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Patients' estimations of the importance of preventive health services: a nationwide, population-based cross-sectional study in Portugal

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ABSTRACT

Objectives: To determine, in the context of primary care preventive health services, the level of importance that Portuguese patients attribute to different preventive activities.

Design: Cross-sectional study.

Setting: Primary Health Care, Portugal.

Participants: 1000 Portuguese adults selected by a stratified cluster sampling design were invited to participate in a computer-assisted telephone survey. Persons with a cognitive or physical disability that hampered the ability to complete a telephone interview and being a nursing home resident or resident in any other type of collective dwelling were excluded.

Outcomes: Mean level of importance assigned to 20 different medical preventive activities.

Results: The mean level of importance assigned to medical preventive activity was 7.70 (95% CI: 7.60 to 7.80). Routine blood and urine tests were considered the most important, with an estimated mean of 9.15 (95% CI: 9.07 to 9.24), followed by medical activities exclusively for women (Pap smear, mammography, and gynecological and breast ultrasounds), with mean importance ranging from 8.45 (95% CI: 8.23 to 8.63) to 8.56 (95% CI: 8.36 to 8.76). Advice regarding alcohol consumption (6.18; 95% CI: 5.96 to 6.39) and tobacco consumption (5.99; 95% CI: 5.75 to 6.23) were considered much less important.

Conclusions: Portuguese patients largely overestimate the importance of preventive medical activities. Family physicians should be aware of these optimistic expectations, because this can influence the doctor-patient relationship when discussing these interventions and incorporating personalized risk. Patients and physicians should receive accurate information on the benefits, harms, and limitations of medical interventions to be able to participate in

shared decision making. Health systems must make an effort to counter this perception of importance.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- Nationwide cross-sectional study with a representative sample of 1000 Portuguese adult general population.
- Wide range of medical preventive activities was considered.
- Evidence that Portuguese patients largely overestimate the importance of preventive medical activities.
- The response rate was 55%, which may be considered low.
- Self-reported bias.
- The quota-sampling scheme may have inherent limitations.

INTRODUCTION

The growing importance attributed to clinical prevention encourages family physicians (FPs) to recommend screening and preventive interventions to their patients, who were also encouraged to participate in a range of national screenings.[1] Despite the benefits of some of these interventions, the individual assessment of the potential benefits and risks wasn't taken into account and many of these medical tests are prescribed to people who are healthy or have some risk factors.[2] Advances in technology, the increasing number of medical tests available for doctors and patients, the cultural belief that more is always better, and some disease-mongering strategies have led preventive medicine to a point where the probability of causing more harm than good is raising great concern.[2-5] The excessive and unnecessary prescription of medical tests has important economic and ethical aspects in current clinical practice.[2, 5, 6]

Patients tend to overestimate the benefits achieved by screening and preventive treatments;[1, 7, 8, 9] patients also tend to undergo some tests, e.g., cancer screening tests, more often and at younger ages than the scientific evidence recommends.[2, 10] Perhaps this happens because of increased social expectations to have a long and healthy life and patients and physicians are inundated with advice on how to live healthier and longer lives.[11]

In Portugal, the vast majority of the adult population considers a great number of medical tests necessary on a nearly annual basis, and most of the population say that receives those tests.[2] The same study also shows that patients' perceptions of required medical testing are far from what the scientific evidence recommends. Portuguese patients do not show a capacity for discriminating between medical tests that are performed on evidence-based recommendations and those that are not.[2]

Many strategies are intended to improve the quality of medical test prescriptions but are based only on the doctor's actions, ignoring both the evolution of the medical consultation into a shared decision-making process [12] and the patient's expectations and beliefs.[13]

We believe that the development of educational interventions aiming to inform populations about the real impact and adequacy of certain healthcare services is crucial to promote the implementation of preventive services that may positively impact each patient's health.[2] In this context, it is vital to understand how patients determine the value of medical tests.

The aim of this study was to determine—in the context of primary care preventive health services— the level of importance that Portuguese patients attribute to different preventive activities.

MATERIALS AND METHODS

Study design

A nationwide cross-sectional study was conducted, in a representative sample of the Portuguese adult general population, using computer-assisted telephone interviews (CATIs) for data collection.

Participant selection criteria

The defined target population was the Portuguese adult general population, and the available population included adult individuals living in Portuguese households with a landline telephone (sampling frame). Eligible adults were aged 18 years and older and lived in a household (private dwelling) with a landline telephone. The exclusion criteria were: having a cognitive or physical disability that hampered the ability to complete a telephone interview, being a nursing home resident or resident in any other type of collective dwelling, and refusal to give informed consent for study participation.

Survey sampling methods

To obtain a representative sample of the Portuguese general adult population, a stratified cluster sampling design was used. First, all counties were used as natural strata; in each county, a random sample of households with landline telephone numbers was selected with a probability proportional to the county population size, as estimated by the national census. Next, one eligible resident was randomly selected in each household based on birth dates (last birthday in the household was selected). Target quotas were set for age and sex strata in each geographical region, to account for the likelihood of being available at home for the interview and to correct the common overrepresentation of females and respondents from older age groups in telephone surveys.[14-16]

A comprehensive set of measures were implemented to prevent non-response and non-response bias. These included: (1) appropriate selection and specific training of interviewers; (2) an introductory presentation as the initial part of household contacts, specifically aimed at capturing participants' attention, obtaining their informed consent, and facilitating participation; and (3) standard operational procedures for contacts and call-backs in case of failed contacts, systematically including eight attempts in different days and at different times of the day. Additionally, to correct for sample imbalances and partially adjust prevalence estimates for selection bias, a set of weighting procedures were implemented.[14-16] Two types of weights were used: (1) weights adapted to the sampling design (stratification and clustering), adjusting for different probabilities of selection among respondents, and (2) post-stratification weights, taking into account population distributions by geographical region of residence, gender, and 5-year age categories, based on the Portuguese National Census.[17]

Quality control

The interviewers were experienced and adequately trained and prepared for the application of the study questionnaire. A pilot run of 100 interviews was performed to assess the time needed for questionnaire completion, language, and comprehension issues. A second pilot run was performed during the first 50 interviews. All interviews were supervised by a data collection supervisor; at least 20% of the interviews were randomly supervised by a study coordinator.

Sample size

Sample size was determined to estimate proportions with an expected margin of error of 4% (assuming a design effect of 1.5) and an intended confidence level (CI) of 95%. Based on these assumptions, a sample of at least 1,000 adults from the general population was required.

Instruments and methods for data collection

Data collection was performed from 16th February 2011 to 11th May 2011, using CATIs. A structured questionnaire containing four sections was used: (1) an introductory section that presented the study aims and motivation; (2) a section that contained questions about the health status of the interviewees; (3) the main research section; and (4) a socio-demographic data collection section.

The main research section had two major parts: the first part asked about what medical tests patients deemed necessary and how often (the results of which are already published [2]) and the second part asked, “What level of importance do you attribute to each of the following medical activities on a scale of 1 to 10, 1 corresponding to “no importance for you and your health” and 10 "very important”” regarding the following 20 medical interventions: blood test for cholesterol levels; counseling on weight; blood pressure evaluation; blood test for fasting glucose levels; being asked about smoking habits; fecal occult blood test (FOBT); chest X-ray; tetanus vaccine; routine blood and urine tests (“general analysis” is a popular expression in Portuguese in periodic health examinations or routine health checks and usually includes urinalysis, blood tests for complete blood count, glucose, total and HDL cholesterol, triglycerides, hepatic enzymes, and creatinine),[2] receiving advice on healthy eating; being asked about their alcohol consumption habits; total colonoscopy; thyroid ultrasound; abdominal ultrasound; the male-specific interventions of prostate ultrasound and prostate-specific antigen test; and the female-specific interventions of mammography, breast ultrasound, gynecological ultrasound, and Pap smear. In this article we report only about the levels of importance attributed to each test.

The interviewers were trained to clarify the meaning of each medical test to ensure that participants correctly understood all of the questions.

Statistical analysis

Statistical analysis was performed using the Statistical Package for the Social Sciences, Version 19.0 for Windows (SPSS®). All the presented prevalence estimates were calculated, after accounting for the sampling design and the appropriate weights described above, using the Complex Samples module of SPSS® 19.0. Point estimates and 95% CI are presented for all prevalence estimates.

Descriptive statistics are presented as absolute frequency (number) and relative frequency (percentage) for categorical variables, and as mean and standard deviation (SD) for continuous variables. When testing hypotheses regarding continuous variables, parametric tests (Student's t-test and one-factor analysis of variance (ANOVA)) were used, accounting for normality assumptions and the number of groups compared.

Whenever statistical hypothesis testing was used, a significance level of α =5% was considered.

