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Gender inequalities in COPD decision-making in primary care

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ABSTRACT

Background: COPD is a frequent severe illness that increasingly affects females. Gender inequalities have been reported in COPD care.
Objective: To analyze decision-making in primary care for men and women with identical COPD as a function of the gender of the family physician (FP).
Methods: Cross-sectional, multicenter study in 457 Andalusian FPs, using a self-administered vignette-based questionnaire on COPD featuring a male or female patient, with four variables on clinical reasoning: "tobacco as most important risk factor (RF)", "ordering of spirometry", "COPD as most likely diagnosis", and "referral". Multilevel logistic regression analysis.
Results: Response rate was 67.4% (308/457). In analysis of the four FP gender-patient gender dyads, tobacco was more frequently considered as priority RF for the man than for the woman in the vignette by female (95.6%vs.67.1%) and male (79.8%vs.62.5%) FPs. COPD was more frequently the most likely diagnosis for the man versus woman by female (84.4%vs.49.9%) and male (78.5%vs.57.8%) FPs. Male FPs more frequently ordered spirometry for the man versus woman (68.1%vs.46.8%). There were no differences in referral between male and female patients. Male FPs were more likely than female FPs to consider tobacco as priority RF for the man (p = 002). Female FPs were more likely than male FPs to refer the man (22.5%vs.8%).
Conclusions: There may be gender inequalities in primary care for COPD in our setting. Diagnostic and therapeutic efforts appear lower in female patients. Male and female FPs only differed in care of the male patient, indicating FP gender-patient gender interaction.

1. Introduction

Chronic obstructive pulmonary disease (COPD) is a common and severe ailment that is more frequent among males than among females in Spain (15.1% *vs*. 5.7%) [1], as reported in other countries [2]. However, although COPD was historically considered a "male" disease, its prevalence [3] and mortality [4] among females has been increasing.

The main cause of COPD in developed countries is tobacco consumption, which has decreased since 1993 in males but not females in Spain, with the prevalence among 15 to 24-year-olds now being virtually the same for each gender [5]. In comparison to male smokers, female smokers are known to suffer greater pulmonary function impairment, more intense dyspnea, and worse quality of life for the same level of exposure to tobacco [2]. In addition, out of the 15% of COPD patients with no history of smoking, 80% are female [4].

Knowledge of gender inequalities in healthcare remains incipient. Surveys have identified gender differences in the utilization of healthcare [5], and there is known to be a set of false notions that can translate into gender biases and result in unequal medical practices for female and male patients [6], with differences in requests for diagnostic tests or the prescription of treatments [7]. This suggests the possibility of biases in the anamnesis and/or physical examination, which are highly influenced by medical semiotics, patient narratives, and medical observation, which is never neutral

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[8]. Medicine is an androcentric science that considers males as the norm, and female symptoms can be misinterpreted [9]. Differences in routine clinical practice have been reported between male and female FPs, finding that the females give longer consultations and have superior psychosocial orientation in comparison to their male counterparts [10,11].

Clinical vignette questionnaires are widely used for studies on the reasoning process of physicians. A vignette is the representation, generally written, of a hypothetical clinical setting. When well designed, they are highly useful to determine whether clinical decision-making is influenced by the genders of the professionals and patients [12].

The objective of this study in the primary care setting was to analyze the clinical decision-making process for a male and female patient with identical COPD symptoms as a function of the gender of the physicians.

2. Material and methods

This observational, cross-sectional study included female and male FPs who had been working for at least one year with the same patient list in 48 health centers (HCs) of four primary care health districts in Andalusia (Southern Spain). These criteria were met by 457 FPs.

Dependent variables were four indicators of the clinical reasoning process for COPD gathered with an *ad hoc* vignette questionnaire: "consideration of tobacco as major RF" (causal orientation), "ordering of spirometry" (diagnostic effort), "COPD as most likely diagnosis" (diagnostic orientation), and "referral to specialist" (FP-perceived severity). FP covariates were gender, age, and postgraduate training in Family Medicine; HC covariates were urban/rural setting (<or $\geq$ 20 min from reference hospital), total assigned population, team size (FPs, pediatricians, and nurses), and postgraduate training for Family Medicine. The patient covariate was gender.

