UNIVERSIDADE D COIMBRA FACULDADE DE MEDICINA

INTEGRATED MASTER'S DEGREE IN MEDICINE – FINAL WORK

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Evaluation of the prevalence of Chronic Obstructive Pulmonary Disease in patients of General Practice and Family Medicine in the Health Administration of the Central Region of Portugal

ORIGINAL SCIENTIFIC ARTICLE

CIENTIFIC FIELD OF GENERAL PRACTICE AND FAMILY MEDICINE

Under the orientation of:
JOSÉ AUGUSTO RODRIGUES SIMÕES, MD, pHD

MARCH/2020

Evaluation of the prevalence of Chronic Obstructive Pulmonary Disease in patients of General Practice and Family Medicine in the Health Administration of the Central Region of Portugal

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ABSTRACT

Background: COPD is a common condition worldwide, with significant morbidity and mortality associated. Symptoms of this disease can be easily over-looked, accounting for the elevated level of under-recognition and underdiagnose. Knowledge of the prevalence of COPD and the significance of its associated factors in the population enables better management of medical resources.

Objectives: Establish the prevalence of COPD in patients of General Practice and Family Medicine in the Regional Health Administration of Central Portugal and analyze the correlation of associated factors.

Methods: Observational study, with data regarding patients coded with the ICPC-2 of COPD (R95) gathered anonymously from the Portuguese Health database.

Results: 24148 individuals identified with COPD, prevalence calculated in 2,57/100 000, most of the patients were older than 65 years (73,7%; n=17805), 60,2% (14544) were male and 39,8% (9604) were female. BMI was registered only in 15470 individuals, FEV_1 % in 1921, and pack-years in 8957. Negative correlations found between age and BMI and age and FEV_1 %.

Discussion: Prevalence was significantly higher in men. Age was identified as a risk factor for this condition. Higher age was also associated with lower FEV_1 % and BMI, both being criteria for worst prognosis. There was a considerable lack of registrations made by the clinicians regarding the patients coded for COPD.

Conclusion: Strong association of COPD with male gender and older age groups. The lack of registrations demands for an improve of the documentation made by clinicians in Primary Care Units.

Keywords: Pulmonary Disease, Chronic Obstructive; Prevalence; General Practice; Community Medicine; Portugal

RESUMO

Introdução: A DPOC é uma condição frequente a nível global, com elevada morbilidade e mortalidade associadas. Os sintomas para esta doença podem ser facilmente ignorados, estando associada a uma elevada percentagem de sub-reconhecimento e subdiagnóstico. O conhecimento da prevalência da DPOC e da importância dos seus fatores associados na população permitem uma melhor gestão de recursos médicos.

Objetivos: Determinar a prevalência de DPOC em pacientes de Medicina Geral e Familiar na Administração Regional de Saúde (ARS) do Centro de Portugal e analisar a correlação de fatores associados.

Métodos: Estudo observacional, dados relativos a pacientes codificados com a ICPC-2 de DPOC (R95) recolhidos de forma anónima a partir da base de dados da ARS do Centro.

Resultados: 24148 indivíduos identificados com DPOC, prevalência calculada em 2,57/100 000, a maioria dos pacientes com mais de 65 anos (73,7%; n=17805), 60,2% (14544) do sexo masculino e 39,8% (9604) do sexo feminino. O IMC estava registado em apenas 15470 indivíduos, o FEV_1 % em 1921, e UMA em 8957. Foram identificadas correlações negativas entre idade e IMC e idade e FEV_1 %.

Discussão: A prevalência foi significativamente mais alta em homens. A idade foi identificada como fator de risco para esta condição. Idade mais avançada foi também associada a FEV_1 % e IMC mais baixos, ambos constituindo critérios de pior prognóstico. Houve uma falta considerável de registos realizados pelos clínicos relativamente aos doentes codificados para DPOC.

Conclusão: Forte associação entre DPOC e género masculino e grupos etários mais velhos. A falta de registos requer melhorias na documentação feita por clínicos em cuidados de saúde primários.

Palavras-chave: Doença Pulmonar; Obstrutiva Crónica; Prevalência; Clínica Geral; Medicina da Comunidade; Portugal.

