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Primary prevention of cardiovascular disease: More patient gender-based differences in risk evaluation among male general practitioners

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Abstract

Objective: Our objective was to analyse general practitioner (GP) cardiovascular risk assessment of patients for primary prevention while considering the gender of both the GP and the patient.

Methods: This study consisted of an observational survey of GPs who were internship supervisors in the Paris metropolitan area. Each of 52 volunteer GPs completed a self-administered questionnaire regarding their own characteristics and randomly selected 70 patients from their patient list. Dependent variables from the patient files included the presence of information about risk factors necessary to assess the patient's cardiovascular risk according to the French scale and the Systematic COronary Risk Evaluation (SCORE) scale. Analyses used mixed logistic models with a random intercept and adjusted for patient and physician characteristics.

Results: Both cardiovascular risk scales could be assessed less frequently in women than in men (odds ratio (OR) = 0.64 (95% confidence interval (CI): 0.5–0.8) for the French scale and OR = 0.63 (95% CI: 0.5–0.8) for the SCORE scale). These gender differences were less substantial when the patients were seen by female (for the SCORE scale OR = 0.72 (95% CI: 0.5–1.01)) compared with male physicians (OR = 0.56 (95% CI: 0.4–0.7)). The patients who were least well assessed for cardiovascular risk were women seen by male physicians.

Conclusion: Even before the onset of cardiovascular disease, women patients receive less satisfactory preventative management than men do, and these differences are even more marked when the physician is a man. More attention to the influence of gender stereotypes is needed in medical training in order to combat the inequalities that they cause.

Keywords
Gender, primary prevention, risk factor

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Introduction

Cardiovascular mortality has been decreasing in developed countries since the 1980s.[1,2] More than half of this diminution (44–76%,according to country) is attributable to improved prevention.[3–5] This decrease does not benefit all groups equally; in particular, it affects men more than women.[6,7] Secondary cardiovascular prevention (i.e., after a first cardiovascular event) is more frequent for men: their risk factors are monitored better than those of women.[8–12] Most cardiovascular events, however, occur in people without known cardiovascular disease (88% in France[13]). To our knowledge, only one study has examined gender

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differences exclusively for primary prevention of cardiovascular diseases; it reported results that differed according to the preventative procedures considered.[14]

The first stage of cardiovascular disease prevention for any patient is an assessment of his or her risk based on different risk factors.[15,16] The first stage of the primary prevention of cardiovascular disease is thus an assessment of the patient's risk, based on various risk factors. At this initial stage, it may be that prevention is practiced differentially according to the patient's gender, as it is for secondary prevention (i.e., less often for women).

Moreover, primary prevention is performed primarily by general practitioners (GPs) or family practitioners,[15] and their preventative practices vary according to gender.[12,17,18] In the cardiovascular domain, as in many preventative areas, women GPs screen and monitor their patients' cardiovascular risk factors better than men GPs do.[10,12,19] The association between a patient's gender and cardiovascular risk assessment may therefore differ according to the GP's gender. Recent studies indicate that some GPs' practices differ according to whether or not they are the same gender as the patient.[17,18,20] Diet and lifestyle advice is better understood by patients with hypertension who are the same gender as their GP.[21]

Our objective in this study was to consider the gender of both the GP and the patient in analysing GPs' cardiovascular risk assessment of patients for primary prevention.

Methods

Design

This study is an ancillary analysis of data from an observational survey named Prev Quanti,[22,23] which was initially designed to examine social inequalities in preventative care (screening for breast, cervical and colorectal cancer, tobacco and alcohol consumption and cardiovascular risk) provided by GPs. In order to have a sample size large enough to be able to study the cancer screening tests recommended for patients aged 50–74 years and still be able to analyse young patients at low cardiovascular risk, we chose to include only patients aged 40–74 years. A power calculation determined that we would require 50 GPs and 70 patients per GP to be able to demonstrate social gradients for the types of preventative care studied. The Prev Quanti study was conducted in 2008–2009 among GPs who supervised students training in general practice during an internship at their office. We used email and telephone calls to recruit GPs among the 215 who were working with two medical school departments of general practice in the Paris metropolitan area (each was paid €300 for work estimated to take approximately 10 hours). Recruitment stopped when 50 GPs had agreed to participate. We randomly selected a sample of 35 men and women aged 40–74 years from each GP's patient list (patients who had reported them to be their regular GP), furnished by the national health insurance fund. There were no exclusion criteria.

