisciplinary care	Total	Belgium	Malta	*p*-value
	N (%)	*N* (%)	*N* (%)	
	N = 59	*N* = 38	*N* = 21	
Pneumologist	48 (81.4%)	33 (86.8%)	15 (71.4%)	0.175
Physical medicine and rehabilitation specialist	28 (47.5%)	20 (52.6%)	8 (38.1%)	0.415
Physiotherapists	27 (45.8%)	21 (55.3%)	6 (28.6%)	0.060
Neurologist	18 (30.5%)	12 (31.6%)	6 (28.6%)	0.810
Hospital rehabilitation centre	15 (25.4%)	11 (29.0%)	4 (19.1%)	0.537
Infectiologist	9 (15.3%)	3 (7.9%)	6 (28.6%)	0.057
Psychiatrists/Psychologists/Psychotherapists	9 (15.3%)	4 (10.5%)	5 (23.8%)	0.258
Cardiologist	6 (10.2%)	3 (7.9%)	3 (14.3%)	0.656
Occupational therapists	5 (8.5%)	2 (5.3%)	3 (14.3%)	0.337
Social workers	1 (1.7%)	0 (0.0%)	1 (4.8%)	0.356
Other/external rehabilitation centre	1 (1.7%)	0 (0.0%)	1 (4.8%)	0.356
Dieticians	0 (0.0%)	0 (0.0%)	0 (0.0%)	n.a.

n.a. = not applicable

Concerning knowledge and perception on Long Covid, GPs emphasized insufficient scientific knowledge and a need for more reliable information and scientific research on Long Covid diagnosis and treatment. Maltese GPs, in particular, stressed the lack of sufficient scientific research on Long Covid. These findings correspond to the knowledge gap of GPs mentioned in recent studies [2, 24].

In our study, most GPs stated to have limited access to educational material on Long Covid. This is supported by recent evidence that expressed the need for training and educational activities for primary care professionals [2]. Furthermore, awareness-rising campaign among healthcare professionals and patients was deemed necessary by our responding GPs, especially among Maltese GPs. Other studies also emphasise GPs' need to be informed regularly on the newly emerging guidelines and treatment plans [24, 25]. For Belgium, several months after our study, primary care professionals and patients received information through the establishment of a care trajectory 'post-Covid-19' (July 2022) [26] and a national evidence-based guideline on follow-up and rehabilitation for Long Covid primary care patients (November 2022) [27]. In Malta, no such initiatives were taken. Moreover, Long Covid patients also emphasise the importance of awareness-rising campaigns, not only for themselves but also for the general population, as they experience difficulties related to Long Covid in the awareness of employers, colleagues, friends and families [28, 29].

In mid-2022, about two third of responding GPs reported that Long Covid patients were not well followed up within primary healthcare. Indeed, as no evidence-based guidelines or rehabilitation plans were available on Long Covid in early 2022, healthcare professionals felt that care and management for Long Covid patients was scattered, not uniform and challenging [9] at the timing of this study.

This study helps identify GPs' criteria for Long Covid assessment in Belgium and Malta. The findings indicate that almost half of GPs applied diagnostic criteria and that the persistence of symptoms remains the main criterion for identifying Long Covid in primary healthcare. This confirms that GPs' Long Covid criteria are in line with international definitions [30, 31], although the cut-off point to define Long Covid is set earlier by GPs (from 4 weeks onwards) in both countries and confirms earlier research [32].

Regarding GPs' experience on Long Covid, in both countries, the majority of GPs (75.2% in Belgium; 77.8% in Malta) encountered patients with Long Covid symptoms. Although some significant differences were observed in the prevalence of the reported Long Covid symptoms between Belgium and Malta, the reported symptoms are in line with other primary care studies [33, 34].

Our study contributes to the current understanding of care and management for Long Covid patients in primary healthcare at the cross-country level. GPs play a key role in coordinating care for Long Covid patients, and most GPs frequently provide care to these patients in both countries. No cross-country differences were identified when other healthcare professionals were involved in Long Covid care. These findings demonstrate GPs' central position in caring for Long Covid primary care patients at cross-country level, as identified earlier in literature [9]. However, in both countries, multidisciplinary care for Long Covid patients is less organized than GPs would prefer. But some months after our study, evidence-based guidelines and recommendations were made at national [27] and international [2, 35] level which may stimulate multidisciplinary care for Long Covid.