ABBREVIATIONS LIST

COPD – Chronic Obstructive Pulmonary Disease

FEV_1 – Forced Expiratory Volume in the first second

ICPC-2 – International Classification for Primary Care

BMI – Body Mass Index

INTRODUCTION:

Chronic Obstructive Pulmonary Disease (COPD) is an obstructive pulmonary pathology, characterized by a not fully reversible and progressive limitation of the airflow.

This pathology is described as a global health problem, with an elevated level of significance conferred by its high mortality and morbidity, as it's currently referred as the fourth leading cause of death worldwide (1). By the end of 2020 COPD is projected to be the third leading cause of death worldwide, with the disease burden tendentially increasing over the next decades, due to aging of the population, as well as the continuous exposure to COPD associated risk factors (2).

In the genesis of this chronic disease is the persistent inflammatory response of the airspaces, responsible for the irreversible alteration of its proprieties, leading to remodeling and consequent distortion, causing the progressive decline of the patient's pulmonary function (3, 4).

The typical findings in this pathology are the persistent decrease of the percentage of forced expiratory volume in the first second (FEV_1%) on the spirometry, accompanied with respiratory symptomatology, usually in the form of persistent cough with sputum (chronic phlegm) (5, 6).

In Portugal, the prevalence of this condition is estimated at 14,2% in individuals with 40 or more years of age, concomitant with an elevated degree of under-diagnose (86,2%) (7), while worldwide the prevalence of COPD was estimated at 11.7% in 2010 (8).

Smoking is the leading risk factor associated with COPD. Smokers have higher prevalence of respiratory symptoms, a higher annual decline in the FEV_1 % and higher mortality associated with the disease, when compared to non-smokers (9).

Ageing is also widely referred as a risk factor for COPD, whether it is due to the ageing of the airways and parenchyma itself or due to the cumulative effects of exposures throughout life still remains controversial (10).

Gender differences have also been described in COPD, with past studies showing a higher prevalence amongst men, however, more recent studies have shown a tendency to a normalization of the prevalence among both sexes, this phenomenon is largely attributed to the change in tobacco smoking patterns, with an increase of tobacco smoking among women throughout the years (11). Clinical presentation of COPD may also vary according to gender, with women being less likely than men to report dyspnea as the main symptom (12, 13), with COPD being listed as the most probable diagnose more often in men than in women, thus associated with a greater degree of under-diagnose amongst women, emphasizing the great value of spirometry in the diagnosis of this condition (14). Female gender has also been described as more susceptible to smoke exposure, showing a greater pulmonary function decline associated with lower smoking exposure when compared to men (15).

Lung-specific measurements, such as FEV_1 %, are widely used as predictors of mortality in COPD, as well as in the general population (16-18). However, other factors have been described as good predictors in the mortality associated with this condition (19), with prognostic tools, such as the BODE index, which accounts for the patient's BMI, degree of airflow obstruction, dyspnea and exercise capacity, showing better results in predicting the risk of death in COPD patients than using FEV_1 % alone (20, 21).

OBJECTIVES:

To establish the prevalence of patients coded with the International Classification for Primary Care (ICPC-2) of “Chronic Obstructive Pulmonary Disease (R95)” in the universe of those enrolled in Primary Health Care units in the area of influence of the Regional Health Administration of Central Portugal.

To characterize socio-demographically the population of patients with a COPD diagnose in this area and analyze the correlation between associated factors, such as: age, gender, FEV_1 %, BMI and smoking burden.

METHODS:

Observational study, descriptive, with an analytic component. The study has received a favorable opinion from the ethics committee of the Regional Health Administration of Central Portugal, with data gathered from the database of General Practice and Family Medicine appointments, that occurred in the Center Region of Portugal, during the year of 2018.

Data referring to age, gender, smoking burden, FEV_1 % and BMI from patients with 40 or more years of age coded with the ICPC-2 of “Chronic Obstructive Pulmonary Disease (R95)”, was collected anonymously from the Portuguese Health database.

All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS), version 25. Descriptive statistics included mean and standard deviation for continuous variables and absolute and relative frequency for categorical variables. Distribution normality was assessed using the Kolmogorov-Smirnov test. Chi-square and Mann-Whitney tests were used to establish associations and differences between variables, respectively. For variables correlation, we used Spearman correlation coefficient and Partial Correlations to adjust for gender. Correlations were considered very strong when a coefficient was greater than 0.90, strong if between 0.70 and 0.90, moderate if between 0.50 and 0.70, weak if between 0.30 and 0.50 and very weak if inferior to 0.30. Results were significant at $p<0,05$.