Ethical considerations

This study was approved by the São João Health Centre Medical Ethics Committee. Participants provided their verbal informed consent at the beginning of the telephone interview. Written consent was not obtained because interviews were conducted by telephone, without the physical presence of the participants. Participants were informed about the estimated duration of the interview and voluntary participation was emphasized; participants were informed that they could interrupt their participation at any moment of the interview. The interviews were not recorded and participants did not receive any kind of compensation. As a measure to standardize the process of obtaining informed consent, interviewers were specifically trained and required to read a standardized text and the interview began only after patient consent. This obtaining of consent procedure was approved by the São João Health Centre Medical Ethics Committee.

RESULTS

From a total of 2945 randomly selected households, 1,804 households contained eligible individuals. From the total number of households with eligible individuals, 804 of the selected individuals refused to participate. We obtained 1,000 valid interviews, corresponding to a response rate of 55%. The mean duration of the interview was 18 minutes. Respondents were between 18 and 97 years old; 520 were women and 480 were men. Table 1 presents the sample's demographic characteristics.

Table 1 shows that 58.9% of the respondents considered themselves to have a good to excellent health status. The self-reported prevalence in our sample was 25.0% for hypertension, 24.3% for hypercholesterolemia, 6.6% for diabetes, 10.4% for heart problems, 9.6% for asthma and/or COPD, 13.6% for depression, and 3.0% for cancer.

Table 1. Study sample demographic characteristics and Self-perceived health status, medical conditions, and risk factors.

	% respondents	Unweighted Count
Age (years) (Mean: 45; Range: 18–97)		
From 18 to 29	26.7%	233
From 30 to 39	17.6%	184
From 40 to 49	16.4%	169
From 50 to 59	14.1%	145
From 60 to 69	12.6%	131
From 70 to 79	9.2%	96
80 or more	3.4%	42
Gender	Male: 47.8%	480
	Female: 52.2%	520
Geographic distribution (NUTS* II)		
North	35.6%	348
Center	23.3%	230
Lisbon	26.4%	262
Alentejo	7.8%	78
Algarve	3.6%	38
Madeira	1.7%	22
Azores	1.6%	22
Marital status		
Single	34.5%	321
Married	56.0%	560
Married but legally separated	0.8%	8
Divorced	2.7%	31
Widowed	6.1%	77
Highest level of education completed		
None	2.8%	35
Primary, 1st cycle	23.7%	250
Primary, 2nd cycle	7.0%	72
Primary, 3rd cycle	17.9%	171
Secondary education	23.4%	220
Post-secondary education	3.7%	33
Higher Education, Bachelor	2.1%	21
Higher Education, Graduation	16.6%	167
Higher Education, Masters	2.1%	23
Higher Education, PhD	0.6%	6
Professional occupation		
Has a profession	53.3%	534
Student	11.7%	96
Homemaker	7.0%	74
Retired	21.8%	234
Unemployed	6.3%	60
Residence location		
Urban	55.3%	559
Rural	44.7%	441
Health status (In general, would you say your health is:)		
Excellent	10.9%	107
Very good	15.3%	139
Good	32.7%	326
Fair	30.4%	314
Poor	10.8%	114
Medical conditions and risk factors		
Hypertension	25.0%	246
Elevated cholesterol	24.3%	270
Diabetes	6.6%	76
Heart problems	10.4%	109
Osteomuscular pain	58.6%	585

Asthma and/or COPD**	9.6%	101
Gastritis or peptic ulcer disease	11.2%	122
Anxiety	37.9%	378
Depression	13.6%	141
Overweight or obesity	26.0%	260
Smoker	17.3%	183
Cancer	3.0%	34
I am healthy, I don't have any disease	15.9%	158

*NUTS: Nomenclature of Territorial Units for Statistics
**COPD: chronic obstructive pulmonary disease

The mean level of importance assigned to different medical preventive activities was 7.70 (95% CI: 7.60 to 7.80; Table 2). The medical activity that patients considered most important was routine blood and urine tests, with a mean importance of 9.15 (95% CI: 9.07 to 9.24); being asked about alcohol consumption (6.18; 95% CI: 5.96 to 6.39) and tobacco consumption (5.99; 95% CI: 5.75 to 6.23) were considered the least important.

Table 2. Mean level of importance that individuals attributed to medical activities, on a scale of 1 to 10; 1 corresponds to "no importance" and 10 to "very important"

Health services	n	Mean estimate	95% CI	
			Lower	Upper
Routine blood & urine tests	988	9.15	9.07	9.24
Pap smear	495	8.56	8.36	8.76
Gynecological ultrasound	500	8.47	8.26	8.68
Breast ultrasound	506	8.46	8.25	8.67
Mammography	505	8.45	8.23	8.66
Cholesterol evaluation	987	8.43	8.31	8.54
Tetanus vaccine	970	8.29	8.16	8.43
Evaluation of glucose	989	8.24	8.12	8.37
Blood pressure evaluation	990	8.17	8.04	8.29
Health eating advice	982	7.91	7.77	8.06
Evaluation of PSA*	476	7.73	7.51	7.94
Prostate ultrasound	476	7.72	7.51	7.94
Lung X-ray	971	7.53	7.39	7.68
FOBT**	954	7.40	7.23	7.56
Abdominal ultrasound	970	7.37	7.21	7.52
Weight advice	979	7.21	7.06	7.36
Total colonoscopy	937	7.17	6.98	7.35
Thyroid ultrasound	940	6.84	6.66	7.02

Alcohol consumption	941	6.18	5.96	6.39
Smoking habits	889	5.99	5.75	6.23
Importance grade average	397	7.70	7.60	7.80

*PSA: prostate specific antigen; **FOBT: fecal occult blood test

For female-specific medical activities (Pap smear, mammography, and gynecological and breast ultrasounds) the attributed level of importance ranged from 8.45 to 8.56 (Table 2); similar estimates of importance were given for the Pap smear and gynecological ultrasound (8.56 *vs.* 8.47) and for breast ultrasound and mammography (8.46 *vs.* 8.45). In contrast, male-specific testing was considered less important: 7.72 and 7.73 for the evaluation of PSA and prostate ultrasound, respectively.

Regarding colo-rectal cancer screening, the level of importance attributed to the FOBT was 7.40 (IC 95%: 7.23 to 7.56) and total colonoscopy 7.17 (95% CI: 6.98 to 7.35; Table 2); colo-rectal cancer screening was considered less important than prostate cancer screening in our sample.

Cardiovascular risk factor screenings (cholesterol evaluation (8.43), evaluation of glucose (8.24), and blood pressure evaluation (8.17)) were considered very important.

Lifestyle measures (advice regarding healthy eating, weight, and alcohol and tobacco consumption) were considered less important than other tests, with scores ranging from 5.99 to 7.91 (Table 2). Advice regarding alcohol consumption and advice regarding tobacco consumption were considered the least important (6.18 and 5.99, respectively).

In Table 3, we made a division: for each specific medical activity, we compared the respondents with declared conditions or risk factors that would justify the importance of that medical test with the responders without conditions or risk factors.

Table 3. Mean level of importance that individuals without risk factors* versus individuals with risk factors* attribute to medical activities, on a scale of 1 to 10; 1 corresponds to "no importance" and 10 to "very important"

Health services	Individuals without risk factors*				Individuals with risk factors*			
	n	Mean estimate	95% CI Lower	95% CI Upper	n	Mean estimate	95% CI Lower	95% CI Upper
Pap smear	471	8.57	8.36	8.78	24	8.27	7.62	8.92
Gynecological ultrasound	404	8.49	8.25	8.72	95	8.39	7.91	8.88
Mammography	428	8.47	8.24	8.69	76	8.33	7.70	8.96
Breast ultrasound	428	8.46	8.24	8.69	77	8.44	7.84	9.04
Cholesterol evaluation	762	8.23	7.98	8.49	217	8.49	8.36	8.61
Evaluation of blood pressure	266	7.74	7.50	7.98	715	8.33	8.19	8.48
Evaluation of glucose	199	7.70	7.40	8.00	781	8.40	8.26	8.54
Prostate ultrasound	459	7.69	7.47	7.91	13	8.34	7.38	9.31
Evaluation of PSA**	459	7.68	7.46	7.91	13	8.56	7.63	9.49
Lung X-ray	825	7.48	7.32	7.63	141	7.88	7.47	8.30
FOBT***	867	7.37	7.20	7.55	82	7.48	6.92	8.05
Abdominal ultrasound	923	7.36	7.20	7.53	41	7.39	6.65	8.14
Thyroid ultrasound	962	6.84	6.66	7.02	9	6.74	5.36	8.11