GPs' characteristics

We used a self-administered questionnaire to collect the GPs' demographic characteristics, the organisation of their office hours (in particular, mean duration of consultations, mean number of consultations weekly and office location (inside/outside Paris city limits)) and their medical training.

Patients' characteristics

Patients' medical characteristics were extracted from their medical files with a data collection template and included gender, age, number of consultations during the past year, length of doctor–patient relationship, history of diabetes and the standard cardiovascular risk factors (personal and family history of cardiovascular disease, smoking status and the date and values of the last measurements of blood pressure, fasting blood glucose and cholesterol).[15,16]

The patients' social and economic characteristics were also collected with a self-administered questionnaire that was mailed to their home by their GP. These included educational level and coverage by special subsidised medical insurance for extremely low-income individuals and their families (couverture médicale universelle (CMU)).

Statistical analysis

We analysed seven dependent variables from the patient files that were relevant to cardiovascular risk assessment. The first five were the presence of information regarding the risk factors necessary to assess the patient's risk (family cardiovascular history, smoking status and measurements within the past 3 years for blood pressure, fasting blood glucose and cholesterol). The other two dependent variables were the presence of data to complete two different cardiovascular risk assessment scales: the French scale[16] (the number of cardiovascular risk factors presented by a patient) and the Systematic COronary Risk Evaluation (SCORE) scale[15] (from a model of the probability of a fatal cardiovascular event in the next 10 years, again based on the patient's cardiovascular risk factors). The risk assessment could be performed with the French scale if all five of the factors mentioned above were included in the record; an assessment with the

Table 1. Characteristics of male and female physicians ($n = 52$).

Characteristic		Male physicians ($n = 33$)%[a]	Female physicians ($n = 19$)%[a]	p-value
Age (years)	≤50	18.2	31.6	0.8
	50–60	57.6	52.6	
	>60	24.2	15.8	
Office location	Paris	59.6	85.6	<0.0001
	Suburb	40.4	14.4	
Mean duration of consultations (minutes)	≤20	78.8	47.4	0.02
	>20	21.2	52.6	
Mean number of consultations weekly	50–70	12.1	42.1	0.4
	70–100	57.6	36.8	
	>100	30.3	21.1	

[a]No missing value.

SCORE scale was possible if the file listed smoking status, blood pressure and cholesterol level.

Patients with a history of cardiovascular disease (patients in secondary prevention) or diabetes (the SCORE scale was not applicable and different cardiovascular prevention procedures were used for these patients) were excluded from the analysis.

The associations between the patient's gender and the dependent variables were estimated: 1) in all patients, regardless of the GP's gender (pooled analyses); 2) by stratifying the patient sample according to the gender of each patient's GP (stratified analyses), with male patients as the reference group; and 3) by comparing the four types of physician–patient pairs (male physician–male patient, male physician–female patient (reference), female physician–male patient, female physician–female patient) (pairwise analyses).

Mixed logistic models with a random intercept were used for these analyses, adjusted for patient and physician characteristics known to be associated with prevention. For the patients, the characteristics taken into account were age (continuous),[24,25] educational level (less than baccalaureate (i.e., did not pass the high school leaving examination), baccalaureate or at least some university),[26] number of consultations annually (0, 1–2 or >3),[24,27] duration of physician–patient relationship (0, 1–2 or >3 years) and CMU coverage.[25] The adjustment factors for physicians were age (<50, 50–60 or >60 years),[28] mean duration of consultations (≤20 or >20 minutes), mean number of consultations weekly (50–70, 70–100 or >100)[24] and office location (Paris vs. suburb).[24]

The statistical analyses were performed with SAS software v.9.3. The advisory committee on the treatment of health research data (Comité Consultatif sur le Traitement de l'Information en matière de Recherche dans le domaine de la Santé (CCTIRS)) approved the study, and all patients provided written informed consent.

Results

Description of GPs

The first 52 GPs who volunteered to participate were included in the study. Their mean age was 55 years (SD = 6), and 63% were men (Table 1). The mean duration of consultations was 21 minutes (SD = 4.8), and physicians saw 92 (SD = 23) patients weekly on average. Table 1 lists the GP characteristics used for the adjustments. Women physicians had longer patient visits and more frequently had offices within the city limits of Paris than their male colleagues. The other GP characteristics have been reported elsewhere[22,23] and do not differ between men and women GPs.