RESULTS:

TABLE 1 - Sample characteristics.

Characteristics	N	% (n) or Mean±SD
Gender, % (n)	24148	
Male		60,2 (14544)
Female		39,8 (9604)
Age (years), mean±SD	24148	71,9±11,6
Age group, % (n)	24148	
<65 years		26,3 (6343)
≥65 years		73,7 (17805)
Region, % (n)	24148	
Baixo Mondego		20,1 (4853)
Baixo Vouga		19,0 (4586)
Beira Interior Sul		7,4 (1780)
Pinhal Litoral		14,4 (3485)
Dão Lafões		14,4 (3468)
Pinhal Interior Norte		8,0 (1930)
ULS Guarda		6,7 (1617)
Cova da Beira		6,2 (1496)
Pinhal Interior Sul		3,9 (933)
BMI (kg/m^2), mean±SD	15470	28,6±7,1
FEV_1 % predicted, mean±SD	1921	62,8±29,8
Pack-years, mean±SD	8957	10,3±22,0

BMI, Body Mass Index; FEV_1, Forced Expiratory Volume in the first second; N, number of patients with available data; SD, Standard deviation.

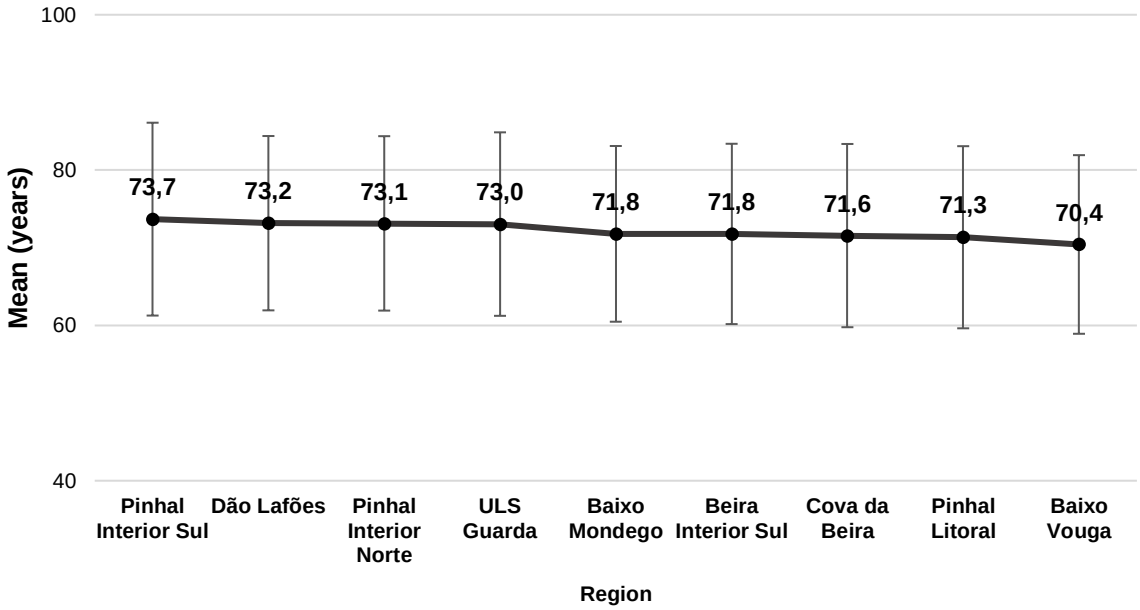
In a universe of 937 817 people enrolled in Primary Health Care units in the center region of Portugal, 24148 patients were coded with ICPC-2 “Chronic Obstructive Pulmonary Disease (R95)” and were included in this study. The prevalence of COPD was 2,57/100 000. Characteristics of participants are shown in Table 1. 60,2% (14544) were male and 39,8% (9604) were female. Mean age was 71,9±11,6 years and most of the patients were above 65 years old (73,7%; n=17805). The Baixo Mondego region was the most represented in our sample (20,1%; n=4853). Out of the 24148 patients represented, only 15470 had BMI registrations, 1921 had FEV_1 %, and 8957 had pack-years registered. Mean BMI was 28,6±7,1 kg/m^2, mean FEV_1 % was 62,8±29,8 and mean packs-year was 10,3±22,0.

TABLE 2 - Gender comparison of clinical features in patients with COPD.