*For cholesterol evaluation, patients with high cholesterol, diabetes, heart problems, smoking habits, hypertension, obesity (BMI ≥30), or a family history of heart problems were excluded. For evaluation of blood pressure, pa heart problems, obesity (BMI ≥30), smoking habits, hypertension, or a family history of heart problems were excluded. For evaluation of glucose, overweight (BMI ≥25) or obese patients and patients with diabetes, hypertensio diabetes, or high cholesterol were excluded. For Pap smear, patients with a personal or family history of cancer of the cervix, or simply "uterus", were excluded. For gynecological ultrasound, patients with a personal or family breast, uterine, or vulvae cancers were excluded. For breast ultrasound and mammography, patients with a personal or family history of breast or ovarian cancer were excluded. For lung X-ray, patients with a personal or famil cancer were excluded. For evaluation of PSA** and prostate ultrasound, patients with a personal or family history of prostate cancer were excluded. For the fecal occult blood test (FOBT***), patients with a personal or family rectal cancer were excluded. For abdominal ultrasound, patients with a personal or family history of liver or pancreatic cancer were excluded. For thyroid ultrasound, patients with a personal or family history of thyroid cancer **PSA: prostate specific antigen; ***FOBT: fecal occult blood test

Comparing the data of patients with and patients without risk factors, we find similar results (Table 3) except for blood pressure evaluation (7.44 vs. 8.33, p<0.001) and glucose evaluation (7.70 vs. 8.40, p<0.001); these were significantly different between groups. Lung X-ray, abdominal ultrasound, and thyroid ultrasound were similarly important to both groups.

Analyzing only the responders without conditions or risk factors, we verified that the levels of importance attributed to each of the evaluated tests were greater than 6.84 and the results were quite similar to the global group analysis (Tables 2 and 3). The medical activities exclusively for women were considered very important, far above the medical activities exclusively for men. Considering the global results, only blood pressure and glucose evaluation were statistically significantly different: the estimated mean of importance for these tests were 7.74 (95% CI: 7.50 to 7.98) and 7.70 (95% CI: 7.40 to 8.01), respectively).

Figure 1 shows the associations between demographic factors and the importance attributed to different medical activities. The female respondents (p<0.001), the 40 to 79-year age group (p <0.001), the respondents with body mass indices (BMIs) ≥30 (p=0.002), and the respondents with a basic level of education (p<0.001) reported significantly higher importance scores for the medical activities; students (p<0.001) and those respondents who had private health insurance (p<0.001) gave lower importance scores for the medical tests. Regarding the self-reported health status, respondents claiming reasonable and weak health statuses reported significantly higher importance scores for the medical tests/interventions than those claiming a good to optimal health status (p<0.001). There were no statistically significant differences between the rural and urban respondents.

Figure 1. Factors influencing the level of importance attributed to medical activities

In Figure 2, we analyze what importance is attributed to the different medical activities after accounting for self-reported health problems. Having a health problem significantly increases the importance attributed to tests (7.82, 95% CI: 7.72 to 7.93 vs. 6.96, 95% CI: 6.70 to 7.21, p<0.001); the opposite happens if the responder considers himself healthy (p<0.001). Almost all conditions were significantly associated with greater importance attributed to medical activities except asthma and/or COPD, smoking, and cancer.

Figure 2. Medical conditions influencing the level of importance attributed to medical activities

DISCUSSION

These results show that the adult Portuguese population considers different medical preventive activities very important, similar to previous studies in other countries.[1, 7, 9, 10, 18]

In our study, the importance given to preventive activities was very similar between the groups with or without conditions or risk factors; therefore, preventive activities are equally important for all. When analyzing by self-reported illness, we found that having any disease increases the importance attached to all preventive medical activities, except for the smokers and patients with respiratory disease or cancer; therefore, the Portuguese aren't aware of the individualization of risk, they have difficulty recognizing risk factors, and are not aware that not all preventive activities are suited to their situation.

The medical activity that they attribute more importance to is "routine blood and urine tests." This test is very popular among the Portuguese in periodic health examinations or routine health checks and usually includes urinalysis and blood tests for complete blood count, glucose, total and HDL cholesterol, triglycerides, hepatic enzymes, and creatinine.[2] In Portugal, there are no official recommendations for the frequency of adult periodic health examinations, including routine blood tests, but our previous study showed that 99.2% of Portuguese adults believed they should undergo general routine blood and urine tests, with a mean frequency interval of 12 months; 87.4% report that they usually undergo this activity.[2] The patient's perceived need for yearly routine blood and urine tests may be linked to the traditional concept of the yearly periodic health examination and seems to be strongly and culturally rooted in the Portuguese population,[2] but there's little evidence that those visits actually provide some benefit for healthy adults.[19-22]

The Portuguese Ministry of Health recommends the following three cancer screenings: breast cancer screening by mammography every 2 years, for women from 50 to 69 years old; colo-

rectal cancer screening by fecal occult blood test every 1–2 years, for adults from 50 to 74 years old; and cervical cancer screening with Pap smears for women between 25 and 60 years old, every 3 years after 2 annual normal tests.[23]

Our results reveal that the Portuguese are very aware and consider cancer screening very important, similar to other studies.[1, 7, 9, 10, 18] This may be due to the National Cancer Plan, established in Portugal since 1990, with great involvement of FPs and direct-to-consumer marketing, specifically national public health campaigns on screening.

Our patients, however, do not discriminate medical tests that are important due to evidence-based recommendations and those that are not. For example, they attribute similar importance to Pap smears and gynecological ultrasound as to breast ultrasound and mammography; our previous study showed that the majority of Portuguese women consider these four tests on a nearly annual basis.[2] This false idea is the result of the strong message from the massive campaigns women have received for decades that they must have early screening and early detection to increase the likelihood of curing cancer. Physicians, FPs included, also perpetuated this idea after perhaps being encouraged to recommend screening and preventive interventions to their patients by professional guidelines and expert opinion.[1]

Interestingly, men attribute less importance to male-specific exams than female-specific exams, possibly due to lower exposure to such screenings in primary care, having fewer screening tests, and being less familiar with health care; Portuguese women consume more health resources than men. Men, however, attribute the same importance to prostate ultrasounds and evaluation of PSA due to strong advertising campaigns in the past that promised effective prostate cancer screenings, despite how prostate cancer screening has never been officially proposed in Portugal.

Unsurprisingly, colorectal cancer screening is not considered as important as screening for other cancers. Colorectal cancer screening by fecal occult blood test was the last cancer screen

to enter the Portuguese National Cancer Plan and it hasn't been promoted the same way as other cancer screening programs. Intervention efforts should be made to effectively disseminate knowledge regarding the benefits of this screening,[24] because colorectal carcinoma is the leading cause of cancer in Portugal.[23] Our previous study showed that only 16.7% of the Portuguese population are screened by FOBT.[2]

Our results also show that patients' medical testing importance scores are far from what the scientific evidence recommends. Note the importance attribute to lung X-ray and abdominal and thyroid ultrasound, even in the absence of risk factors. We think that these tests are also considered in cancer screening contexts.

Portuguese patients attribute a lot of importance to cardiovascular risk factors (dyslipidemia, diabetes, and hypertension), which increases if they have conditions or risk factors. They show great sensitivity to blood pressure monitoring and glycemic and cholesterol control, which may be because Portuguese primary care is well organized regarding the follow-up of diabetes and hypertension, which are followed up in a specific consultation. Our findings of overestimation of the benefits of cardiovascular disease prevention are consistent with previous studies of perceptions of the benefits of lipid lowering and hypertension treatment.[1] Cardiovascular diseases are the primary cause of death in Portugal.[23,25]

Our study suggests that the Portuguese consider diagnostic and laboratory tests much more important than the interventions of preventive counseling and health promotion. They attribute lower importance to lifestyle measures like advice regarding healthy eating, weight, and alcohol and tobacco consumption. The Portuguese seem unaware that behavioral risks are the main modifiable risk factors for the prevention of chronic conditions[22] and counseling is not seen as a "true" medical prescription. Another explanation could be that patients are not as often reminded of important lifestyle-related risk factors as they should be and thus are unaware of their unhealthy lifestyles.[10, 22, 24] Others think that many patients take risks not

because of ignorance but after weighing the rewards against the risks; when clinicians counsel patients about any behavior risk, the patients' receptivity can depend on patients' readiness to change.[10] The *Health Belief Model* suggests that adherence to preventive counseling depends on perceived susceptibility, perceived severity, perceived benefits, and perceived barriers.[29]

The Portuguese seem aware of the importance of unhealthy eating and their weight, but further efforts are required to educate the public about the risks associated with alcohol consumption and smoking. Some studies show that alcohol drinkers do not see or fail to admit that alcohol use is a risky habit that needs to be changed.[10]

Socioeconomic factors and health status influence the levels of importance attributed to medical activities. Females, being in the 40 to 79-year-old age group, the obese, a basic level of education, being a homemaker/retired, who don't have private health insurance, having reasonable or weak health status, and having medical conditions were all related to higher levels of importance regarding preventive services. Other studies show that lower levels of education, increasing age, and previous screening or disease experience were associated with higher estimations of the benefits of interventions.[10] It would be interesting to observe whether these findings are replicated in other countries and to study what justifies these associations.

