



Original Article

Knowledge of chronic obstructive pulmonary disease, presence of chronic respiratory symptoms and use of spirometry among the Spanish population: CONOCEPOC 2019 study[☆]



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ABSTRACT

Objective: The aim of this study was to analyze current data on the population's level of knowledge about COPD and to evaluate certain diagnostic interventions, such as the use of spirometry.

Material and methods: An epidemiological, observational, cross-sectional study by telephone interview, with random dialing of landline telephone numbers, was conducted in November 2019, in a nationally representative sample of adults over 40 years of age.

Results: From a total of 51,079 telephone calls, a total of 1920 individuals responded. Mean age was 61.9 years and 31.6% were men. Overall, 19.4% were current smokers and 13.4% reported respiratory disease (5% reported COPD). In total, 27.9% had spontaneous knowledge of COPD, which is a relative increase from the 17% observed in 2011. The most frequent information channel was the media (35.5%), with a significant presence of social networks and the Internet (25.7%). Almost one fifth (18.1%) had chronic respiratory symptoms. Of these, 59.3% had requested medical care, and 66.2% had undergone spirometry. Spirometry was performed less frequently in subjects treated in primary care compared to respiratory medicine departments (51.9% versus 79.1%; $P < .001$).

Conclusions: Knowledge of COPD is still scarce, and strategies are needed to increase awareness and the importance of assessing respiratory symptoms and increased use of spirometry.

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Conocimiento de la enfermedad pulmonar obstructiva crónica, presencia de síntomas respiratorios crónicos y uso de la espirometría en la población española: estudio CONOCEPOC 2019

RESUMEN

Objetivo: El objetivo de este estudio es analizar los datos actuales del nivel de conocimiento de la población sobre la EPOC y evaluar algunas actuaciones diagnósticas, como el uso de espirometría.

Material y métodos: Estudio epidemiológico, observacional y transversal mediante entrevista telefónica, con marcación aleatoria de números de teléfono fijos, realizado en noviembre del 2019, con una muestra representativa a nivel nacional en adultos mayores de 40 años.

Palabras clave:

Enfermedad pulmonar obstructiva crónica

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Resultados: De un total de 51079 contactos telefónicos se obtuvo un total de 1920 encuestados. La edad media era 61,9 años con 31,6% de hombres. 19,4% eran fumadores actuales y un 13,4% referían tener alguna enfermedad respiratoria (5% referían una EPOC). El 27,9% tenía conocimiento espontáneo sobre la EPOC, lo que supone un aumento relativo respecto al 17% observado en el 2011. El canal de información más frecuente eran los medios de comunicación (35,5%), con importante presencia de redes sociales e internet (25,7%). Un 18,1% tenían síntomas respiratorios crónicos. De ellos, un 59,3% solicitaron atención médica, y 66,2% se realizó la espirometría. La espirometría era realizada con menor frecuencia en sujetos atendidos en atención primaria respecto a neumología (51,9% versus 79,1%; $P < .001$).

Conclusiones: El conocimiento de la EPOC es todavía escaso, y son necesarias estrategias para aumentar la concienciación y la importancia de evaluar los síntomas respiratorios y el mayor uso de la espirometría.

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Introduction

Chronic obstructive pulmonary disease (COPD) is a health problem of the first magnitude due to its high prevalence and mortality and heavy health and social welfare burden, yet the rate of underdiagnosis remains significant^{1,2}.

The IBERPOC study³, conducted in Spain in 1997, revealed that 78.2% of study cases confirmed by spirometry had no previous diagnosis of COPD. The EPISCAN I study⁴ carried out 10 years later reported an underdiagnosis rate of 73%, while the preliminary results of the recent EPI-SCAN II study⁵, also conducted in Spain, suggest that this trend will continue and could reach a rate of 81.7%. This represents a significant proportion of patients who, due to a lack of diagnosis, are not receiving specific treatment and active interventions for the prevention of infections and smoking cessation that would improve their prognosis.

The factors that affect this underdiagnosis are multiple and complex, and greater insight into the issues involved will lead to the implementation of efficient strategies for improving COPD diagnosis based on encouraging the public to recognize and prioritize symptoms and to seek healthcare, while raising awareness among health professionals of the need to evaluate respiratory symptoms by requesting spirometry.

Studies conducted in Spain in 2005⁶ and 2011⁷ revealed that knowledge of COPD is limited, that many people with respiratory symptoms do not seek medical attention, and that spirometry was underused. In the last 10 years, scientific societies and health authorities have conducted strategic interventions, including public awareness and outreach campaigns, and have implemented training programs and provided equipment to improve the practice of spirometry. However, in spite of these actions, the preliminary data of the EPI-SCAN II study⁵ suggest that underdiagnosis remains a problem.

The aim of this study was to update our information on the level of knowledge of COPD and associated diagnostic interventions among the general population and to compare the results with the available evidence.

Methodology

CONOCEPOC II is an epidemiological, observational, cross-sectional study sponsored by the Spanish Society of Pulmonology and Thoracic Surgery (SEPAR) and conducted in November 2019. The design was identical to that of the studies carried out in 2005⁶ and 2011⁷, and consisted of a telephone survey conducted in all regions of Spain. Participation was voluntary, confidential and anonymous, and data were collected by calling landline telephone numbers at random.

Subject selection

The inclusion criteria were men and women aged 40 years and over who agreed to complete a telephone questionnaire. Sampling

was carried out according to the following stratification criteria: age according to 10-year groups (40–50, 51–60, 61–70 and >70 years) and population strata (rural: $\leq 10,000$ inhabitants; and urban: >10,000 inhabitants). Data sets equally distributed by age and place of residence were obtained from the 5 established geographical areas (southern region: Andalusia, Extremadura, and the Canary Islands; northern region: Asturias, Cantabria, Galicia, La Rioja, Navarra, and the Basque Country; eastern region: Catalonia and Aragon; western region: Valencia, Balearic Islands, and Murcia; and central region: Castilla-La Mancha, Castilla and Leon, and Madrid), with a total of 384 responses from each region. The distribution of respondents by provinces is shown in Appendix 1 (Annex 1). This sample size allowed us to accurately estimate population size by geographic area for a 5% error and an 80% power for a 5% or greater prevalence of different variables. Thus, the overall sample is representative of the country as a whole and of each geographical region.