Strengths and limitations

Strengths of this study include the use of a questionnaire validated by Long Covid experts and GPs. No effect is expected from the fact that the study started a bit later in Malta, as no guidelines or rehabilitation plans were established at international level during spring-summer 2022. Moreover, by launching this study in a period with evolving evidence, scattered information and no uniform recommendations at international level, GPs could answer from their experience as GP, as faithfully as possible for their practice.

This study has some limitations. Sample selection bias, inherent to the data collection process of this study, is avoided as much as possible. For Belgium, by distributing the survey among all Belgian GPs' associations, the over representativity of older GPs in the SGP network [22] is tackled. Belgian respondents to the Long Covid survey are representative with all Belgian GPs for region and age, but not for sex which is consistent with international literature indicating that men are less likely to participate in online surveys [36]. For Malta, participants' sociodemographic could not be compared with those of non-responders due to the anonymous nature of the study and data protection regulations. Any private GPs (not affiliated with the state's primary health care) opting out of holding a membership with the Malta Family Medicine College would have been missed, which might have resulted in under-representing the GPs practicing in Malta.

The overall response rate was very low for Belgium (1%). As in survey research, response representativeness is more important than response rate [37], this limitation is countered by our study. For Malta, the overall response rate was 22% which is consistent with the general response rate achieved among Maltese doctors [23]. One may potentially interpret low participation levels as reflective of the GPs lack of appropriate knowledge and experience in dealing with Long Covid patients that influenced their willingness to participate.

As under-recording of Long Covid patients has been an issue in primary healthcare [38] and as some patients with Long Covid experience hurdles in finding a GP that understands their Long Covid complaints and needs [29, 39] GPs in our study may have under-estimated Long Covid in their practice.

Finally, a follow-up on this cross-sectional study could be of interest to evaluate the impact of recent developed guidelines and recommendations in Belgium and Malta.

Conclusions

This study is beneficial for a deeper understanding of Long Covid at international level. At cross-country level, most GPs frequently provide (multidisciplinary) care to Long Covid patients and GPs' care for these patients showed similarities. Although GPs did not feel adequately equipped with scientific knowledge and educational material on Long Covid, similar diagnostic criteria were applied by GPs in Belgium and Malta. To help GPs in their approach towards Long Covid, uniform evidence-based guidelines, scientific support, training, educational activities and awareness-rising campaigns must be provided to all primary care professionals at national and European level.

Abbreviations

GP	General Practitioner
SGP network	(Belgian) Sentinel General Practitioners network
IQR	Inter Quartile Range
OR	Odds Ratio
aOR	Adjusted Odds Ratio
CI	Confidence Interval
RIZIV	Rijksinstituut voor ziekte- en invaliditeitsverzekering

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12875-024-02617-9.

Supplementary Material 1

Supplementary Material 2

Supplementary Material 3

Supplementary Material 4

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Author contributions

SM, SC, SB and RD designed the study. SM and SC collected the data, performed the analysis and interpretation of the data. SM drafted the manuscript and SM, SC, SB and RD critically revised the manuscript. All authors approved the final version of the manuscript.

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Data availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

In Belgium, as the SGP network as a whole was approved by the Ethical Committees of the Scientific Society of Flemish GPs and the Catholic University of Louvain, no specific ethics approval was required for this survey. Authorisation was received by the Social Security and Health Sectoral Committee (deliberation No 17/065 of 18 July 2017, amended on 20 March 2020 and 1 September 2020). The English questionnaire version was approved by the University of Malta Research and Ethics Committee (ID: MED-2022-0011). All methods were performed in accordance with relevant guidelines and regulations (Declaration of Helsinki). A data transfer agreement (DTA) between the University of Malta and Sciensano was approved (UM Ref: 2022 189 UM SCNO). This study was conducted in agreement with country-specific regulations on privacy and data collection and treatment. Informed consent was obtained from all individual participants (i.e. GPs) involved in the study. An email was sent to all Belgian and Maltese GPs with information on this study and informed consent was received by submitting the questionnaire. Only anonymous data were collected.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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