Why do Portuguese patients attribute such high levels of importance to medical tests and preventive services?

It is not clear why patients have overly optimistic expectations, but some commentators have pointed to deficiencies in the quality of information provided to patients.[1, 7, 9, 18] For example, when physicians promote cancer screening, they tend to promote the benefits and say little about the harm; leaflets, posters, and advertising media also tend to show only the benefits. Also, we think that doctors do not assess their patients' perceptions of the harms

associated with screening and medical interventions[1] and patients are not curious about those harms. The notion of "the more tests, the better" is very rooted in the Portuguese population, giving them the false feeling that they are "in good health."

Doctors may also tend to overestimate the magnitude of the benefits of some preventive activities and have difficulty imparting numerical estimates of the benefit to the patient in the interpretation of screening test results, which may impair their ability to facilitate informed decision-making by their patients;[1, 30] e.g., in cancer screening, evidence shows that the harms are poorly reported in randomized trials, so health care practitioners cannot make informed choices about them.[31] The belief that more care is better, a lack of knowledge of the harm from overuse, discomfort with uncertainty, and regret for errors of omission or inaction,[32] could explain Portuguese FPs' excessive use of some medical interventions.[33]

Given the potential for serious harm in healthy individuals, screening should be offered only when the benefits are firmly documented and considered to outweigh the harms, which should be equally well-quantified.[31] The harms of overuse may include over-diagnosis with misclassification (false-positive or false-negative tests), incidental findings, and complications from diagnostic investigations and subsequent overtreatment (physical, psychological, and economic costs).[32]

It is possible that the use of decision aids may reduce patients' tendency to overestimate interventions benefits and thus improve their ability to make informed decisions to accept or decline interventions.[1] FPs should be aware of the recommended testing for cardiovascular risk factors and cancer screening to better educate patients regarding the judicious use of such tests.[10] The challenge now is to balance messages and reduce the public's risk for overuse, over-diagnosis, and overtreatment,[7, 32] but this will take time in the consultation[6] and will be hard to communicate in the presence of such enthusiasm and consumerism. More research is needed to explore ways to convey this message.

Our study has some limitations. First, we obtained a 55% response rate, which may be considered low. Low response rates are a frequent limitation in this type of population survey and may constitute a source of selection bias. Changes in telecommunications, marketing, and culture are some of the factors that are thought to contribute to the growing threat of non-responses to household telephone surveys.[14,34]

Second, we have to consider that we are dealing with a self-perceived assessment of the participant's medical condition that may not correspond to the true need for health services.

Third, the questionnaire focused on a limited set of medical tests/interventions. To include other medical tests—for example, more serum tumor markers or computer tomographies—would have been interesting. We did not include these tests because doing so would have excessively extended the duration of the interviews.

Fourth, to select a representative sample of the Portuguese adult population, we implemented a stratified cluster sampling of households and randomly selected participants in each household based on birthdates. We implemented quotas, however, for age and gender strata for each geographical region. Thus, the quota-sampling scheme has inherent limitations.

Despite the limitations of our study, we believe that this optimistic scenario about medical preventive activities is generalizable to the Portuguese population, the vast majority of Western European countries, and many other developed/developing countries in the world. These findings suggest that FPs should be aware of these optimistic expectations, because this can influence the doctor-patient relationship when discussing these interventions and incorporating personalized risk. Patients and physicians should receive accurate information on the benefits, harms, and limitations of medical interventions to be able to participate in shared decision making. Educating patients about proper expectations will require effort from health systems to adjust the patients' perceived importance regarding medical testing.

FOOTNOTES

Contributorship statement

CMdSM and LMBS had the original idea of the study, designed the questionnaire and the sampling methodology, drafted and revised the paper. CMdSM made the quality control during the data collection. CMNdCS, LMBS and OMdSR planned, supervised and has performed the statistical data analysis, contributed to the paper draft and revised the paper. PAAPS, MLGDdC, AMRdCP and AAOPH contributed to the questionnaire design and revised the paper.

Competing interests

None.

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None.

Data Sharing Statement

No additional data are available.

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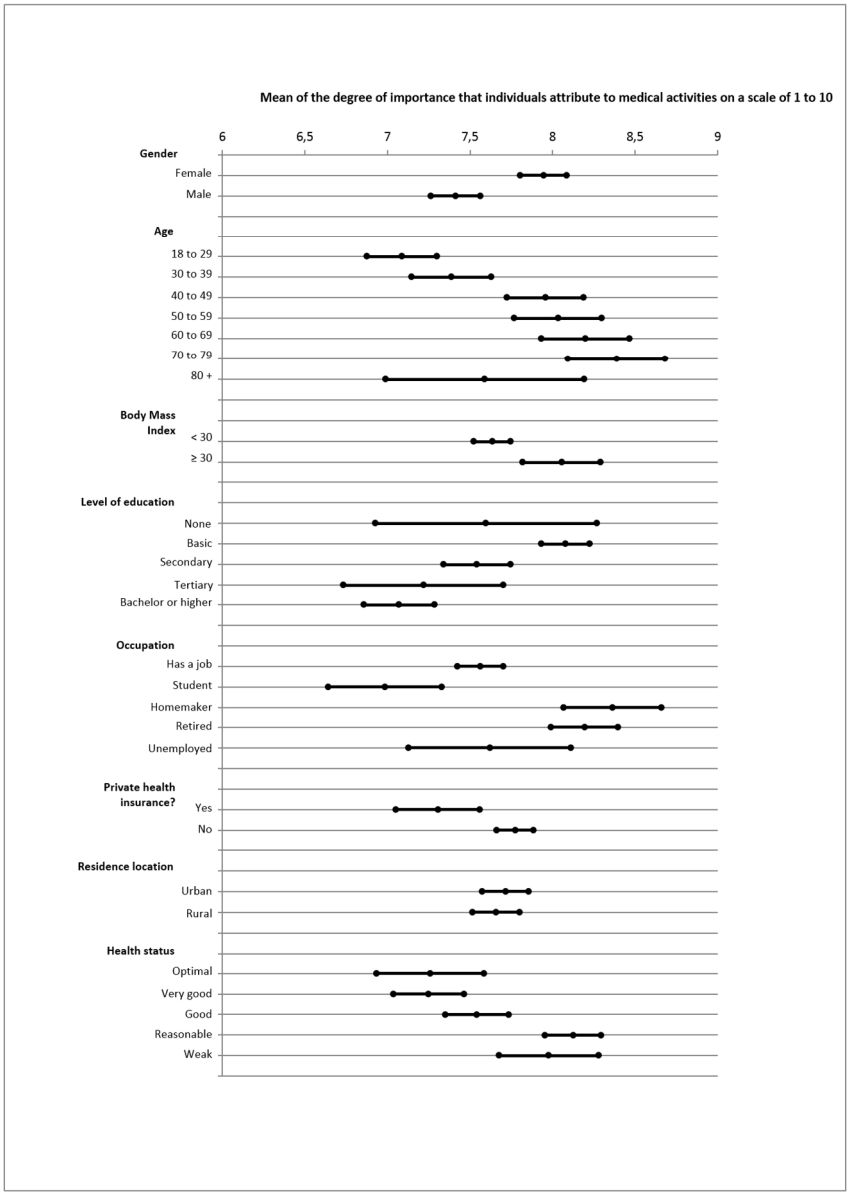
Figure legends