Field work

Telephone interviews were organized by Saatchi & Health and conducted by trained, qualified interviewers. Calls were placed between 14:00 h and 21:30 h on weekdays, and each interview lasted approximately 15 min. After dialing landline telephone number at random in the relevant geographical area, several things could happen: if the number did not correspond to a residence or home, that number was randomly replaced; if no-one answered after a maximum of 4 attempts, the call was considered a non-contact; another possibility was refusal to participate. Finally, if an eligible person was absent when the call was placed, the number was recorded and then called back on the day or at the time the participant was expected to be at home.

Data collection

The questionnaire on respiratory symptoms and diagnoses used in the survey was based on the European Commission for Steel and Coal (ECSC) questionnaire⁸ translated and validated in Spanish, to which questions on knowledge of COPD, use of spirometry, and perception of severity of other chronic diseases were added, as in the previous studies^{6,7}. Spontaneous knowledge of COPD was assessed by asking interviewee what they knew about the disease, without any guidance from the interviewer. Respondents who demonstrated a spontaneous knowledge of COPD were asked to list the symptoms that are directly related to the disease. “Suggested” knowledge of COPD was investigated in respondents who had no spontaneous knowledge of the disease. Perceived level of health and disease severity was assessed on a scale of 0–10 points, where the higher the score, the greater the perceived health and severity level. Breathlessness was assessed by the modified Medical Research Council (mMRC) scale⁹. Questions on new forms of tobacco use were also included. The full questionnaire can be found in Appendix 2 (Annex 2).

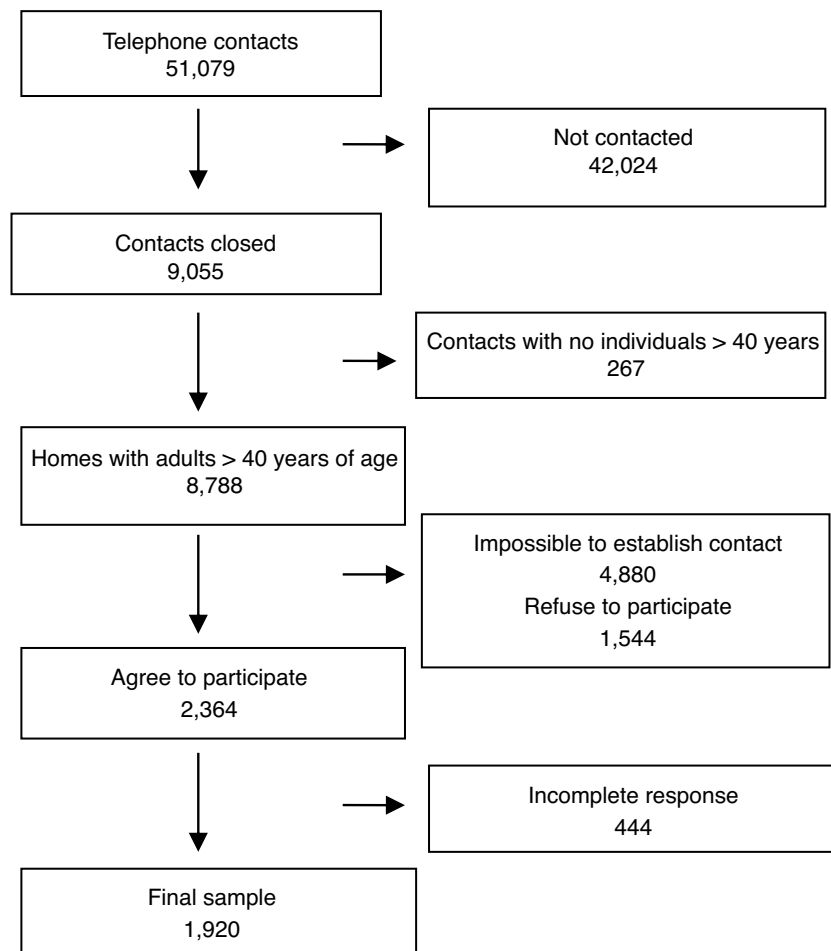


Fig. 1. STROBE sampling flow diagram.

Statistical analysis

In the descriptive analysis, qualitative variables are presented with their frequency distribution; quantitative variables are summarized with their mean and standard deviation (SD); and quantitative variables showing an asymmetric distribution are summarized with the median and interquartile range. Comparisons are made between study groups (by smoking history, spirometry, and reported diagnosis of COPD, including the terms “emphysema” and “chronic bronchitis”). A high risk of COPD was defined as an accumulated tobacco consumption of at least 20 pack-years with reported chronic respiratory symptoms in subjects aged 55 years or older. The association between qualitative variables was evaluated with the chi-squared (χ^2) test or Fisher’s exact test, if more than 25% of expected frequencies were less than 5. For quantitative variables, mean values were compared using the Student’s *t*-test or ANOVA variance analysis (in groups with more than 2 categories) or the Mann-Whitney *U* test or the Kruskal-Wallis test (in groups with more than 2 categories) when quantitative variables did not conform to a normal distribution. A multinomial regression was performed to predict the level of knowledge. All statistical comparisons with a probability of error of less than 5% were considered significant. Data processing and analysis were performed using the IBM SPSS Statistics V21 statistical package (IBM Corporation, Armonk, NY, USA).

Results

A total of 51,079 telephone calls were placed, and 8788 homes with adults over the age of 40 were identified, yielding a final sample of 1920 participants, with a response rate of 21.8%. The STROBE flow diagram is shown in Fig. 1.

Population characteristics

Overall, 31.6% participants were men, and the mean age was 61.9 years; 14.5% were current smokers and 4.5% had tried other forms of tobacco consumption. A total of 13.4% reported having respiratory disease, including 5% who reported COPD. The clinical and demographic characteristics of the individuals surveyed are presented in Table 1.