Description of patients

For the 3640 randomly selected patients, the return rate for physician questionnaires was 98.8% ($n = 3600$), while the patient participation rate was 71.5% ($n = 2605$). Data were collected from both patient and physician for 71.4% ($n = 2599$) of the patients included. Patients with a history of cardiovascular disease ($n = 253$) and diabetes ($n = 281$) were excluded from the analysis. Finally, our sample comprised 2262 patients, with a mean age of 53.9 years (SD = 9.3) that was similar for men and women (Table 2). Women saw their doctors more often and more frequently lived with a partner than men did.

Patient gender-related differences

In the pooled analyses, smoking status information and blood glucose and cholesterol measurements were

Table 2. Characteristics of male and female patients ($n = 2262$).

Characteristic		Male patients ($n = 1014$)		Female patients ($n = 1248$)		
		n	%	*n*	%	*p*-value
Physician sex	Male	622	61.3	778	62.3	0.63
	Female	392	38.7	470	37.7	
Number of consultations annually	<1	167	16.5	233	18.7	0.0005
	1–2	409	40.3	405	32.5	
	≥3	438	43.2	610	48.8	
Duration of physician–patient relationship (years)	<1	86	7.4	88	5.7	0.03
	2–5	635	63.9	744	60.9	
	>5	293	28.7	416	33.4	
Educational level	University year 1–2	110	11.0	159	13.0	0.09
	Passed 'bac'[a]	296	29.7	398	32.5	
	University year 3–4	589	59.1	669	54.6	
CMU coverage[b]	Yes	81	8.0	61	4.9	0.003
	No	933	92.0	1187	95.1	

[a]'bac' is the baccalaureate examination for leaving secondary school.
[b]Couverture Médicale Universelle (CMU) is the special government health insurance for very-low-income people.

reported less often in the files of female patients (Table 3). Both cardiovascular risk scales could be assessed less frequently in women than in men (odds ratio (OR) = 0.64 (95% confidence interval (CI): 0.5–0.8) for the French scale and OR = 0.63 (95% CI: 0.5–0.8) for the SCORE scale).

In the stratified analyses, the associations between the dependent variables (information regarding risk factors and ability to calculate cardiovascular risk with the two scales) and the patient's gender differed according to the GP's gender. The associations for male GPs were the same as in the pooled analyses (with a slightly wider amplitude). When the GP was a woman, the association of these variables according to the patient's gender differed only for smoking status, which was reported significantly less often for women patients.

Physician–patient pairs

Information regarding risk factors was regularly less available in the medical files of women patients of male GPs. Similarly, cardiovascular risk assessment for both scales could be performed significantly less often for women seeing male physicians (Table 4).

Compared with the other combinations, information regarding cardiovascular risk factors was found least frequently in the reference pair of a male physician and a female patient (Table 4). Accordingly, use of a scale to assess this risk was least frequently possible in this reference pair.

Discussion

Main findings

In our sample, the cardiovascular risk assessment of patients for primary prevention was poorer for women patients. It was less often possible to assess cardiovascular risk for women compared with men from information in their medical files. These gender differences were less substantial when the patients were seen by female compared with male doctors. The patients who were least well assessed for cardiovascular risk were women seen by male doctors.

Interpretation

These disparities by patient gender are similar to those observed for secondary prevention, as we expected. Accordingly, although the guidelines offer no indication that screening for risk factors for cardiovascular disease should differ according to patient gender, it appears that GPs are more attentive to these factors in their male patients. This practice probably relies on an epidemiologic reality: cardiovascular disease is more frequent among men,[29,30] who are also more likely than women to adopt risk behaviours (smoking and alcohol consumption).[31] Nonetheless, today, the behaviour of men and women, especially in relation to smoking, is growing more similar.[31]

The patient gender differences for cardiovascular risk assessment also vary according to the doctor's gender: male GPs appear to have more gender-based

Table 3. Patient gender differences in cardiovascular risk evaluation, with and without stratification for general practitioners' gender ($n = 2124$).