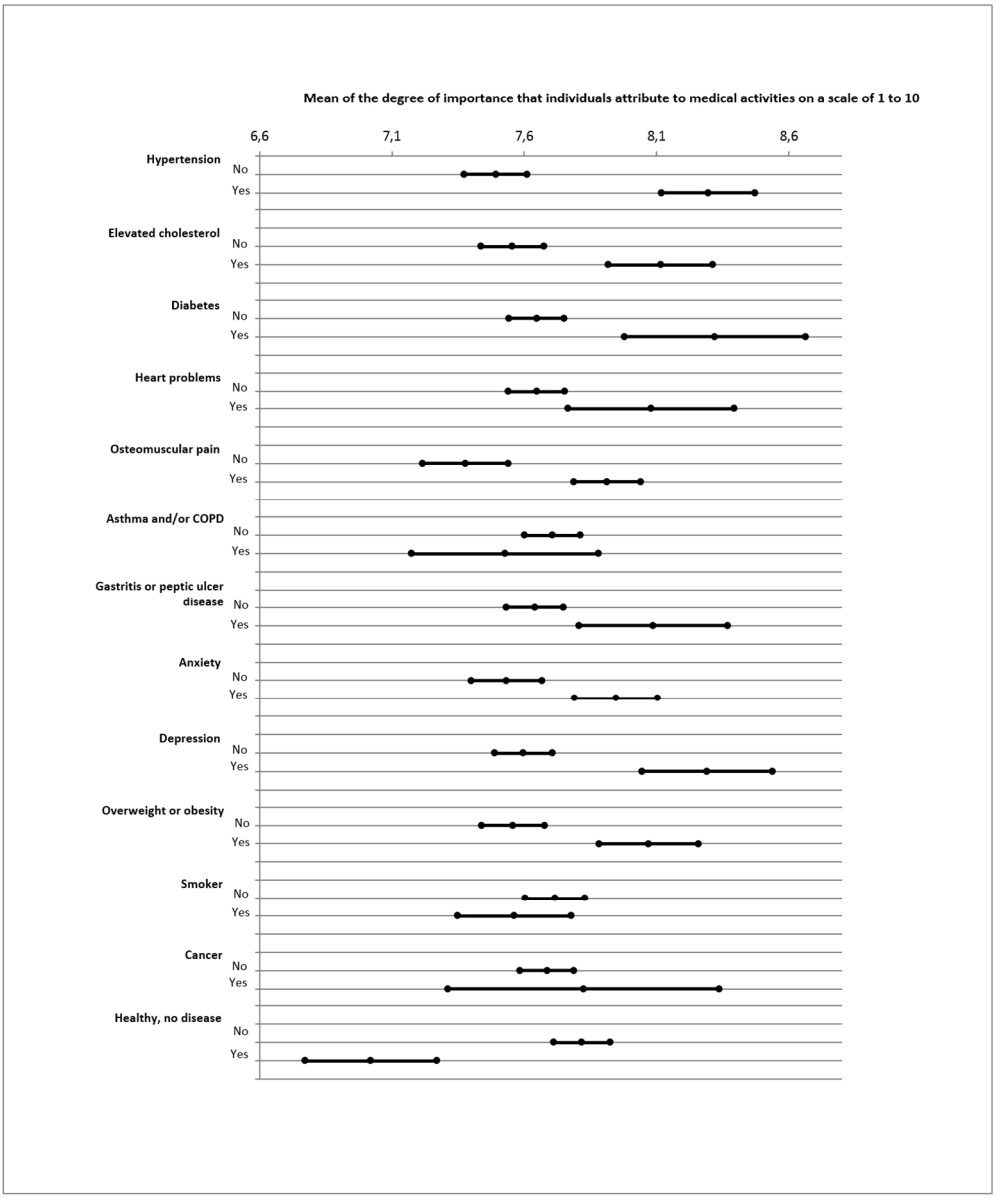
Figure 1. Factors influencing the level of importance attributed to medical activities

Figure 2. Medical conditions influencing the level of importance attributed to medical activities



Factors influencing the level of importance attributed to medical activities

375x526mm (150 x 150 DPI)



Medical conditions influencing the level of importance attributed to medical activities

408x489mm (96 x 96 DPI)

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract **[page 1]**
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found **[page 2-3]**
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported **[page 4-5]**
Objectives	3	State specific objectives, including any prespecified hypotheses **[page 5]**
Methods		
Study design	4	Present key elements of study design early in the paper **[page 5]**
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection **[page 5-7]**
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants **[page 6-7]**
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable **[page 7-8]**
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group **[page 7-8]**
Bias	9	Describe any efforts to address potential sources of bias **[page 6]**
Study size	10	Explain how the study size was arrived at **[page 6-7]**
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why **[page 7-8]**
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding **[page 8]**
		(*b*) Describe any methods used to examine subgroups and interactions **[N/A]**
		(*c*) Explain how missing data were addressed **[N/A]**
		(*d*) If applicable, describe analytical methods taking account of sampling strategy **[page 8]**
		(*e*) Describe any sensitivity analyses **[N/A]**
Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed **[page 9]**
		(b) Give reasons for non-participation at each stage **[page 9]**
		(c) Consider use of a flow diagram **[N/A]**
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders **[page 9-11, tables 1 and 2]**
		(b) Indicate number of participants with missing data for each variable of interest **[page 12, table 3]**
Outcome data	15*	Report numbers of outcome events or summary measures **[N/A]**
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included **[pages 12-15, tables 3 and 4, figures 1 and 2]**
		(*b*) Report category boundaries when continuous variables were categorized **[N/A]**
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period **[N/A]**
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses **[page 13-15, table 4, figures 1 and 2]**

Discussion		
Key results	18	Summarise key results with reference to study objectives **[page 15-19]**
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias **[page 20-21]**
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence **[page 19-20]**
Generalisability	21	Discuss the generalisability (external validity) of the study results **[page 21]**
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based **[N/A]**

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Patients' estimations of the importance of preventive health services: a nationwide, population-based cross-sectional study in Portugal

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Patients' estimations of the importance of preventive health services: A nationwide, population-based cross-sectional study in Portugal

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ABSTRACT

Objectives: To determine, in the context of primary care preventive health services, the level of importance that Portuguese patients attribute to different preventive activities.

Design: Cross-sectional study.

Setting: Primary Health Care, Portugal.

Participants: One thousand Portuguese adults selected by a stratified cluster sampling design were invited to participate in a computer-assisted telephone survey. Persons with a cognitive or physical disability that hampered the ability to complete a telephone interview and being a nursing home resident or resident in any other type of collective dwelling were excluded.

Outcomes: Mean level of importance assigned to 20 different medical preventive activities, using a scale of 1 to 10, with 1 corresponding to “no importance for you and your health” and 10 indicating "very important.”

Results: The mean level of importance assigned to medical preventive activity was 7.70 (95% CI: 7.60 to 7.80). Routine blood and urine tests were considered the most important, with an estimated mean of 9.15 (95% CI: 9.07 to 9.24), followed by female-specific interventions (Pap smear, mammography, and gynecological and breast ultrasounds), with mean importance ranging from 8.45 (95% CI: 8.23 to 8.63) for mammography to 8.56 (95% CI: 8.36 to 8.76) for Pap smear. Advice regarding alcohol consumption (6.18; 95% CI: 5.96 to 6.39) and tobacco consumption (5.99; 95% CI: 5.75 to 6.23) were considered much less important.

Conclusions: Our results reveal that Portuguese patients overestimate the importance of preventive medical activities, tend to give more importance to diagnostic and laboratory tests than to lifestyle measures, do not discriminate tests that are important and evidence-based, and seem not be aware of the individualization of risk. Family physicians should be aware of

these optimistic expectations, because this can influence the doctor-patient relationship when discussing these interventions and incorporating personalized risk.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- A population based cross-sectional study with a representative sample of 1,000 Portuguese adults and 20 medical preventive activities considered.
- To our knowledge, this is the first study about perceived importance attributed by patients to different preventive activities.
- This study gives additional evidence that Portuguese patients overestimate the importance of preventive medical activities, many of them not evidence-based.
- The response rate of 55% and the quota-sampling scheme may be considered as limitations.

INTRODUCTION

The growing importance attributed to clinical prevention encourages family physicians (FPs) to recommend screening and preventive interventions to their patients, who were also encouraged to participate in a range of national screenings.[1] Despite the benefits of some of these interventions, individual assessments of the potential benefits and risks wasn't taken into account, and many of these medical tests have been prescribed to people who are healthy or have some risk factors.[2] Advances in technology, the increasing number of medical tests available for doctors and patients, the cultural belief that more is always better, and some disease-mongering strategies have led preventive medicine to a point where the probability of causing more harm than good is raising great concern.[2-5] The excessive and unnecessary prescription of medical tests has important economic and ethical implications in current clinical practice.[2, 5, 6]

Patients tend to overestimate the benefits achieved by screening and preventive treatments;[1, 7-9] patients also tend to undergo some tests, e.g., cancer screening tests, more often and at younger ages than the scientific evidence recommends.[2, 10] Perhaps this happens because of increased social expectations to have a long and healthy life and patients and physicians are inundated with advice on how to do so.[11]

In Portugal the vast majority of the adult population considers a great number of medical tests necessary on a nearly annual basis, and most of the population indicate that they receive those tests.[2] The same study also shows that patients' perceptions of required medical testing are far from what the scientific evidence recommends. Portuguese patients do not show a capacity for discriminating between medical tests that are performed on evidence-based recommendations and those that are not.[2]

Many strategies are intended to improve the quality of medical test prescriptions but are based only on the doctor's actions, ignoring both the evolution of the medical consultation into a shared decision-making process [12] and the patient's expectations and beliefs. [13]

We believe that the development of educational interventions aiming to inform populations about the real impact and adequacy of certain healthcare services is crucial to promote the implementation of preventive services that may positively impact each patient's health.[2] In this context, it is vital to understand how patients assess the value of medical tests.