Respiratory symptoms and reported clinical management

A total of 354 (18.4%) participants reported at least 1 chronic respiratory symptom, a third of whom reported 2 or more symptoms. Shortness of breath was reported by 13.1% of the respondents. The percentage of individuals with respiratory symptoms was higher among current and former smokers ($P < .001$). Over half (59.9%) of the active smokers had attempted to quit, with 3.1 ± 4.6 (mean \pm SD) attempts; 19.7% of the active smokers reported having tried some other form of tobacco use compared with 5% of the

Table 1
Clinical and demographic characteristics of the survey population.

	Total (n = 1920)
Men, n (%)	607 (31.6)
Age (years), mean ± SD	61.9 ± 13.5
Smoking history	
Accumulated exposure (pack-years), mean ± SD	21.0 ± 22.7
Never smokers, n (%)	1136 (59.2)
Former smokers, n (%)	505 (26.3)
Active smokers, n (%)	279 (14.5)
Have you ever tried other forms of smoking? n (%)	87 (4.5)
Perceived level of health ^a , mean ± SD	7.4 ± 1.8
Reports having some respiratory disease, n (%)	258 (13.4)
Reports respiratory disease, n (%)	
COPD	99 (5)
Asthma	67 (3.5)
Other	94 (4.9)
Reports some chronic respiratory symptoms, n (%)	354 (18.4)

Data expressed as mean ± standard deviation or by absolute (relative) frequencies depending on the nature of the variable.

^a Scale from 0 to 10 points.

former smokers ($P < .01$). Overall, 20.4% of active smokers vs. 12% of former smokers believe that alternatives to conventional smoking can help stop the habit ($P < .05$).

Among respondents who reported respiratory symptoms, 210 (59.3%) had seen a doctor, more often in primary care (61.4%) than in the respiratory medicine department (38.6%), and 45 (12.7%) reported attending the emergency department for respiratory problems. Spirometry had been performed in 139 (62.2%) respondents who reported respiratory symptoms and had consulted a doctor. No geographical differences were detected in reported clinical management. The clinical and demographic characteristics of the individuals surveyed are shown in Table 2.

Analysis of the diagnostic circuit of respondents with respiratory symptoms shows little improvement over previous studies in 2005 and 2011 (Fig. 2).

Use of spirometry

The use of spirometry differed significantly depending on sex and smoking history. Respondents who reported having performed a spirometry were more often men, had a history of smoking, and met criteria for a high risk of COPD than those who did not perform a spirometry ($P < .001$). There were also differences depending on the treating specialist: 79.1% of those treated by a pulmonologist reported having performed spirometry compared with 51.9% of those seen by a family doctor ($P < .001$) (Table 3) (Fig. 3).

Reported diagnosis of COPD

Ninety-six (5%) respondents reported having COPD. Of these, 20% did not report spirometry testing, although 34.4% had attended the emergency department for respiratory problems; 245 (13.4%) participants met criteria for a high risk of COPD, but did not report having COPD. These individuals were younger (63.4 ± 12.9 vs. 67.4 ± 8.4), had a higher smoking exposure measured in pack-years (43.1 ± 24.9 vs. 25.9 ± 25.2), and were more frequently active smokers (26% vs. 17.7%). Just over half (51.4%) of respondents had consulted a doctor, most often the family doctor (70.6%), but only 9.8% reported having performed spirometry, although 7.8% had attended the emergency department for respiratory problems (Table 4).

Knowledge of COPD

Over a quarter (27.9%) of the surveyed population had a spontaneous knowledge of COPD, the most well-known symptom

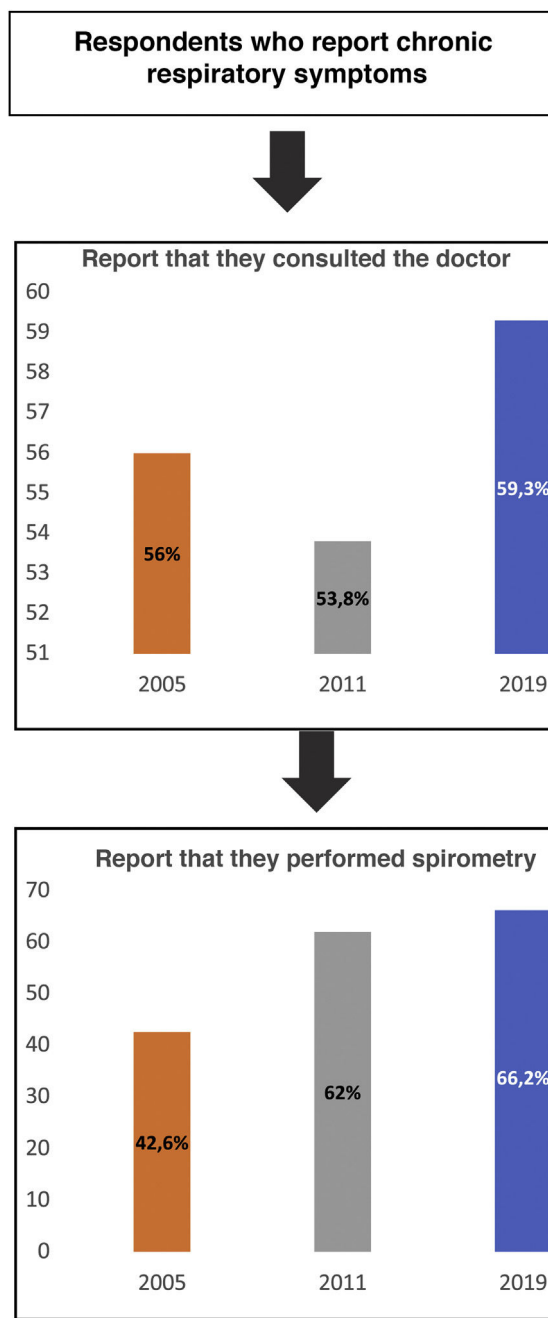


Fig. 2. Changes in the diagnostic circuit for respiratory symptoms in 2005, 2011, and 2019.