	All physicians				Male physicians				Female physicians			
	Male patients ($n = 1014$)%	Female patients ($n = 1248$)%	OR[a] (reference = men) (95% CI)	*p*-value	Male patients ($n = 618$)%	Female patients ($n = 772$)%	OR[a] (reference = men) (95% CI)	*p*-value	Male patients ($n = 391$)%	Female patients ($n = 468$)%	OR[a] (reference = men) (95% CI)	*p*-value
Presence of information about the risk factors												
Family cardiovascular history	99.3	99.6	1.90 (0.61–6.32)	0.26	99.2	99.6	1.38 (0.33–5.72)	0.65	99.5	99.6	0.63 (0.12–4.03)	0.63
Smoking status	57.2	45.5	**0.56 (0.51–0.72)**	**<0.001**	53.8	41.9	**0.53 (0.42–0.74)**	**<0.001**	62.6	51.5	**0.58 (0.43–0.81)**	**0.0007**
Blood pressure measurement[b]	78.1	81.9	1.11 (0.92–1.44)	0.35	76.1	78.0	1.00 (0.83–1.34)	0.99	81.3	88.3	1.38 (0.94–2.13)	0.13
Fasting blood glucose measurement[b]	48.9	45.4	**0.80 (0.72–0.97)**	**0.02**	49.4	42.9	**0.72 (0.62–0.93)**	**0.007**	48.1	49.6	0.93 (0.74–1.32)	0.64
Cholesterol measurement[b]	46.6	41.7	**0.71 (0.63–0.92)**	**0.0004**	48.5	41.0	**0.62 (0.51–0.84)**	**0.0001**	43.5	43.4	0.83 (0.63–1.11)	0.24
Cardiovascular risk assessment												
French scale	22.5	16.5	**0.64 (0.53–0.83)**	**0.0001**	22.2	13.9	**0.52 (0.42–0.74)**	**<0.001**	23.0	20.7	0.80 (0.64–1.12)	0.22
SCORE scale	25.6	19.0	**0.63 (0.51–0.84)**	**<0.0001**	25.2	17.0	**0.56 (0.41–0.72)**	**<0.001**	26.1	22.2	0.72 (0.53–1.01)	0.06

[a]Adjusted for patient variables (age, number of consultations annually, duration of physician–patient relationship (years), educational level and CMU coverage) and for physician variables (age, office location, mean duration of consultations (minutes) and mean number of consultations weekly). The unadjusted ORs, which are not presented, are very close to the adjusted ORs.
[b]Measurement within the past 3 years.
OR: odds ratio; CI: confidence interval; CMU: couverture médicale universelle; Score: Systematic COronary Risk Evaluation.

Table 4. Differences in cardiovascular risk assessment according to the *gender* composition of physician–patient pairs ($n = 2124$).

	Gender composition of the physician–patient pairs	%	OR[a] (95% CI)	*p*-value
Presence of information about the risk factors				
Family cardiovascular history	M/M	99.2	1.82 (0.39–8.51)	0.71
	M/F	99.6	1	
	F/M	99.5	0.75 (0.10–5.79)	
	F/F	99.6	0.66 (0.09–5.09)	
Smoking status	M/M	53.8	1.87 (1.46–2.39)	<0.0001
	M/F	41.9	1	
	F/M	62.6	3.77 (1.88–7.57)	
	F/F	51.5	2.25 (1.13–4.84)	
Blood pressure measurement[b]	M/M	76.1	1.06 (0.79–1.40)	0.06
	M/F	78.0	1	
	F/M	81.3	1.43 (0.77–2.68)	
	F/F	88.3	2.19 (1.17–4.13)	
Fasting blood glucose measurement[b]	M/M	49.4	1.41 (1.12–1.77)	0.01
	M/F	42.9	1	
	F/M	48.1	1.50 (1.03–2.17)	
	F/F	49.6	1.51 (1.06–2.17)	
Cholesterol measurement[b]	M/M	48.5	1.56 (1.24–1.98)	0.003
	M/F	41.0	1	
	F/M	43.5	1.40 (0.91–2.16)	
	F/F	43.4	1.30 (0.85–1.99)	
Cardiovascular risk assessment				
French scale	M/M	22.2	1.88 (1.39–2.56)	0.0004
	M/F	20.7	1	
	F/M	13.9	2.31 (1.33–4.00)	
	F/F	23.0	2.00 (1.16–3.44)	
SCORE scale	M/M	25.2	1.77 (1.33–2.35)	0.0002
	M/F	22.2	1	
	F/M	17.0	2.20 (1.30–3.73)	
	F/F	26.1	1.71 (1.01–2.30)	

Numbers in pair sets: M/M = 622; M/F = 778; F/M = 392; F/F = 470.