Two data sources were used: a) health district management for FP and HC variables, and b) COPD vignette questionnaire with four questions on clinical decision making, completed by the FPs in a clinical session at their HC between January 2012 and May 2013. Two identical versions of the questionnaire were prepared in relation to a female and male patient, respectively. The versions were randomly distributed among the female and male FPs in the original sample, with each participant completing the questionnaire for one of the genders.

A workshop with a panel of three male and four female FPs examined the *apparent validity* of the clinical vignette (appendix), followed by a pilot test in 10 FPs with similar characteristics to those in the study sample.

All text responses to open questions were encoded by researchers blinded to the genders of the physician and patient. After an initial descriptive analysis, categories with equal clinical meaning were grouped together. Descriptive statistical analysis was conducted of all variables. The data structure was multilevel: the first level was the FP, nested in the HC, which was in turn nested in the health district; only two levels were used, given the reduced number of health districts. A mixed binary logistic regression model was adjusted for each dependent variable by the restrictive maximum likelihood method, including and therefore controlling for all independent variables, regardless of their significance in the non-adjusted model. The HC was included in all models as random effect factor. STATA 12 statistical package was used for the statistical analysis. $P < 0.05$ was considered statistically significant.

3. Results

The questionnaire was completed by 308 FPs (67.4%) with a mean age of 54.31 yrs, whose characteristics did not differ from those of non-respondents (Table 1). The most frequent reason (65.5%) for non-response was the absence of the FP during the clinical session in which the questionnaire was administered. Among the responders, the mean age was 52.45 yrs for the female FPs and 54.85 yrs for the males ($p < 0.001$). The proportion with post-graduate training did not differ between female and male FPs.

The FP-patient dyads comprised: 68 female physicians-female patients, 63 female physicians-male patients, 105 male physicians-female patients, and 72 male physicians-male patients.

Tables 2 and 3 list the odds ratios (ORs) of the crude models and the models adjusted for "consideration of tobacco as most important RF" and "ordering of spirometry". Only the age of FPs and gender of patients were related to these variables after adjustment. The models in Table 4 show that the frequency of "COPD as most likely diagnosis" was associated with the assigned population size and patient gender in the adjusted model. The regression models for "referral to specialist" (Table 5) show that its frequency was higher in one of the health districts and increased with larger size of the team and assigned population in the adjusted model.

Table 6 evidences that tobacco was more frequently considered as the most important RF for the man than for the woman by both female (95.6% *vs*. 67.1%) and male (79.8% *vs*. 62.5%) FPs. COPD was also more frequently the most likely diagnosis for the man than for the woman by both female (84.4% *vs*. 49.9%) and male (78.5% *vs*. 57.8%) FPs. The ordering of spirometry was more frequent for the man than for the woman by male FPs (68.1% *vs*. 46.8%), revealing an FP gender-patient gender interaction. There was no difference between the female and male patient in "referral to specialist" by either female ($p = 0.189$) or male ($p = 0.820$) FPs.

In the analysis by FP gender, female FPs more frequently considered tobacco as the most important RF in the man in comparison to the male FPs ($p = 0.002$); i.e., the care of the man varied as a function of the gender of the FP. However, male and female FPs did not differ in the frequency of their consideration of tobacco as the most important RF for the woman ($p = 0.591$), indicating interaction. Interaction was also observed for referral of the male patient to a specialist, which was more frequently prescribed by male versus female FPs, with borderline significance ($p = 0.059$).

4. Discussion

The response rate to the questionnaire was acceptable, and there were no relevant differences between respondents and non-respondents, indicating a good internal validity. Although the mean age was slightly younger in the female versus male FPs, the multiple regression analysis controlled for the age of the FP, among other potential confounders.

The study is population-based and provides knowledge on gender inequalities in healthcare and on gender differences in the practice of FPs, matters of increasing interest over the past few decades.

Few FP and HC characteristics were found to be associated with decision making for COPD symptoms. The central focus of our study was on associations with the genders of FPs and patients. Both female and male physicians were more likely to ask the man than the woman about their tobacco consumption, as previously observed in our country [13], probably due to an assumption that smoking is more frequent among males than females. However, smoking is increasingly prevalent among females [5], who develop COPD at earlier ages with lower tobacco consumption in comparison to males [3], and whose quality of life is more impaired [14]. Thus,

Table 1
Comparison between family physicians who responded to the vignette-based questionnaire and those who did not.