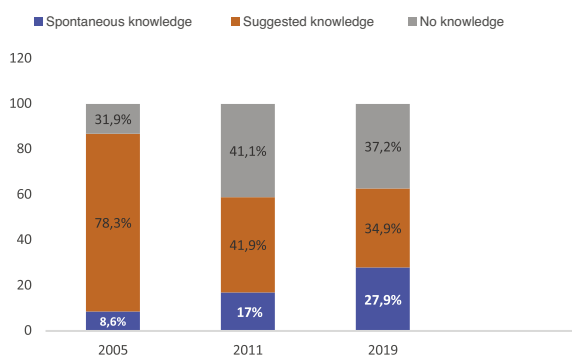


Fig. 3. Changes in COPD awareness between 2005 and 2019.

Table 2
Characteristics of survey respondents according to smoking history.

	Total (n = 1920)	Never smokers (n = 1136)	Former smokers (n = 505)	Active smokers (n = 279)
Sex (men), n (%)	607 (31.6)	246 (21.7)	250 (49.5) ^{b,c}	111 (39.8) ^e
Age (years), mean ± SD	61.9 ± 13.5	63.6 ± 14.2	61.5 ± 12.2 ^{a,d}	55.9 ± 10.6 ^f
Pack-years, median (P25–75)	15 (5–30)	–	15 (5–30)	17.7 (6–22.5)
Attempted smoking cessation, n (%)	–	–	–	167 (59.9)
No. of attempts, mean ± SD	–	–	–	3.15 ± 4.61
Have you tried other forms of smoking? n (%)	87 (4.5)	7 (0.6)	25 (5) ^{b,d}	55 (19.7) ^f
Electronic cigarette	56/87 (64.4)	4/7 (57.1)	15/25 (60)	37/55 (67.3)
Vaping	16/87 (18.4)	1/7 (14.3)	2/25 (8)	13/55 (23.6)
Attitude regarding alternatives to conventional smoking (%)				
Very favorable	0.4	0.4	0.6	0
Favorable	6.5	5.5	5.9	11.8
Not known	38.8	43.3	34.5	28.7
Unfavorable	34.3	30.5	38.8	41.9 ^f
Very unfavorable	19.9	20.4	20.2	17.6
Do you think they can help quit smoking? (%)				
Yes	12.8	11.3	12 ^c	20.4 ^f
No	55.4	50.6	62.4	62.4
Don't know	31.8	38.1	25.5	17.2
Do you think they have health risks? (%)				
Yes	60.9	56.8	64.3	71.7
No	9.5	10.4	8.7	7.5
Don't know	29.6	32.8	26.9	20.8
Reports some chronic respiratory symptoms, n (%)	354 (18.4)	170 (15)	104 (20.6) ^{b,d}	80 (28.7) ^f
No. of respiratory symptoms (%)				
0	81.6	85	79.4 ^{b,d}	71.3 ^f
1	12.5	10.7	14.9	15.8
2	2.5	1.9	2.4	5.4
3	2.1	1.3	2.4	4.7
4	1.4	1.1	1	2.9
Respiratory symptoms, n (%)				
Chronic cough	133 (5.9)	49 (4.3)	30 (5.9) ^d	34 (12.2) ^f
Chronic expectoration	102 (5.3)	40 (3.5)	31 (6.1) ^{a,c}	31 (11.1) ^f
Wheezing or noises in the chest	93 (4.8)	44 (3.9)	23 (4.6) ^d	26 (9.3) ^f
Shortness of breath	253 (13.1)	127 (11.2)	71 (14) ^{a,c}	54 (19.3) ^e
Has a sensation of breathlessness when walking on the flat or at rest, n (%)	119 (6.2)	69 (6)	29 (5.7)	20 (7.2)
Has seen the doctor, n (%)	210 (10.9)	107 (9)	61 (12)	42 (15)
Family doctor	129/210 (61)	69/107 (64.5)	33/61 (54.1)	27/42 (64.3)
Pulmonologist	81/210 (38.6)	38/107 (35.5)	28/61 (45.9)	15/41 (35.7)
Has performed spirometry at some time, n (%)	139 (7.2)	61 (5.4)	48 (9.5) ^b	30 (10.8)
Has gone to the emergency department for respiratory problems, n (%)	45 (2.3)	27 (2.4)	13 (2.6)	5 (1.8)
Perceived level of health, mean ± SD	7.41 ± 1.88	8.53 ± 1.48	8.62 ± 1.30	8.63 ± 1.59

Data expressed as mean ± standard deviation or by absolute (relative) frequencies depending on the nature of the variable.

^a $P < .01$ former smokers compared to never smokers.

^b $P < .05$ former smokers compared to never smokers.

^c $P < 0.01$ former smokers compared to current smokers.

^d $P < .05$ former smokers compared to never smokers.

^e $P < .01$ current smokers compared to never smokers.

^f $P < .05$ current smokers compared to never smokers.

being breathlessness (72.5%), while 34.9% of the respondents had suggested knowledge. Among individuals with spontaneous or suggested knowledge, the most frequent sources of information were the media (35.5%), family and acquaintances (27.7%), and social media and the Internet (25.7%). The perception of COPD severity was very high, 8.5 ± 1.4 , and only surpassed by angina. Some results showed a slight improvement in spontaneous knowledge compared to the results of 2011 and 2005 (Table 5).

With regard to knowledge of COPD (Table 6), statistically significant differences were observed in age, place of residence, and smoking history. In the multivariate analysis, respiratory symptoms and spirometry were associated with spontaneous knowledge of COPD ($P < .05$) (Table 6).

Discussion

The main outcome of this survey is that 27.9% of the Spanish adult population spontaneously know about COPD, a small increase from the 17% observed in 2011⁷. Nevertheless, this improved knowledge does not appear to be reflected in a change in the proce-

dures performed for the diagnosis of this disease, as only two thirds of respondents with respiratory symptoms consulted the doctor, despite COPD being perceived as a serious disease. Furthermore, the use of spirometry is limited, since only two thirds of the respondents who consulted the doctor for symptoms reported ever having performed spirometry, while respondents who reported having a diagnosis of COPD stated that they had not undergone spirometry testing, as recommended in the current guidelines¹⁰. Some authors suggest that there is still a wide gap between the public's perception of COPD and the significant health and social welfare impact of the disease, as reflected in the latest data which show an increase in prevalence and mortality in Spain^{1,11,12}.