The aim of this study was to determine, in the context of primary care preventive health services, the level of importance that Portuguese patients attribute to different preventive activities.

MATERIALS AND METHODS

Study design

A nationwide cross-sectional study was conducted, using a representative sample of the Portuguese adult general population. Computer-assisted telephone interviews (CATIs) were used for data collection.

Participant selection criteria

The defined target population was the Portuguese adult general population, and the available population included adult individuals living in Portuguese households with a landline telephone (sampling frame). Eligible adults were aged 18 years and older and lived in a household (private dwelling) with a landline telephone. The exclusion criteria included having a cognitive or physical disability that hampered the ability to complete a telephone interview, being a nursing home resident or resident in any other type of collective dwelling, and refusing to give informed consent for study participation.

Survey sampling methods

To obtain a representative sample of the Portuguese general adult population, a stratified cluster sampling design was used. First, all counties (geographical subdivisions of the Portuguese regions) were used as natural strata. In each county, a random sample of households with landline telephone numbers was selected with a probability proportional to the county population size, as estimated by the national census. Next, one eligible resident was randomly selected in each household based on birth dates (last birthday before the call in the household was selected). Target quotas were set for age and sex strata in each geographical region, to account for the likelihood of being available at home for the interview and to correct the common overrepresentation of females and respondents from older age groups in telephone surveys.[14-16]

A comprehensive set of measures were implemented to prevent non-response and non-response bias. These included: (1) appropriate selection and specific training of interviewers; (2) an introductory presentation as the initial part of household contacts, specifically aimed at capturing participants' attention, obtaining their informed consent, and facilitating participation; and (3) standard operational procedures for contacts and callbacks in case of failed contacts systematically including eight attempts on different days and at different times of the day. Additionally, to correct for sample imbalances and partially adjust prevalence estimates for selection bias, a set of weighting procedures were implemented.[14-16] Two types of weights were used: (1) weights adapted to the sampling design (stratification and clustering), adjusting for different probabilities of selection among respondents, and (2) post-stratification weights, taking into account population distributions by geographical region of residence, gender, and five-year age categories, based on the Portuguese National Census.[17]

Quality control

The interviewers were experienced and adequately trained and prepared for the application of the study questionnaire. A pilot run of 100 interviews was performed to assess the time needed for questionnaire completion, language, and comprehension issues. A second pilot run was performed during the first 50 interviews. All interviews were supervised by a data collection supervisor; at least 20% of the interviews were randomly supervised by a study coordinator.

Sample size

Sample size was determined to estimate proportions with an expected margin of error of 4% (assuming a design effect of 1.5) and an intended confidence level (CI) of 95%. Based on these assumptions, a sample of at least 1,000 adults from the general population was required.

Instruments and methods for data collection

Data collection was performed from 16 February 2011 to 11 May 2011, using CATIs. A structured questionnaire containing four sections was used: (1) an introductory section that presented the study aims and motivation; (2) a section that contained questions about the health status of the interviewees; (3) the main research section; and (4) a socio-demographic data collection section.

The main research section had two major parts. The first part asked about the medical tests patients deemed necessary and how often (the results of which are already published [2]). The second part asked, “What level of importance do you attribute to each of the following medical activities on a scale of 1 to 10, with 1 corresponding to “no importance for you and your health” and 10 indicating "very important.” This section included 20 medical interventions: blood test for cholesterol levels; counseling on weight; blood pressure evaluation; blood test for fasting glucose levels; smoking habits; fecal occult blood test (FOBT); chest X-ray; tetanus vaccine; routine blood and urine tests (“general analysis” is a popular expression in Portuguese in periodic health examinations or routine health checks and usually includes urinalysis, blood tests for complete blood count, glucose, total and HDL cholesterol, triglycerides, hepatic enzymes, and creatinine),[2] advice on healthy eating; alcohol consumption habits; total colonoscopy; thyroid ultrasound; abdominal ultrasound; the male-specific interventions of prostate ultrasound and prostate-specific antigen test; and the female-specific interventions of mammography, breast ultrasound, gynecological ultrasound, and Pap smear. In this article we report only about the levels of importance attributed to each test.

The interviewers were trained to clarify the meaning of each medical test to ensure that participants correctly understood all of the questions.

Statistical analysis

Statistical analysis was performed using the Statistical Package for the Social Sciences, Version 19.0 for Windows (SPSS®). All the presented prevalence estimates were calculated, after accounting for the sampling design and the appropriate weights described above, using the Complex Samples module of SPSS® 19.0. Point estimates are presented for all prevalence estimates. Point estimates and 95% CI are presented for all mean estimates.

Descriptive statistics are presented as absolute frequency (number) and relative frequency (percentage) for categorical variables and as the mean for continuous variables. When testing hypotheses regarding continuous variables, parametric tests (Student's t-test and one-factor analysis of variance (ANOVA)) were used, accounting for normality assumptions and the number of groups compared.

Whenever statistical hypothesis testing was used, a significance level of α =5% was considered.

Ethical considerations

This study was approved by the São João Health Centre Medical Ethics Committee. Participants provided their verbal informed consent at the beginning of the telephone interview. Written consent was not obtained because interviews were conducted by telephone, without the physical presence of the participants. Participants were informed about the estimated duration of the interview and voluntary participation was emphasized; they were notified that they could interrupt their participation at any moment of the interview. The interviews were not recorded and participants did not receive any kind of compensation. As a measure to standardize the process of obtaining informed consent, interviewers were specifically trained and required to read a standardized text and the interview began only after the patient's consent was received. This obtaining of consent procedure was approved by the São João Health Centre Medical Ethics Committee.

RESULTS

From a total of 2,945 randomly selected households, 1,804 households contained eligible individuals. From the total number of households with eligible individuals, 804 of the selected individuals refused to participate. We obtained 1,000 valid interviews, corresponding to a response rate of 55%. The mean duration of the interview was 18 minutes. Respondents were between 18 and 97 years old; 520 were women and 480 were men. Table 1 presents the sample's demographic characteristics.

Table 1 shows that 58.9% of the respondents considered themselves to have a good to excellent health status. The self-reported prevalence in our sample indicated 25.0% for hypertension, 24.3% for hypercholesterolemia, 6.6% for diabetes, 10.4% for heart problems, 9.6% for asthma and/or COPD, 13.6% for depression, and 3.0% for cancer.

Table 1. Study sample demographic characteristics and self-perceived health status, medical conditions, and risk factors.

	% respondents	Unweighted Count
Age (years) (Mean: 45; Range: 18–97)		
From 18 to 29	26.7%	233
From 30 to 39	17.6%	184
From 40 to 49	16.4%	169
From 50 to 59	14.1%	145
From 60 to 69	12.6%	131
From 70 to 79	9.2%	96
80 or older	3.4%	42
Gender	Male: 47.8%	480
	Female: 52.2%	520
Geographic distribution (NUTS* II)		
North	35.6%	348
Center	23.3%	230
Lisbon	26.4%	262
Alentejo	7.8%	78
Algarve	3.6%	38
Madeira	1.7%	22
Azores	1.6%	22
Marital status		
Single	34.5%	321
Married	56.0%	560
Married but legally separated	0.8%	8
Divorced	2.7%	31
Widowed	6.1%	77
Highest level of education completed		
None	2.8%	35
Basic, 4 years of education	23.7%	250
Basic, 6 years of education	7.0%	72
Basic, 9 years of education	17.9%	171
Secondary, 12 years of education	23.4%	220
Post-secondary education (professional certificates)	3.7%	33
Higher Education, Bachelors	2.1%	21
Higher Education, Graduation	16.6%	167
Higher Education, Masters	2.1%	23
Higher Education, PhD	0.6%	6
Professional occupation		
Has a profession	53.3%	534
Student	11.7%	96
Homemaker	7.0%	74
Retired	21.8%	234
Unemployed	6.3%	60
Residence location		
Urban	55.3%	559
Rural	44.7%	441
Health status (In general, would you say your health is:)		
Excellent	10.9%	107
Very good	15.3%	139
Good	32.7%	326
Fair	30.4%	314
Poor	10.8%	114
Medical conditions and risk factors		
Hypertension	25.0%	246
Elevated cholesterol	24.3%	270
Diabetes	6.6%	76
Heart problems	10.4%	109
Osteomuscular pain	58.6%	585

Asthma and/or COPD**	9.6%	101
Gastritis or peptic ulcer disease	11.2%	122
Anxiety	37.9%	378
Depression	13.6%	141
Overweight or obesity	26.0%	260
Smoker	17.3%	183
Cancer	3.0%	34
I am healthy, I don't have any disease	15.9%	158

*NUTS: Nomenclature of Territorial Units for Statistics
**COPD: chronic obstructive pulmonary disease

The mean level of importance assigned to different medical preventive activities was 7.70 (Table 2). The medical activity that patients considered most important was routine blood and urine tests, with a mean importance of 9.15; questions regarding alcohol consumption (6.18) and tobacco consumption (5.99) were considered the least important.