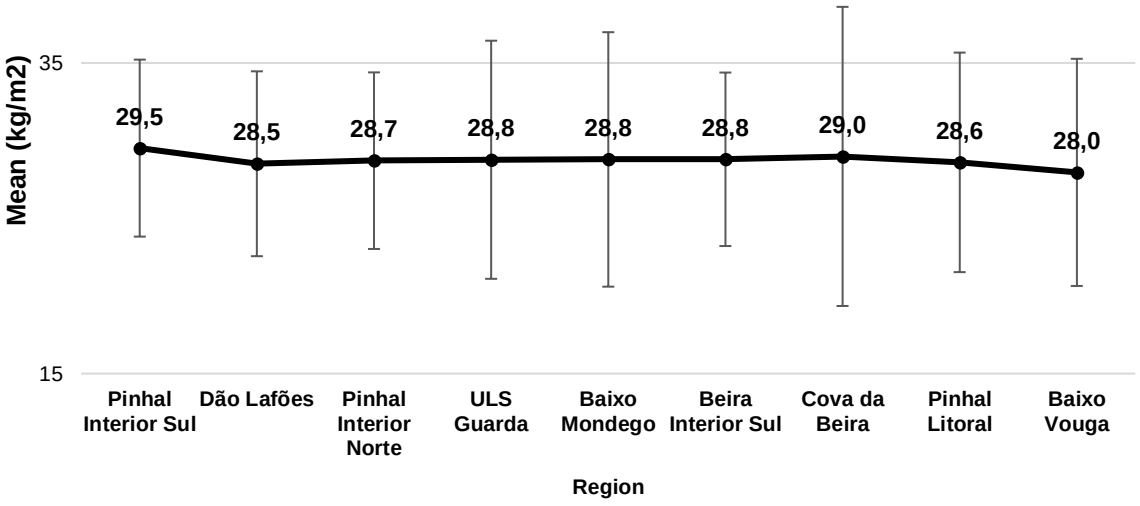
Characteristics	Gender		P-value
	Male (n=14544)	Female (n=9604)	
Age (years), mean±SD	70,9±11,2	73,5±11,9	**<.001**
Age group, % (n)			**<.001**
<65 years	28,2 (4097)	23,4 (2246)	
≥65 years	71,8 (10447)	76,6 (7358)	
Region, % (n)			**<.001**
Baixo Mondego	20,6 (2996)	19,3 (1857)	
Baixo Vouga	19,0 (2766)	19,0 (1820)	
Pinhal Litoral	14,2 (2067)	14,8 (1418)	
Dão Lafões	14,1 (2048)	14,8 (1420)	
Pinhal Interior Norte	7,7 (1123)	8,4 (807)	
Beira Interior Sul	7,4 (1074)	7,4 (706)	
ULS Guarda	6,8 (988)	6,5 (629)	
Cova da Beira	6,9 (1004)	5,1 (492)	
Pinhal Interior Sul	3,3 (478)	4,7 (455)	
BMI (kg/m^2), mean±SD	28,1±6,0	29,3±8,5	**<.001**
FEV_1 % predicted, mean±SD	61,1±27,9	66,1±33,2	**.001**
Pack-years, mean±SD	14,9±25,8	3,4±11,5	**<.001**

BMI, Body Mass Index; FEV_1, Forced Expiratory Volume in the first second; SD, Standard deviation.