A lack of knowledge of COPD is also observed in other countries. A survey conducted in Poland¹³ showed that only 14% of the general population had some superficial knowledge of COPD. Other studies have also shown that other collectives, such as medical students¹⁴, healthcare personnel^{15,16}, and COPD patients themselves^{16,17} have very limited knowledge of the disease. These data underline the urgent need for better educational, outreach and awareness interventions. One interesting finding from our study is that more than

Table 3
Characteristics of patients who see the doctor for symptoms, by reported performance of spirometry.

	Total (n = 210)	Performed at least 1 spirometry (n = 139)	Never performed spirometry (n = 71)	P-value ^a
Sex (men), n (%)	62 (29.5)	48 (34.5)	14 (19.7)	.018
Age (years), mean ± SD	62 ± 14	64.4 ± 13.6	67.7 ± 14.4	.110
Smoking history				.012
Active smokers, n (%)	42 (20)	30 (21.6)	12 (16.9)	
Former smokers, n (%)	61 (9)	48 (34.5)	13 (18.3)	
Never smokers, n (%)	107 (50.6)	61 (43.9)	46 (64.8)	
Meets criteria for high risk of COPD ^b , n (%)	103 (49)	78 (56.1)	25 (35.2)	<.001
Reports shortness of breath, n (%)	156 (74.3)	107 (77)	49 (69)	.402
Chronic cough	75 (35.8)	49 (35.3)	26 (36.6)	.845
Chronic expectoration	66 (31.4)	45 (32.4)	21 (29.6)	.680
Wheezing or noises in the chest	71 (33.8)	50 (36)	21 (29.6)	.354
Reports having some respiratory disease, n (%)	140 (66.7)	86 (61.9)	17 (23.9)	<.001
Have you ever attended the emergency department for worsening respiratory symptoms? n (%)	41 (19.5)	32 (23)	9 (12.7)	.074
Attending physician, n (%)				<.001
Family doctor	129 (61.4)	67 (48.2)	62 (87.3)	
Pulmonologist	91 (38.6)	72 (51.8)	9 (12.7)	
Perceived level of health, mean ± SD	8.7 (1.4)	6.0 (2.0)	6.2 (2.2)	.546

Data expressed as mean ± standard deviation or by absolute (relative) frequencies depending on the nature of the variable.

^a Calculated using chi-squared test or by nature of the variable.

^b Meets criteria for high-risk COPD: age ≥55 years; pack-year index ≥20; some chronic respiratory symptoms.

Table 4
Characteristics of respondents who report having COPD and of respondents with high-risk criteria and who report not having COPD.

	Respondents reporting COPD (n = 95)	Respondents with criteria for high risk of COPD ^b who do not report COPD (n = 245)	P-value ^a
Sex, men, n (%)	29 (30.2)	126 (55.5)	<.001
Age, years, mean ± SD	67.4 ± 8.4	63.4 ± 12.9	.007
Smoking history			
Pack-years, mean ± SD	25.9 ± 25.2	43.1 ± 24.9	
Never smokers (%)	3.1	0	
Former smokers (%)	79.2	74	
Active smokers (%)	17.7	26	
Attempted smoking cessation, n (%)	16 (94.1)	30 (47.5)	.001
No. of attempts, mean ± SD	2.6 ± 1.5	2.6 ± 1.3	.812
Have you ever tried other forms of smoking, n (%)	7 (7.3)	20 (8.2)	.826
Do you think they can help to quit smoking (%)	17.4	15	
Do you think they have health risks (%)	85.5	91	
≥ 2 chronic respiratory symptoms, n (%)	43 (44.8)	66 (27)	.001
Reports a sensation of breathlessness, n (%)	32 (33.3)	46 (18.8)	.005
Has seen the doctor, n (%)	84 (87.5)	126 (51.4)	.001
Family doctor (%)	36.1	70.6	.005
Pulmonologists (%)	63.9	29.4	
Has gone to the emergency department for respiratory problems, n (%)	33 (34.4)	19 (7.8)	<.001
Has performed spirometry at some time, n (%)	80 (83.3)	24 (9.8)	<.001
Receives treatment for respiratory symptoms, n (%)	76 (79.2)		
Inhalers	74 (97.4)		
Oral	2 (2.6)		
Oxygen therapy	15 (19.7)		
Perceived level of health, mean ± SD	6.8 (2.0)	6.9 (2.1)	.687

Data expressed as mean ± standard deviation or by absolute (relative) frequencies, by nature of the variable.

^a Calculated using chi-squared test or by nature of the variable.

^b Meets criteria for high risk of COPD: 55 years of age or more; pack-year index of 20 or more; chronic respiratory symptoms.

25% of respondents have learnt about the disease from the Internet and social networks. This channel is growing considerably as a source of awareness and scientific information, and up to 55% of Spaniards browse the Internet to search for health information, with women showing a greater preference for seeking information on health issues (11.8% more than men)¹⁸. However, the challenge is to provide valuable, reliable, and validated information. In our study, lack of knowledge was greatest in rural areas and in respondents over 70 years of age. This population may have more limited access to information sources, and is therefore a potential target of educational initiatives delivered by health professionals. It is important that health professionals, especially in primary care, use the term COPD and explain its meaning, as the expression is still unfamiliar¹⁹. This health education should be offered not only to

individuals with respiratory symptoms and to patients undergoing spirometry, but also to smokers and at-risk populations. Only 9.9% of the respondents in our study reported that they had learnt about the disease from their doctors.

We also found that the importance of seeking medical attention for respiratory symptoms is underestimated and the use of spirometry is still limited, despite the fact that it should be a key tool in the diagnostic process. In our analysis, the frequency of chronic respiratory symptoms was 18.4%, somewhat lower than reported in previous studies in Spain conducted in 1999 (IBERPOC, 48%)²⁰, 2005 (telephone survey, 24%)⁶, and 2011 (CONOCEPOC, 28.8%)⁷. This difference could be related to the lower number of current smokers (14.5%) and a higher proportion of women in our survey (68%). According to data from the 2017 National Health Sur-

Table 5
Changes in the level of knowledge of COPD.