Variables	Categories	Sample (N = 457)	Responders (N = 308) N (%)	Non-responders (N = 149) N (%)	P
Gender	Female	193	131 (67.9)	62 (32.1)	0.852
	Male	264	177 (67.1)	87 (32.9)	
Postgraduate training in Family Medicine	Yes	181	128 (70.7)	53 (29.3)	0.220
	No	276	180 (65.2)	96 (34.8)	
Health district	1	163	117 (71.8)	46 (28.2)	0.061
	2	85	49 (57.7)	36 (42.3)	
	3	109	69 (63.3)	40 (36.7)	
	4	100	73 (73)	27 (27)	
Setting	Urban	298	210 (70.5)	88 (29.5)	0.055
	Rural	159	98 (61.7)	61 (38.3)	
Accredited health center	Yes	221	144 (65.2)	77 (34.8)	0.323
	No	236	164 (69.5)	72 (30.5)	

Table 2
Crude and adjusted regression models for consideration of tobacco as major risk factor.

Variables	Categories	Contents		Crude model			Adjusted model		
		N	%	Odds ratio	CI (95%)	P	Odds ratio	CI (95%)	P
Health district	1	79	67.52	1			1		
	2	33	67.35	1.037	0.527; 2.039	0.916	0.871	0.199; 3.816	0.855
	3	56	81.16	2.581	1.181; 5.639	0.017	1.301	0.320; 5.291	0.714
	4	60	82.19	2.582	0.906; 7.36	0.076	1.648	0.666; 4.077	0.279
Setting	Urban	157	74.76	1			1		
	Rural	71	72.45	0.859	0.474; 1.556	0.616	0.814	0.234; 2.836	0.747
Accredited health center	Yes	112	77.78	1			1		
	No	116	70.73	0.647	0.346; 1.211	0.173	0.853	0.447; 1.625	0.628
Size of team	<=12	39	70.91	1			1		
	12 < team size ≤ 27	117	74.52	1.159	0.456; 2.952	0.756	0.719	0.346; 1.495	0.377
	>27	72	75.00	1.155	0.432; 3.088	0.773	0.802	0.322; 1.995	0.635
Assigned population	<=9172	29	72.50	1			1		
	9173–21,343	45	73.68	1.022	0.365; 2.857	0.967	1.572	0.68; 3.63	0.290
	>21,343	73	75.26	1.058	0.342; 3.27	0.922	1.824	0.574; 5.796	0.308
Postgraduate training in Family Medicine	Yes	100	78.13	1			0.911	0.441. 1.879	0.800
	No	128	71.11	0.672	0.367; 1.23	0.198			
Age of physician (yrs)	≤52	59	83.10	1			1		
	52 < age ≤ 58	123	76.88	0.561	0.201; 1.565	0.269	0.66	0.226; 1.925	0.447
	>58	46	59.74	0.22	0.075; 0.648	0.006*	0.287	0.08; 1.025	0.055
Gender of physician	Female	106	80.92	1					
	Male	122	68.93	0.519	0.267; 1.01	0.053			
Gender of patient	Female	109	63.01	1					
	Male	119	88.15	4.045	2.342; 6.987	0.000*			
FP-patient dyads	Female physician-Female patient	46	67.65	1			1		
	Female physician-Male patient	60	95.24	11.315	3.287; 38.952	0.000*	10.268	2.670; 39.483	0.001*
	Male physician-Female patient	63	60.00	0.798	0.366; 1.742	0.572	0.931	0.405; 2.139	0.866
	Male physician-Male patient	59	81.94	2.072	0.997; 4.306	0.051	2.29	0.962; 5.447	0.061

* Statistically significant.

among patients with low tobacco exposure, pulmonary function reduction was found to be more severe in females than in males [15]. Quitting smoking is the first measure against COPD, and the tobacco consumption of patients should always be addressed when there is suspicion of this condition. Failure to do so may have especially severe health consequences for women with COPD symptoms.