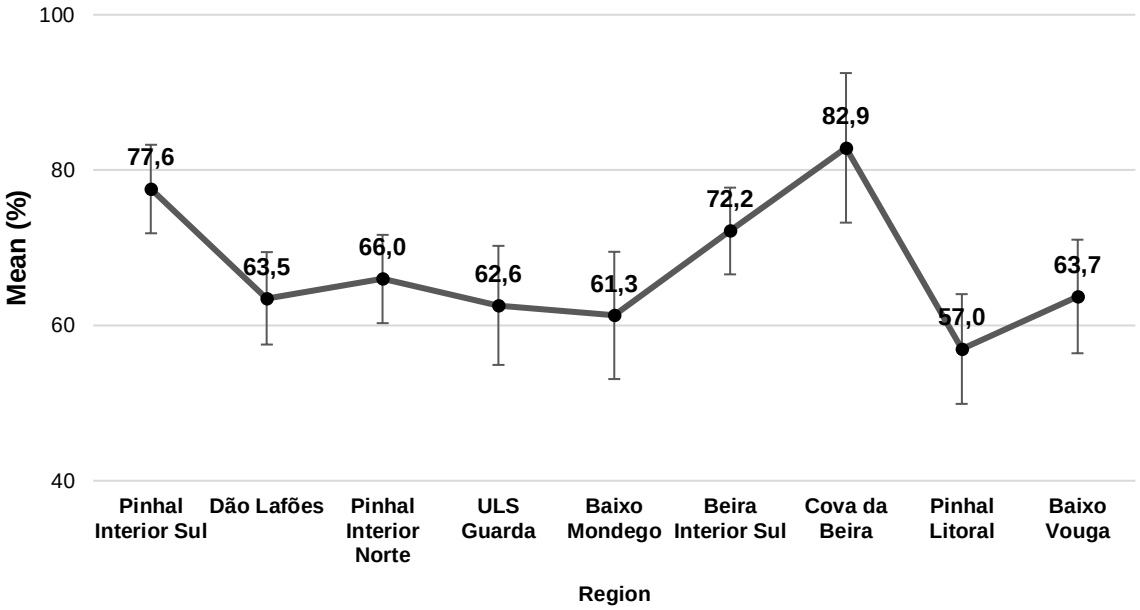
Table 2 represents the gender comparison of the collected data. Females with COPD were significantly older (73,5 years old) comparing with males (70,9 years old; p<.001) and the latter were significantly overrepresented in the age group below the age of 65 years (28,2%; p<.001). The gender was associated with the participant's region (p<.001). Female patients with COPD had a higher median BMI (M=29,3; p<.001), FEV_1 % (M=66,1; p=.001) but a lower median pack-years (M=3,4±11,5) comparing with males.



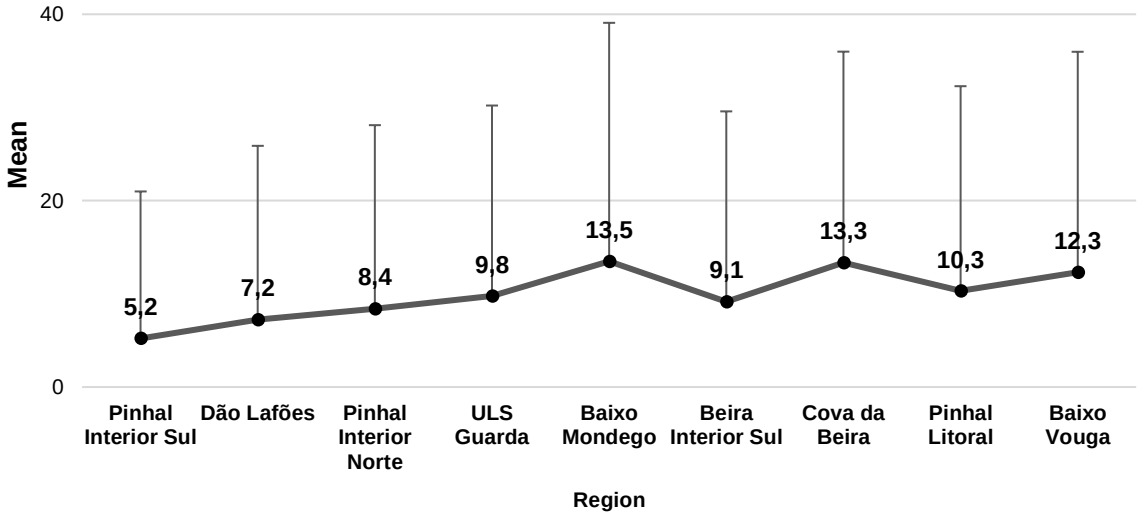
GRAPH 1 | Age distribution across regions.



GRAPH 2 | BMI distribution across regions.



GRAPH 3 | FEV_1 % distribution across regions.



GRAPH 4 | Pack-years distribution across regions.
Negative error bars were hidden.

Graphs 1 to 4 show the distribution of age, BMI, FEV_1 % and packs-year according to the participant's region. Mean age and BMI were highest in Pinhal Interior Sul region and lowest in Baixo Vouga (Graph 1 and 2). Mean FEV_1 % was higher in the interior regions of Cova da Beira and Pinhal Interior do Sul and lower in the seaside locations (Pinhal Litoral and Baixo Mondego) (Graph 3). Mean packs-year were higher in Baixo Mondego and Cova da Beira, but lower Pinhal Interior Sul and Dão Lafões (Graph 4). There were significant differences in terms of age (p<.001), BMI (p<.001), FEV_1 % (p<.001) and packs-year (p<.001) between regions.