	2005 (n = 6758)	2011 (n = 6528)	2019 (n = 1920)
Spontaneous knowledge, n (%)	574 (8.6)	1111 (17)	535 (27.9)
Known symptoms of COPD, n (%)			
Shortness of breath	264 (45.9)	900 (81.1)	388 (72.5)
Morning cough	103 (17.9)	322 (29)	133 (24.8)
Expectoration/sputum/phlegm	74 (12.9)	118 (10.6)	74 (1.8)
Wheezing when breathing	–	191 (17.2)	104 (19.4)
Suggested knowledge of COPD, n (%)	5295 (78.3)	2738 (41.9)	671 (34.9)
Knowledge source, n (%)			
Communication	245 (42.7)	442 (39.8)	410 (35.5)
Social media or the Internet	–	–	297 (25.7)
Doctor	139 (24.2)	262 (23.6)	115 (9.9)
Pharmacist	22 (3.8)	19 (1.7)	14 (1.2)
Family/acquaintances	191 (33.3)	347 (31.3)	320 (27.7)
Perception of COPD severity, mean \pm SD	8.3 \pm 1.6	8.3 \pm 1.5	8.5 \pm 1.4
Perception of severity, mean \pm SD			
Diabetes	7.7 \pm 1.8	7.6 \pm 1.5	7.7 \pm 1.5
AHT	7.6 \pm 1.7	7.5 \pm 1.5	7.6 \pm 1.5
AMI	8.7 \pm 1.6	8.8 \pm 1.2	8.7 \pm 1.3
Gastric ulcer	7.0 \pm 1.7	6.9 \pm 1.5	7.0 \pm 1.5
Osteoarthritis	7.8 \pm 1.7	7.5 \pm 1.5	7.5 \pm 1.5

Data expressed as mean \pm standard deviation or by absolute (relative) frequencies depending on the nature of the variable.

Table 6
Characteristics by level of knowledge of COPD.

Tot ^a (n = 1920)	Spontaneous knowledge (n = 535)	Suggested knowledge (n = 671)	No knowledge (n = 714)	P ^a
Sex, men, n (%)	158 (29.5)	224 (33.4)	225 (31.5)	.359
Age, n (%)				.003
40–50 years	142 (26.5)	173 (25.8)	165 (23.1)	
51–60 years	145 (27.1)	159 (23.7)	176 (24.6)	
61–70 years	150 (28.0)	152 (22.7)	178 (24.9)	
>70 years	98 (18.3)	187 (27.9)	195 (27.3)	
Setting < 10,000 inhabitants, n (%)	164 (30.6)	263 (39.2)	322 (45.1)	<.001
Smoking history, n (%)				<.001
Never smoker	258 (48.2)	415 (61.8)	463 (64.8)	
Former smoker	184 (34.4)	156 (23.2)	165 (23.1)	
Active smokers	93 (17.4)	100 (14.9)	86 (12.0)	
History of smoking (ex-smoker or active smoker), n (%)	277 (51.8)	256 (38.2)	251 (35.2)	<.001
Criteria for high risk of COPD ^b , n (%)	85 (30.7)	71 (27.7)	89 (35.5)	.167
Perceived level of health, mean \pm SD	7.5 \pm 1.7	7.3 \pm 1.9	7.4 \pm 1.9	.382
Reports respiratory symptoms, n (%)	127 (23.7) ^c	111 (16.5)	116 (16.3)	.001
Reports shortness of breath, n (%)	103 (19.3)	67 (10)	82 (11.5)	<.001
Has performed spirometry, n (%)	68 (12.7) ^c	42 (6.3)	29 (4)	.001

Data expressed as mean (standard deviation) or absolute (relative) frequencies depending on the nature of the variable.

^a Calculated using chi-squared test or by nature of the variable.

^b Meets criteria for high risk of COPD: ≥ 55 years of age; pack-year index ≥ 20 ; some chronic respiratory symptoms.

^c $P < .05$ in multivariate analysis by nominal regression.

vey, the smoking rate among people over 45 years of age is 20.8% (17.7% in women and 24.5% in men)²¹. Other factors known to influence the frequency of respiratory symptoms are educational level, place of residence, and pollution levels^{22,23}, although these were not evaluated in our study. Another determinant for the presence of chronic respiratory symptoms may be the use of new forms of tobacco consumption. The market for these devices is growing rapidly, especially among young people and smokers who believe that they reduce the risks associated with smoking and are an aid to quitting smoking. In Spain, 9% of the population between the ages of 15 and 64 have tried them on at least 1 occasion²⁴. In our survey, 19.7% of active smokers and 5% of former smokers used these devices: 20.4% of active smokers believe them to be an aid to smoking cessation, although 71.7% understand that they entail health risks.

Five percent of respondents reported a diagnosis of COPD, similar to the 4.8% reported 20 years ago in the IBERPOC study⁶, and the 5.3% reported 10 years ago in EPISCAN I⁷. These data show that underdiagnosis persists and is driven by many factors. Some of these are patient-related, as only 59.3% of individuals

with respiratory symptoms sought medical attention, 74% of whom reported breathlessness. We found no differences according to smoking habit, although only 52.5% of active smokers with symptoms reported having seen a doctor, while almost half of the individuals at high risk for COPD had not seen a doctor.

However, underdiagnosis is also associated with the underuse of spirometry, something that occurs even in a population at high risk of COPD. Although half of these individuals had sought medical attention for respiratory symptoms, only 75% of them underwent spirometry. This is significant because COPD is highly prevalent among this group, and up to 25% may have undiagnosed COPD²⁵. It should be noted that our sample comprises a higher percentage of women. Doctors' level of suspicion for COPD in women has been documented to be lower, so they request fewer spirometries for this group²⁶, contributing to a higher rate of underdiagnosis in women⁴.