Table 2. Mean level of importance that individuals attributed to medical activities, on a scale of 1 to 10; 1 corresponds to "no importance" and 10 to "very important."

Health services	n*	Mean estimate	95% CI	
			Lower	Upper
Routine blood and urine tests	988	9.15	9.07	9.24
Pap smear	495	8.56	8.36	8.76
Gynecological ultrasound	500	8.47	8.26	8.68
Breast ultrasound	506	8.46	8.25	8.67
Mammography	505	8.45	8.23	8.66
Cholesterol evaluation	987	8.43	8.31	8.54
Tetanus vaccine	970	8.29	8.16	8.43
Evaluation of glucose	989	8.24	8.12	8.37
Blood pressure evaluation	990	8.17	8.04	8.29
Health eating advice	982	7.91	7.77	8.06
Evaluation of PSA**	476	7.73	7.51	7.94
Prostate ultrasound	476	7.72	7.51	7.94
Lung X-ray	971	7.53	7.39	7.68
FOBT***	954	7.40	7.23	7.56
Abdominal ultrasound	970	7.37	7.21	7.52
Weight advice	979	7.21	7.06	7.36
Total colonoscopy	937	7.17	6.98	7.35
Thyroid ultrasound	940	6.84	6.66	7.02
Alcohol consumption	941	6.18	5.96	6.39
Smoking habits	889	5.99	5.75	6.23

Importance grade average	993	7.70	7.60	7.80

* n=1000, but there were "no answer" results
**PSA: prostate specific antigen; ***FOBT: fecal occult blood test

For female-specific interventions (Pap smear, mammography, and gynecological and breast ultrasounds) the attributed level of importance ranged from 8.45 to 8.56 (Table 2). Similar estimates of importance were given for the Pap smear and gynecological ultrasound (8.56 *vs.* 8.47) and for breast ultrasound and mammography (8.46 *vs.* 8.45). In contrast, male-specific interventions were considered less important, i.e., 7.72 and 7.73 for the evaluation of PSA and prostate ultrasound, respectively.

Regarding colorectal cancer screening, the level of importance attributed to the FOBT was 7.40 and total colonoscopy 7.17 (Table 2). Colorectal cancer screening was considered less important than prostate cancer screening in our sample.

Cardiovascular risk factor screenings (cholesterol evaluation (8.43), evaluation of glucose (8.24), and blood pressure evaluation (8.17)) were considered very important.

Lifestyle measures (advice regarding healthy eating, weight, and alcohol and tobacco consumption) were considered less important than other tests, with scores ranging from 5.99 to 7.91 (Table 2). Advice regarding alcohol and tobacco consumption were considered the least important (6.18 and 5.99, respectively).

In Table 3, for each specific medical activity, we compared the respondents with declared conditions or risk factors that would justify the importance of that medical test with the respondents without conditions or risk factors.

Table 3. Mean level of importance that individuals without risk factors* versus individuals with risk factors attribute to medical activities, on a scale of 1 to 10; 1 corresponds to "no importance" and 10 to "very important."

Health services	Individuals without risk factors*				Individuals with risk factors				p
	n	Mean estimate	95% CI Lower	95% CI Upper	n	Mean estimate	95% CI Lower	95% CI Upper	
Pap smear	471	8.57	8.36	8.78	24	8.27	7.62	8.92	0.385
Gynecological ultrasound	404	8.49	8.25	8.72	95	8.39	7.91	8.88	0.738
Mammography	428	8.47	8.24	8.69	76	8.33	7.70	8.96	0.684
Breast ultrasound	428	8.46	8.24	8.69	77	8.44	7.84	9.04	0.939
Cholesterol evaluation	762	8.23	7.98	8.49	217	8.49	8.36	8.61	0.083
Evaluation of blood pressure	266	7.74	7.50	7.98	715	8.33	8.19	8.48	<0.001
Evaluation of glucose	199	7.70	7.40	8.00	781	8.40	8.26	8.54	<0.001
Prostate ultrasound	459	7.69	7.47	7.91	13	8.34	7.38	9.31	0.196
Evaluation of PSA**	459	7.68	7.46	7.91	13	8.56	7.63	9.49	0.075
Lung X-ray	825	7.48	7.32	7.63	141	7.88	7.47	8.30	0.070
FOBT***	867	7.37	7.20	7.55	82	7.48	6.92	8.05	0.721
Abdominal ultrasound	923	7.36	7.20	7.53	41	7.39	6.65	8.14	0.942
Thyroid ultrasound	962	6.84	6.66	7.02	9	6.74	5.36	8.11	0.882

Comparing the data of patients with and patients without risk factors, we found similar results (Table 3) except for blood pressure evaluation (7.44 vs. 8.33, p<0.001) and glucose evaluation (7.70 vs. 8.40, p<0.001); these were significantly different between groups. Lung X-ray (p=0,070), abdominal ultrasound (p=0,942), and thyroid ultrasound (p=0,882) were similarly important to both groups.

Analyzing only the respondents without conditions or risk factors, we verified that the levels of importance attributed to each of the evaluated tests were greater than 6.84 and the results were quite similar to the global group analysis (Tables 2 and 3).

Figure 1 shows the associations between demographic factors and the importance attributed to different medical activities. The female respondents (p<0.001), the 40 to 79-year age group (p <0.001), the respondents with body mass indices (BMIs) ≥30 (p=0.002), and the respondents with a basic level of education (p<0.001) reported significantly higher importance scores for the medical activities. Students (p<0.001) and those respondents who had private health

insurance (p<0.001) gave lower importance scores for the medical tests. Regarding the self-reported health status, respondents claiming reasonable and weak health statuses reported significantly higher importance scores for the medical tests/interventions than those claiming a good to optimal health status (p<0.001). There were no statistically significant differences between the rural and urban respondents.

Figure 1. Factors influencing the level of importance attributed to medical activities

In Figure 2, we analyze the level of importance attributed to the different medical activities after accounting for self-reported health problems. Having a health problem significantly increases the importance attributed to tests (7.82 vs. 6.96, p<0.001); the opposite happens if the responder considers himself healthy (p<0.001). Almost all conditions were significantly associated with greater importance attributed to medical activities except asthma and/or COPD, smoking, and cancer.

Figure 2. Medical conditions influencing the level of importance attributed to medical activities

DISCUSSION

These results show that the adult Portuguese population considers different medical preventive activities very important, similar to previous studies in other countries.[1, 7, 9, 10, 18]

In our study, the importance given to preventive activities was very similar between the groups with or without conditions or risk factors; therefore, preventive activities are equally important for all. When analyzing by self-reported illness, we found that having any disease increases the importance attached to all preventive medical activities except for the smokers and patients with respiratory disease or cancer. It seems that Portuguese are not aware of the

individualization of risk, have difficulty recognizing risk factors, and are unaware that not all preventive activities are suited to their situation.

The medical activity to which the respondents attributed the most importance is "routine blood and urine tests." This test is very popular among the Portuguese in periodic health examinations or routine health checks. In Portugal, there are no official recommendations for the frequency of adult periodic health examinations, including routine blood tests, but our previous study showed that 99.2% of Portuguese adults believed they should undergo general routine blood and urine tests, with a mean frequency interval of 12 months; 87.4% reported that they usually underwent this activity.[2] The patients' perceived need for yearly routine blood and urine tests may be linked to the traditional concept of an annual periodic health examination and seems to be strongly and more culturally rooted in the Portuguese population,[2] but there is little evidence that such visits actually provide some benefit for healthy adults.[19-22]

The Portuguese Ministry of Health recommends the following three cancer screenings: breast cancer screening by mammography every two years, for women from 50 to 69 years old; colorectal cancer screening by fecal occult blood test every one to two years, for adults from 50 to 74 years old; and cervical cancer screening with Pap smears for women between 25 and 60 years old, every three years following two annual normal tests.[23]

Our results reveal that the Portuguese are very aware and consider cancer screening very important, similar to other studies.[1, 7, 9, 10, 18] This may be due to the National Cancer Plan, established in Portugal in 1990, with great involvement of FPs and direct-to-consumer marketing, specifically national public health campaigns on screening.