Spirometry was ordered less frequently for the woman than for the man by both female and male FPs, as previously reported in other countries [2,16–18]. Spirometry is specified in clinical practice guidelines for establishing the diagnosis of COPD [19]; therefore, failure to order this test indicates either that the disease was not suspected by some FPs or that they were not aware of the correct diagnostic protocol. Miravitlles et al. [20] reported that COPD was more frequently diagnosed in males than in females based on clinical symptoms alone but that this gender difference disappeared when account was taken of spirometry results. These findings underscore the importance of this test for reducing gender inequalities in primary care for COPD and its underdiagnosis in females. Spirometry also provides an evaluation of the severity of this disease, essential information for its correct treatment.

The likelihood of a COPD diagnosis was more frequent when the vignette described a man, with a gender difference of 34.5% when the FP was female and 20.7% when the FP was male. Various reviews have described this COPD underdiagnosis in females [2,3,21], consistent with the reported perception by female patients of a greater delay in their diagnosis [22]. In studies in Spain [20] and North America [23] using clinical vignettes of smoker patients, the frequency of COPD diagnosis was also lower for the women, although the frequencies were lower in both studies than in ours.

It has been reported that patient gender is the most influential characteristic in diagnostic and therapeutic behavior [24]. FPs frequently attribute more psychosomatic problems and emotional components to females than to males with the same clinical

Table 3
Crude and adjusted regression models for ordering of spirometry.

Variables	Categories	Contents		Crude model			Adjusted model		
		N	%	Odds ratio	CI (95%)	P	Odds ratio	CI (95%)	P
Health district	1	63	53.85	1			1		
	2	24	48.98	0.717	0.294; 1.75	0.466	0.67	0.104; 4.316	0.674
	3	47	68.12	2.198	0.936; 5.162	0.071	1.592	0.309; 8.192	0.578
	4	42	57.53	1.01	0.502; 2.411	0.812	0.826	0.381; 1.791	0.628
Setting	Urban	120	57.14	1			1		
	Rural	56	57.14	0.933	0.471; 1.846	0.842	0.835	0.16; 4.353	0.831
Accredited health center	Yes	87	60.42	1			1		
	No	89	54.27	0.777	0.401; 1.504	0.455	0.887	0.449; 1.75	0.730
Size of team	<=12	29	52.73	1			1		
	13–27	91	57.96	1.247	0.562; 2.768	0.588	0.603	0.197; 1.848	0.376
	>27	56	58.33	1.299	0.45; 3.749	0.628	0.626	0.096; 4.061	0.623
Assigned population	<=9172	19	47.50	1			1		
	9173–21,343	70	59.06	1.605	0.795; 3.238	0.187	3.035	0.881; 10.45	0.078
	>21,343	56	57.73	1.653	0.624; 4.378	0.312	3.692	0.522; 26.071	0.190
Postgraduate training in Family Medicine	Yes	80	62.50	1			1		
	No	96	53.33	0.736	0.417; 1.30	0.292	1.002	0.567; 1.771	0.994
Age of physician (yrs)	<=52	49	69.01	1			1		
	53–58	93	58.13	0.548	0.239; 1.256	0.155	0.586	0.262; 1.309	0.193
	>58	34	44.16	0.31	0.126; 0.762	0.011*	0.323	0.129; 0.811	0.016*
Gender of physician	Female	80	61.07	1					
	Male	96	54.24	0.804	0.443; 1.459	0.473			
Gender of patient	Female	87	50.29	1					
	Male	89	65.93	2.323	1.229; 4.392	0.009*			
FP- patient dyads	Female physician- Female patient	38	55.88	1			1		
	Female physician- Male patient	42	66.67	1.772	0.741; 4.237	0.198	1.59	0.674; 3.749	0.290
	Male physician- Female patient	49	46.67	0.664	0.273; 1.614	0.367	0.734	0.299; 1.802	0.500
	Male physician- Male patient	47	65.28	1.891	0.861; 4.156	0.113	2.026	0.939; 4.371	0.072

*Statistically significant.

Table 4
Crude and adjusted models for COPD as most likely diagnosis.