The use of spirometry, particularly by family doctors, must increase, given the preliminary data from the EPI-SCAN II epidemiological study⁴, which show a prevalence of COPD of 12.4% in the

population over 40 years of age and rising trends due to the gradual aging of the population and tobacco exposure.

The 3E study reported that use of spirometry was still limited²⁷, despite a slight improvement in figures compared with studies performed more than 20 years ago²⁸. Promoting the routine use of quality spirometry in primary care is a priority for achieving earlier diagnosis and changing the natural history of this disease, as this is the care level where the individual with risk factors or respiratory symptoms first comes into contact with the system.

Calling landline numbers at random is a methodology similar to that used in the 2005 and 2011 surveys. It is also representative of the Spanish population, which is important given the objective of analyzing changes in the knowledge of COPD among that population. However, it should be borne in mind that according to data from the 2019 survey of the National Institute of Statistics, 77% of households in Spain have a landline telephone¹⁸. Some limitations should also be considered, such as the lack of stratification by sex in the sampling process (resulting in a higher percentage of women in the sample evaluated) and a smaller sample size that, in contrast to the 2011 survey, did not take into account representativeness among the autonomous communities, thus limiting the analysis of regional variability and resulting in some small samples close to an estimated prevalence of less than 5%. We must also point out that the study evaluates self-reported, unvalidated responses, although it does provide true estimates of respiratory symptoms and diagnostic interventions reported anonymously in a large population with national representation with a response rate of 21.8%, higher than the 13.1% rate reported in the previous 2011 survey.

Conclusions

Knowledge of COPD among the Spanish population and the use of spirometry, even in high-risk subjects, is still limited, and strategies are needed to increase awareness of the disease, to emphasize the importance of assessing respiratory symptoms, and to promote the use of spirometry in primary care.

Conflict of interests

MCR has received honoraria in the past 3 years for lectures, scientific consultancy, and clinical trial participation from: Boehringer Ingelheim, Bial, Chiesi, Ferrer, Gebro, GlaxoSmithKline, Grifols, Menarini, and Novartis.

JLRH has received honoraria in the past 3 years for lectures, scientific consultancy, and clinical trial participation from: Boehringer Ingelheim, Bial, Chiesi, GlaxoSmithKline, Grifols, Menarini and Novartis.

MM has received honoraria for speaking engagements from AstraZeneca, Boehringer Ingelheim, Chiesi, Cipla, Menarini, Rovi, Bial, Sandoz, Zambon, CSL Behring, Grifols y Novartis; consultancy fees from AstraZeneca, Boehringer Ingelheim, Chiesi, Ferrer, GlaxoSmithKline, Bial, Gebro Pharma, Kamada, CSL Behring, Laboratorios Esteve, Ferrer, Mereo Biopharma, Verona Pharma, TEVA, Spin Therapeutics, pH Pharma, Novartis, Sanofi and Grifols, and research grants from GlaxoSmithKline and Grifols.

JLLC has received honoraria in the past 3 years for lectures, scientific consultancy, clinical trial participation, and writing of papers from (in alphabetical order): AstraZeneca, Boehringer Ingelheim, Chiesi, CSL Behring, Esteve, Ferrer, Gebro, GlaxoSmithKline, Grifols, Menarini, Novartis, Rovi and Teva.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.arbres.2020.07.036>.