TABLE 3 - Spearman correlation matrix of clinical variables.

Variables (unadjusted)	**Age**	**BMI**	**FEV1**
BMI (kg/m^2)	**-0,032****		
FEV_1 %	**-0,073***	0,034	
Packs-year (greater than 0)	**0,219****	0,005	-0,051
Variables (adusted for gender)	**Age**	**BMI**	**FEV1**
BMI (kg/m^2)	0,046		
FEV_1 %	**-0,065***	0,052	
Packs-year (greater than 0)	**0,223****	**0,058***	-0,010

*p<0.05; **p<0.001.

Unadjusted and adjusted correlations between continuous variables using Spearman correlation coefficient are shown in Table 3. There were negative correlations between age, BMI and FEV_1 %. Age and packs-year showed a positive correlation. Partial correlations controlling for gender showed a negative correlation between age and FEV_1 % (r_S=-0,065) and positive correlations between age and packs-year (r_S=0,223) and between packs-year and BMI (r_S=0,058). All significant correlations were very deemed as very weak (coefficient <0.3).

DISCUSSION:

We identified 24148 patients that were coded with the ICPC-2 “Chronic Obstructive Pulmonary Disease (R95)” out of a universe of 937.817 people, resulting in a prevalence of 2,57/100 000. Prevalence of COPD in the center region of Portugal was significantly lower than the prevalence estimated for this disease in past studies both worldwide and in Portugal (7,8).

Age was identified as a risk factor for this condition, with the age group above 65 years of age being the most represented in our sample. Higher age was also associated with greater pulmonary function decline (lower FEV_1 %) and lower BMI, both being criteria for worst prognosis (16-21). Smoking burden was also found to increase with age.

Airway obstruction associated with this disease was found to be more severe (with lower FEV_1 %) amongst patients in seaside locations.

Prevalence was significantly higher in men, with a concomitant higher smoking burden in this gender. Being safe to assume, that even though recent studies have shown a tendency to a normalization of the prevalence amongst genders (11), the center region of Portugal is still showing great differences in this field, probably due to the lack of change in smoking patterns, with smoking still being highly associated with the male gender in this area.

All the data was gathered due to the existence of a national health database containing information regarding most Primary Health Care appointments, nevertheless there was a considerable lack of registrations made by the clinicians regarding FEV_1 %, BMI and smoking burden in the form of packs-year for the patients coded for COPD.

CONCLUSION:

COPD in the center region of Portugal is a pathology vastly associated with the male gender and with older age groups. Smoking burden was also substantially higher amongst men when compared to women in this region, not accompanying the changes in smoking patterns found in developed countries worldwide.

The prevalence calculated for this condition was considerably low in this region, and with this study we report the need to improve coding and registrations made by clinicians in Primary Health Care units in the center region of Portugal, as COPD is one of the major causes of death worldwide, therefore we would benefit from better registrations for this condition as well as a better documentation for its associated factors such as FEV_1 %, BMI and smoking burden, as these represent important tools when accessing morbidity and mortality associated with this disease.

ACKNOWLEDGEMENTS

To my Professor and thesis advisor, José Augusto Rodrigues Simões, for the opportunity to fulfill this project under his mentorship, for all the support and expertise brought into this work, for all the patience to answer all of my questions and all the vital rectifications throughout this journey.

To Professor Luiz Miguel Santiago, for the essential assistance during this project, his knowledge was crucial in the making of the present work and I thank him for all the input, patience and problem-solving mentality.

To Dr. Conceição Saraiva, from the informatic services of the Regional Health Administration of Center Portugal, for being so helpful and efficient with the data gathering.

To my mother and father, for always being by my side and supporting all my projects, for always believing in me and for giving me strength, for all the patience and unconditional love. Everything I do, I do it for them.

To my boyfriend, for always being understanding and supportive, always accompanying me through the best and worst moments.

To my friends, for keeping me sane and sharing my difficulties, always ready to pick me up whenever I needed.