Variable	Category	Contents		Crude model			Adjusted model		
		N	%	Odds ratio	CI (95%)	P	Odds ratio	CI (95%)	P
Health district	1	76	64.96	1			1		
	2	29	59.18	0.669	0.263; 1.701	0.398	3.105	0.349; 27.604	0.310
	3	51	73.91	2.146	0.741; 6.221	0.159	3.774	0.52; 27.398	0.189
	4	47	64.38	0.97	0.411; 2.286	0.944	0.73	0.366; 1.454	0.370
Setting	Urban	142	67.62	1			1		
	Rural	61	62.24	0.767	0.386; 1.524	0.449	0.215	0.032; 1.459	0.116
Accredited health center	Yes	100	69.44	1			1		
	No	103	62.80	0.643	0.315; 1.313	0.226	0.93	0.535; 1.619	0.799
Size of team	<=12	30	54.55	1			1		
	13–27	107	68.15	1.718	0.837; 3.529	0.140	1.122	0.507; 2.485	0.776
	>27	66	68.75	1.907	0.638; 5.700	0.248	0.763	0.251; 2.32	0.633
Assigned population	<=9172	23	57.50	1			1		
	9173–21,343	109	63.74	1.212	0.501; 2.933	0.670	1.765	0.683; 4.561	0.240
	>21,343	71	73.20	2.358	0.797; 6.974	0.121	3.901	1.119; 13.6	0.033*
Postgraduate training in Family medicine	Yes	90	70.31	1			1		
	No	113	62.78	0.78	0.399; 1.534	0.467	0.924	0.483; 1.768	0.811
Age of physician (yrs)	<=52	50	70.42	1			1		
	53–58	108	67.50	0.928	0.46; 1.872	0.835	0.968	0.493; 1.9001	0.925
	>58	45	58.44	0.501	0.201; 1.249	0.138	0.59	0.213; 1.635	0.310
Gender of physician	Female	89	67.94	1					
	Male	114	64.41	1.017	0.576; 1.798	0.953			
Gender of patient	Female	94	54.34	1					
	Male	109	80.74	3.89	2.097; 7.214	0.000*			
FP-patient dyads	Female physician - Female patient	36	52.94	1			1		
	Female physician - Male patient	53	84.13	5.706	1.865; 17.454	0.002*	4.937	1.533; 15.898	0.007*
	Male physician - Female patient	58	55.24	1.335	0.692; 2.576	0.388	1.273	0.631; 2.569	0.500
	Male physician - Male Patient	56	77.78	3.922	1.803; 8.534	0.001*	3.769	1.762; 8.062	0.001*

* Statistically significant.

symptoms [24,25], indicating that gender stereotypes affect medical practice. A previous study in primary care [13] showed that FPs scored the severity of identical respiratory symptoms higher when the patient was male versus female. The more frequent referral to a specialist for the man in our study may also indicate a higher severity rating in males.

Analysis of the behavior of the male and female FPs in our study demonstrates differences in two variables that show an interaction. First, in comparison to male FPs, female FPs were more likely to consider tobacco the most important risk factor for the man

Table 5
Crude and adjusted regression models for referral to specialist.