References

- GBD 2015 Chronic Respiratory Disease Collaborators. Global, regional, and national deaths, prevalence, disability-adjusted life years, and years lived with disability for chronic obstructive pulmonary disease and asthma, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet Respir Med.* 2017;5:691–706. [http://dx.doi.org/10.1016/S2213-2600\(17\)30293-X](http://dx.doi.org/10.1016/S2213-2600(17)30293-X).
- Estrategia en EPOC del Sistema Nacional de Salud [accessed 29 April 2020]. Available from: <https://www.mscbs.gob.es/organizacion/sns/planCalidadSNS/docs/EstrategiaEPOCSNS.pdf>, 2009.
- Sobradillo-Peña V, Miravittles M, Gabriel R, Jiménez-Ruiz CA, Villasante C, Masa JF, et al. Geographic variations in prevalence and underdiagnosis of COPD: results of the IBERPOC multicentre epidemiological study. *Chest.* 2000;118:981–9. <http://dx.doi.org/10.1378/chest.118.4.981>.
- Miravittles M, García-Río F, Muñoz L, Duran-Tauleria E, Sánchez G, Sobradillo V, et al. Prevalence of COPD in Spain: impact of undiagnosed COPD on quality of life and daily life activities. *Thorax.* 2009;64:863–8. <http://dx.doi.org/10.1136/thx.2009.115725>.
- Alfageme I, de Lucas P, Ancochea J, Miravittles M, Soler-Cataluña JJ, García-Río F, et al. 10 years after EPISCAN: a new study on the prevalence of COPD in Spain—a summary of the EPISCAN II protocol. *Arch Bronconeumol.* 2019;55:38–47. <http://dx.doi.org/10.1016/j.arbres.2018.05.011>.
- Miravittles M, de la Roza C, Morera J, Montemayor T, Gobartt E, Martín A, et al. Chronic respiratory symptoms, spirometry and knowledge of COPD among general population. *Respir Med.* 2006;100:1973–80. <http://dx.doi.org/10.1016/j.rmed.2006.02.024>.
- Soriano JB, Calle M, Montemayor T, Álvarez-Sala JL, Ruiz-Manzano J, Miravittles M. Conocimientos de la población general sobre la enfermedad pulmonar obstructiva crónica y sus determinantes: situación actual y cambios recientes. *Arch Bronconeumol.* 2012;48:308–15. <http://dx.doi.org/10.1016/j.arbr.2012.07.001>.
- Minette A. Questionnaire of the European Community for Coal and Steel (ECSC) on respiratory symptoms: 1987—updating of the 1962 and 1967 questionnaires for studying chronic bronchitis and emphysema. *Eur Respir J.* 1989;2:165–77.
- Bestall JC, Paul EA, Garrod R, Garnham R, Jones PW, Wedzicha JA. Usefulness of the Medical Research Council (MRC) dyspnoea scale as a measure of disability in patients with chronic obstructive pulmonary disease. *Thorax.* 1999;54:581–6. <http://dx.doi.org/10.1136/thx.54.7.581>.
- Miravittles M, Soler-Cataluña JJ, Calle M, Molina J, Almagro P, Quintano JA, et al. Guía española de la enfermedad pulmonar obstructiva crónica (GesE-POC) 2017. Tratamiento farmacológico en fase estable. *Arch Bronconeumol.* 2017;53:324–35. <http://dx.doi.org/10.1016/j.arbres.2017.03.018>.
- Ancochea J, Soriano JB. COPD in Spain at the start of a new decade. *Arch Bronconeumol.* 2020. <http://dx.doi.org/10.1016/j.arbres.2020.01.025> [Epub ahead of print].
- Ministerio de Sanidad, Servicios Sociales e Igualdad. Informe anual del Sistema Nacional de Salud, 2015 [accessed 28 April 2020]. Available from: <https://www.mscbs.gob.es/estadEstudios/estadisticas/sisInfSanSNS/tablasEstadisticas/Inf.Anual.SNS.2015.1.pdf>.
- Śliwiński P, Puchalski K. Chronic obstructive pulmonary disease in the awareness of Polish society. Report from the public opinion survey by the Polish Respiratory Society and TNS Polska. *Pneumonol Alergol Pol.* 2015;83:1–13. <http://dx.doi.org/10.5603/PiAP.2015.0001>.
- Mohigefer J, Calero-Acuña C, Marquez-Martín E, Ortega-Ruiz F, Lopez-Campos JL. Understanding of COPD among final-year medical students. *Int J Chron Obstruct Pulmon Dis.* 2017;13:131–9. <http://dx.doi.org/10.2147/COPD.S138539>.
- Davis KJ, Landis SH, Oh YM, Mannino DM, Han MK, van der Molen T, et al. Continuing to Confront COPD International Physician Survey: physician knowledge and application of COPD management guidelines in 12 countries. *Int J Chron Obstruct Pulmon Dis.* 2014;10:39–55. <http://dx.doi.org/10.2147/COPD.S70162>.
- Menezes AM, Landis SH, Han MK, Muellerova H, Aisanov Z, van der Molen T, et al. Continuing to confront COPD International Surveys: comparison of patient and physician perceptions about COPD risk and management. *Int J Chron Obstruct Pulmon Dis.* 2015;10:159–72. <http://dx.doi.org/10.2147/COPD.S74315>.
- Nakken N, Janssen DJA, van den Bogaart EHA, Muris JWM, Vercoelen JH, Custers FL, et al. Knowledge gaps in patients with COPD and their proxies. *BMC Pulm Med.* 2017;17:136. <http://dx.doi.org/10.1186/s12890-017-0481-8>.
- Instituto Nacional de Estadísticas. Datos sobre equipamiento y uso de tecnologías de información y comunicación en los hogares de España [accessed 28 April 2020]. Available from: https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736176741&menu=ultiDatos&idp=1254735976608.
- Wong SS, Abdullah N, Abdullah A, Liew SM, Ching SM, Khoo EM, et al. Unmet needs of patients with chronic obstructive pulmonary disease (COPD): a qualitative study on patients and doctors. *BMC Fam Pract.* 2014;15:67. <http://dx.doi.org/10.1186/1471-2296-15-67>.
- Miravittles M, de la Roza C, Naberan K, Lamban M, Gobartt E, Martín A, et al. Attitudes towards the diagnosis of chronic obstructive

- pulmonary disease in Primary Care. Arch Bronconeumol. 2006;42:3–8, [http://dx.doi.org/10.1016/s1579-2129\(06\)60106-7](http://dx.doi.org/10.1016/s1579-2129(06)60106-7).
21. Encuesta Nacional de Salud de España 2017. Determinantes de salud [accessed 28 April 2020]. Available from: <https://www.mscbs.gob.es/estadEstudios/estadisticas/encuestaNacional/encuestaNac2017/encuestaResDetall2017.htm>.
 22. Hasunuma H, Yamazaki S, Tamura K, Hwang YH, Ono R, Amimoto Y, et al. Association between daily ambient air pollution and respiratory symptoms in children with asthma and healthy children in western Japan. J Asthma off J Assoc Care Asthma. 2018;55:712–9, <http://dx.doi.org/10.1080/02770903.2017.1369988>.
 23. Kotaki K, Ikeda H, Fukuda T, Yuhei K, Yuki F, Kawasaki M, et al. Trends in the prevalence of COPD in elderly individuals in an air-polluted city in Japan: a cross-sectional study. Int J Chron Obstruct Pulmon Dis. 2019;14:791–8, <http://dx.doi.org/10.2147/COPD.S189372>.
 24. Observatorio Español de las Drogas y las Adicciones (OEDA) [accessed 28-abril-2020]. Available from: <http://www.pnsd.mscbs.gob.es/profesionales/sistemasInformacion/home.htm>.
 25. Llordés M, Jaen Manzanera A, Almagro P, Heredia Budo JL, Morera J, Soriano JB, et al. Prevalence, risk factors and diagnostic accuracy of COPD among smokers in primary care. COPD. 2015;12:404–12, <http://dx.doi.org/10.3109/15412555.2014.974736>.
 26. Izquierdo JL, Morena D, González Y, Paredero JM, Pérez B, Graziani D, et al. Clinical management of COPD in a real-world setting. A big data analysis. Arch Bronconeumol. 2020, <http://dx.doi.org/10.1016/j.arbres.2019.12.025> [Epub ahead of print] 2019.
 27. López-Campos JL, Soriano JB, Calle M. A comprehensive, national survey of spirometry in Spain: current bottlenecks and future directions in primary and secondary care. Chest. 2013;144:601–9, <http://dx.doi.org/10.1378/chest.12-2690>.
 28. Naberan Toña C. Encuesta de la actitud terapéutica y de control de los médicos generales de las ABS de Barcelona, respecto a enfermedades obstructivas respiratorias. Aten Primaria (Barc). 1994;13:112–6.