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APPENDICES

Appendix I - Ethics committee of the Regional Health Administration of Central Portugal opinion

GOVERNO DE PORTUGAL
MINISTÉRIO DA SAÚDE

ARSC ADMINISTRAÇÃO REGIONAL DE SAÚDE DO CENTRO, I.P.

COMISSÃO DE ÉTICA PARA A SAÚDE

PARECER FINAL:	DESPACHO:
Favorável	Homologado o parecer 25.07.19

Conselho Diretivo da A.R.S. do Centro, I.P.

ASSUNTO: **Parecer sobre o Projeto 79/2019**

Dr.ª Rosa Reis Marques
Presidente,

Dr. João Rodrigues
Vice-Presidente,

Dr. Luís Militão Cabral
Vogal,

Dr. Mário Ruivo
Vogal,

Este projeto foi submetido pela estudante do Mestrado Integrado em Medicina da FMUC Jéssica Andreia Rodrigues Ricardo e tem como objetivo determinar a prevalência de DPOC e de fatores associados em doentes seguidos em Medicina Geral e Familiar na área geográfica da ARSC.

Trata-se de um estudo observacional e descritivo que se propõe recolher informação de forma anónima da base de dados informática da ARSC, após identificação do diagnóstico ICPC-2 R95 e correspondente aos ficheiros dos ACeS da Região relativos ao ano de 2018. Recolherá também informação da ficha individual dos utentes sobre idade, sexo, IMC, carga tabágica, FEV1 e espirometria.

Não se antevê qualquer impedimento ético para a realização deste projeto. O parecer é positivo.

O Relator: Prof. Doutor Pedro Lopes Ferreira

O Presidente da CES: Prof. Doutor Fontes Ribeiro

Appendix II – Statistical data request

REPÚBLICA PORTUGUESA SAÚDE | SNS SERVIÇO NACIONAL DE SAÚDE | ARSC ADMINISTRAÇÃO REGIONAL DE SAÚDE DO CENTRO, I.P

Entidade: Administração Regional de Saúde do Centro, I. P.

Formulário 2

À atenção do Coordenador do Gabinete de Sistemas de Informação e Comunicações

Pedido de Dados Estatísticos ao GSIC

Nome: José Augusto Rodrigues Simões

Categoria Profissional: Médico, Assistente Graduado de MGF

Coordenação: ○ Sim ○ Não

Unidade de Saúde: USF Caminhos do Cértoma, ACeS Baixo Mondego

Email: jasimoes@arscentro.min-saude.pt

Telemóvel: 924406126

Finalidade dos dados solicitados

☒ Investigação ☒ Apresentação em Congresso ☐ Tratamento de ficheiro ☐ Curriculum

Outra:

Inclui: ☒ Contagens ☒ Listas anonimizadas

Periodo a que se reporta os dados: 01-01-2018 a 31-12-2018

Prazo de disponibilização da informação: Dependente dos Serviços da ARS

Descrição dos dados solicitados

OBJETIVOS: Determinar a prevalência de DPOC e de fatores associados, em doentes seguidos em Medicina Geral e Familiar, na área geográfica da Administração Regional de Saúde (ARS) do Centro.
Dados a recolher, de forma anónima, a partir da base de dados informática da ARS do Centro referentes aos doentes inscritos com o diagnóstico ICPC-2 de DPOC, nos ficheiros de Medicina Geral e Familiar da ARS Centro, e que tiveram consulta no ano de 2018.
Registos a selecionar: Processos de pessoas com idade superior a 40 anos com codificação ICPC-2 "R95" (Doença Pulmonar Obstrutiva Crónica) de pessoas que tiveram, pelo menos 1 consulta, no decorrer do ano 2018, nas unidades de prestação de cuidados médicos na área de influência da ARS do Centro IP.
Variáveis a selecionar: (variáveis existentes na ficha individual dos processos clínicos informatizados)
idade,
sexo,
índice de massa corporal (IMC),
carga tabágica quantificada em unidades maço ano (UMA),
função pulmonar pelo valor de FEV1

Autorização do Superior Hierárquico

Local: COIMBRA Data: 2019/07/25

Autorizado por *(quando aplicável)*: CD da ARS do Centro, IP

Importante: Todos os campos do formulário são de preenchimento obrigatório.
Deve ser sempre e exclusivamente enviado para o mail do Coordenador do Gabinete de Sistemas de Informação e Comunicações.

ARS CENTRO, I.P. - Alameda Júlio Henriques, 3000-457 Coimbra