[a]Adjusted for patient variables (age, number of consultations annually, duration of physician–patient relationship (years), educational level and CMU coverage) and for physician variables (age, office location, mean duration of consultations (minutes) and mean number of consultations weekly). The unadjusted ORs, which are not presented, are very close to the adjusted ORs.

[b]Measurement within the past 3 years.

OR: odds ratio; CI: confidence interval; F: female; M: male; CMU: couverture médicale universelle; Score: Systematic COronary Risk Evaluation.

practices in this area than their female colleagues. To our knowledge, no previous study has observed such findings. The association between patient gender and cardiovascular prevention has generally been studied in non-stratified analyses that do not allow the effect of the GP's gender on the monitoring of patients' risk factors to be studied. We attribute our results in part to physicians interpreting guidelines differently according to their gender. We think that women GPs follow guidelines more routinely and thus are less subject to variations in practice, especially according to their patients' gender. This supposition is based on sociological findings that, both at work and at school, women have a propensity to be more 'conformist'[32] than men, an attitude that we can consider to be socially constructed.[33]

Finally, the fact that women patients treated by male physicians receive the least effective primary cardiovascular prevention can be interpreted as the combined effect of three levels of inequality due to gender in the physician–patient pair: the unfavourable effect of being a female patient; the unfavourable effect a male

physician; and the unfavourable effect of discordance between the patient's and doctor's gender. Women seen by male doctors are subject to all three levels of inequality.

Limitations and strengths

One of the limitations of our study is that our sample of physicians is not representative of the population of French GPs. All participating doctors volunteered for the study, practice in the Paris metropolitan area and are associated with a medical school. We have no data that enable us to compare the participating physicians to other GPs supervising in the same medical school departments, but the characteristics of our sample are similar to those of French GPs in terms of age, gender and type of practice (solo/group).[34] Moreover, recent data show that internship supervisors are not very different from other GPs in terms of either demography or practices.[35] Nevertheless, because of their association with a medical school and their agreement to participate in a study about prevention, the doctors in our sample might follow preventative guidelines more closely and be more systematic in their preventative practices than the average physician. Accordingly, the cardiovascular risk assessment we measured may be overestimated, while the patient gender-related differences observed for this assessment may be underestimated.

Another limitation is that our sample included a relatively small number of GPs and substantially more were men than women. In mixed models, power depends first on the number of level 2 subjects (the physician level in our case). Accordingly, the lack of significance of the associations between the dependent variables (except for smoking) and patient gender in the group of women GPs may be linked to inadequate power in this stratum. Although we cannot rule out the possibility of gender differences in cardiovascular risk assessment among women GPs, the lower amplitude of the ORs observed in this stratum compared with that of male GPs suggests that the male GPs' practices, compared with those of women, are more unfavourable to their patients. We tested the cross-level interactions (patient's sex and physician's sex), as shown in Table 3. None were significant (results not presented). The interaction observed in our stratified analyses of physicians' gender should thus be confirmed by a sample including more physicians and thus providing more statistical power. Another strength of our study is that we studied each risk factor separately before the global analysis, as recommended. This made it possible to point out that these gender differences are systematically unfavourable to women for each individual risk factor, not only globally.

Implications for practice and research

Our study shows that even before the onset of a cardiovascular disease, women patients receive less satisfactory preventative management than men do, as already shown at subsequent stages of cardiovascular risk management (at the moment of a cardiovascular event or for secondary prevention). Nonetheless, it appears that these differences are still more marked when the physician is a man. Although the increasing percentage of women doctors[36,37] will have a favourable impact on these gender differences, doctors need to be more aware that their own personal characteristics (and not only those of their patients) influence their practices. More attention is needed in medical training on the influence of gender stereotypes in order to combat the inequalities that they cause.

It would be interesting to test whether gender differences exist at the subsequent stages of therapeutic management in primary prevention (lifestyle and diet advice, medication, etc.) and whether the GP's gender also plays an important role there. Finally, our study should be repeated within a few years to examine any changes over time in these gender differences and monitor their reduction.

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