Variables	Categories	Contents		Crude model			Adjusted model		
		N	%	Odds ratio	CI (95%)	P	Odds ratio	CI (95%)	P
Health district	1	13	11.40	1			1		
	2	7	14.89	1.844	0.636; 5.342	0.259	1.219	0.147; 10.094	0.854
	3	15	21.74	2.034	0.361; 11.471	0.421	1.673	0.211; 13.279	0.627
	4	22	30.14	4.095	1.511; 11.097	0.006*	3.641	1.331; 9.961	0.012*
Setting	Urban	38	18.36	1			1		
	Rural	19	19.79	1.275	0.447; 3.639	0.649	0.949	0.159; 5.673	0.954
Accredited health center	Yes	24	16.67	1			1		
	No	33	20.75	1.47	0.57; 3.794	0.426	1.074	0.538; 2.146	0.839
Size of team	<=12	11	21.15	1			1		
	13–27	27	17.31	0.642	0.243; 1.701	0.373	1.237	0.40; 3.826	0.712
	>27	19	20.00	0.976	0.343; 2.777	0.964	6.326	1.087; 36.814	0.040*
Assigned population	<=9172	9	25.00	1			1		
	9173–21,343	36	21.18	0.712	0.253; 2.002	0.519	0.602	0.161; 2.256	0.452
	>21,343	12	12.37	0.382	0.123; 1.099	0.074	0.107	0.017; 0.688	0.019*
Postgraduate training in Family Medicine	Yes	15	11.90	1			1		
	No	42	23.73	2.595	1.335; 5.045	0.005*	1.825	0.82; 4.059	0.140
Age of physician (yrs)	<=52	8	11.27	1			1		
	53–58	28	18.06	2.529	1.01; 6.328	0.047*	1.607	0.569; 4.536	0.370
	>58	21	27.27	3.877	1.628; 9.235	0.002*	2.423	0.751; 7.823	0.139
Gender of physician	Female	18	14.06	1					
	Male	39	22.29	2.082	0.933; 4643	0.073			
Gender of patient	Female	34	20.12	1					
	Hombre	23	17.16	0.802	0.302; 2.131	0.658			
FP- patient dyads	Female physician – Female patient	12	18.18	1			1		
	Female physician – Male patient	6	9.68	0.5	0.135; 1.859	0.301	0.523	0.142; 1.924	0.329
	Male physician – Female patient	22	21.36	1.551	0.57; 4.222	0.390	1.631	0.56; 4.749	0.370
	Male physician - Male patient	17	23.61	1.576	0.477; 5.202	0.455	1.315	0.375; 4.611	0.668

* Statistically significant.

Table 6
Adjusted proportion of variables "Consideration of tobacco as most important risk factor", "Ordering of spirometry", "COPD as most likely diagnosis", and "Referral to specialist level" by patient gender and physician gender.

Consideration of tobacco as most important risk factor			
	Female	Male	p
Female physician	67.1	95.6	0.000*
Male physician	62.5	79.8	0.012*
P	0.591	0.002	
Ordering Of spirometry			
	Female	Male	p
Female physician	55.5	68.2	0.159
Male physician	46.8	68.1	0.019*
P	0.425	0.989	
Copd as most likely diagnosis			
	Female	Male	p
Female physician	49.9	84.4	0.000*
Male physician	57.8	78.5	0.001*
P	0.334	0.440	
Referral to specialist			
	Female	Male	p
Female physician	16.4	8.7	0.189
Male physician	20.6	22.5	0.820
P	0.509	0.059	

* Statistically significant.

($p = 0.002$) but there was no difference for the woman. Hence, this superior practice of the female FPs would only benefit males, with anamnesis for tobacco in almost 96% of the cases. Numerous studies have indicated that female FPs are more likely than male FPs to implement preventive recommendations for health problems suffered by women, but less consistent findings have been reported for health problem that affect both genders. Very little evidence is available on interactions between the gender of the physician and the gender of the patient [10].

There was also interaction in the referral to a specialist, which was the same between male and female FPs for the woman ($p = 509$) but differed for the man, who was more frequently referred by male versus female FPs ($p = 0.059$). A previous study in the same population found no differences in referral between male and female physicians but reported a lower referral rate for female patients overall and in 52% of specialties [26].

A study strength is our analysis of the decision making of FPs with the aim of determining the role of the gender of professionals and the gender of patients, controlling for the effect of certain FP and HC characteristics. The absence of data from real practice may be a study limitation, although vignettes are a widely accepted research methodology and evaluate care quality more accurately in comparison to reviews of clinical records [27], This approach has proven useful to identify gender inequalities in healthcare [24,28,29].

Further research is warranted to examine the reasons for these gender inequalities and to explore gender differences in etiology, symptoms, and treatment effectiveness [4,30]. It would also be of interest to investigate the effects on diagnostic and therapeutic efforts of other potential sources of inequality, including socio-economic level, sexual orientation, ethnicity, or age. Finally, it is essential to improve medical education on the impact of tobacco and disease in females [31].

There appear to be gender inequalities in the approach to COPD in our setting, with lower diagnostic and therapeutic efforts in female patients [2,3,21,32]. Some differences between male and female physicians were only observed for the male patient, evidencing FP gender-patient gender interaction.

Conflicts of interest statement

None conflicts of interest.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.rmed.2016.03.017.

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