Our patients, however, did not discriminate between medical tests that were important due to evidence-based recommendations and those that were not. For example, they attributed similar importance to Pap smears and gynecological ultrasound as to breast ultrasound and

mammography. Our previous study showed that the majority of Portuguese women considered these four tests on a nearly annual basis.[2] This false idea is the result of the strong message from the massive campaigns women have received for decades: that they must have early screening and early detection to increase the likelihood of curing cancer. Physicians, FPs included, also perpetuated this idea after perhaps being encouraged to recommend screening and preventive interventions to their patients by professional guidelines and expert opinions.[1]

Interestingly, men attribute less importance to male-specific interventions than woman to female-specific interventions, possibly due to lower exposure to such screenings in primary care, having fewer screening tests, and being less familiar with health care. Portuguese women utilize more health resources than men.[24] Men, however, attribute the same importance to prostate ultrasounds and evaluation of PSA possibly due to strong advertising campaigns in the past that promised effective prostate cancer screenings, despite the fact that prostate cancer screening has never been officially proposed in Portugal.

Unsurprisingly, colorectal cancer screening is not considered as important for screening as other cancers. Colorectal cancer screening by fecal occult blood test was the last cancer screen to enter the Portuguese National Cancer Plan and it has not been promoted the same way as other cancer screening programs. Intervention efforts should be made to effectively disseminate knowledge regarding the benefits of this screening,[25] because colorectal carcinoma is the leading cause of cancer in Portugal.[23] Our previous study showed that only 16.7% of the Portuguese population are screened by FOBT.[2]

Our results also show that patients' importance scores for medical testing are far from what the scientific evidence recommends. Note the importance attribute to lung X-ray and abdominal and thyroid ultrasound, even in the absence of risk factors. We believe that the

importance attached to these tests is related to the respondent's belief of early detection of cancers.

Portuguese patients attributed great importance to tests related to cardiovascular risk factors (dyslipidemia, diabetes, and hypertension), which increased if they had conditions or risk factors. This may be because Portuguese primary care is well organized regarding the follow-up of diabetes and hypertension. Our findings of overestimation of the benefits of cardiovascular disease prevention are consistent with previous studies of perceptions of the benefits of lipid lowering and hypertension treatment.[1] Cardiovascular diseases are the primary cause of death in Portugal. [23,26]

Our study suggests that the Portuguese consider diagnostic and laboratory tests much more important than the interventions of preventive counseling and health promotion. They attribute lower importance to lifestyle measures, such as advice regarding healthy eating, weight, and alcohol and tobacco consumption. These results run counter to the European trend revealed in the EUROPREVIEW study that shows that patients consider changes in lifestyle important or very important to health improvement.[10]The Portuguese seem unaware that behavioral risks are the main modifiable risk factor for the prevention of chronic conditions [27] and counseling is not seen as a "true" medical prescription. Another explanation could be that patients are not as often reminded of important lifestyle-related risk factors as they should be and, thus, are unaware of their unhealthy lifestyles.[10, 28, 29] Others think that many patients take risks not because of ignorance but after weighing the rewards against the risks; when clinicians counsel patients about any behavior risk, the patients' receptivity can depend on their readiness to change.[10] The *Health Belief Model* suggests that adherence to preventive counseling depends on perceived susceptibility, perceived severity, perceived benefits, and perceived barriers.[30]

The Portuguese seem aware of the importance of unhealthy eating and their weight, but further efforts are required to educate the public about the risks associated with alcohol consumption and smoking. Some studies show that alcohol drinkers do not see or fail to admit that alcohol use is a risky habit that needs to be changed.[8, 10]

Socioeconomic factors and health status influence the levels of importance attributed to medical activities. Females in the 40 to 79-year-old age group, the obese, those with a basic level of education homemakers/retirees, those without private health insurance, those with reasonable or weak health status, and participants with medical conditions all placed a higher level of importance on preventive services. Other studies show that lower levels of education, increased age, and previous screening or disease experience were associated with higher estimations of the benefits of interventions.[10] It would be interesting to observe whether these findings are replicated in other countries and to study the justification of these associations.

Why do Portuguese patients attribute such high levels of importance to medical tests and preventive services?

It is not clear why patients have overly optimistic expectations, but some researchers have pointed to deficiencies in the quality of information provided to patients.[1, 7, 9, 18] For example, when physicians promote cancer screening, they tend to promote the benefits and say little about the harm; leaflets, posters, and advertising media also tend to show only the benefits. In addition, we think that doctors do not assess their patients' perceptions of the harms associated with screening and medical interventions[1] and patients are not curious about such harm. The notion of "the more tests, the better" is very rooted in the Portuguese population, giving them the false sense that they are "in good health."

Doctors may also tend to overestimate the magnitude of the benefits of some preventive activities and have difficulty imparting numerical estimates of the benefits to the patient in the

interpretation of screening test results, which may impair the ability to facilitate informed decision making by their patients.[1, 31] For example, in cancer screening, evidence shows that the harms are poorly reported in randomized trials, so health care practitioners cannot make informed choices about them.[32] The belief that more care is better, a lack of knowledge of the harm from overuse, discomfort with uncertainty, and regret for errors of omission or inaction[33] could explain Portuguese FPs' excessive use of some medical interventions.[34]

Given the potential for serious harm in healthy individuals, screening should be offered only when the benefits are firmly documented and considered to outweigh the harms, which should be equally well-quantified.[32] The harm of overuse may include over-diagnosis with misclassification (false-positive or false-negative tests), incidental findings, and complications from diagnostic investigations and subsequent overtreatment (physical, psychological, and economic costs).[33]

It is possible that the use of decision aids may reduce patients' tendency to overestimate interventions benefits and, thus, improve their ability to make informed decisions to accept or decline interventions.[1] FPs should be aware of the recommended testing for cardiovascular risk factors and cancer screening to better educate patients regarding the judicious use of such tests.[10] The challenge now is to balance messages and reduce the public's risk for overuse, over-diagnosis, and overtreatment,[7, 33] but this will take time in the consultation[6] and will be hard to communicate in the presence of such enthusiasm and consumerism. More research is needed to explore ways to convey this message.

Our study has some limitations. First, we obtained a 55% response rate, which may be considered low. Low response rates are a frequent limitation in this type of population survey and may constitute a source of selection bias. Changes in telecommunications, marketing, and culture are some of the factors that are thought to contribute to the growing threat of non-responses to household telephone surveys.[14, 35]

Second, we have to consider that we are dealing with a self-perceived assessment of the participant's medical condition that may not correspond to the true need for health services. Patients may have erroneous perceptions about their medical conditions and this may also interfere the level of importance they attribute to medical services.

Third, the questionnaire focused on a limited set of medical tests/interventions. To include other medical tests, for example, more serum tumor markers or computer tomographies, would have been interesting. We did not include these tests because doing so would have excessively extended the duration of the interviews.

Fourth, to select a representative sample of the Portuguese adult population, we implemented a stratified cluster sampling of households and randomly selected participants in each household based on birthdates. We implemented quotas, however, for age and gender strata for each geographical region. Thus, the quota-sampling scheme has inherent limitations.

Despite the limitations of our study, we believe that this optimistic scenario about medical preventive activities is generalizable to the Portuguese population, the vast majority of Western European countries, and many other developed/developing countries in the world.

CONCLUSIONS

Our results reveal that Portuguese patients overestimate the importance of preventive medical activities, tend to give more importance to diagnostic and laboratory tests than to lifestyle measures, do not discriminate tests that are important and evidence-based, and seem not be aware of the individualization of risk.

Of particular note are the importance attributed to “routine blood and urine tests” attached to the traditional periodic health examination or routine health checks, the high importance of the type of tests considered in cancer screening, and the minimal importance attributed to

alcohol and tobacco consumption. On the other hand, the Portuguese seem be very aware of dyslipidaemia, diabetes, and hypertension.

These findings suggest that FPs should be aware of these optimistic expectations, because this can influence the doctor-patient relationship when discussing these interventions and incorporating personalized risk. Patients and physicians should receive accurate information on the benefits, harms, and limitations of medical interventions to be able to participate in shared decision making. Educating patients regarding appropriate expectations will require effort from health systems to adjust the patients' perceived importance of medical testing.

FOOTNOTES

Contributorship statement

CMdSM and LMBS had the original idea for this study. CMdSM, LMBS and LFA designed the questionnaire and the sampling methodology, and drafted and revised the paper. CMdSM conducted the quality control during the data collection. CMNdCS, LMBS and OMdSR planned, supervised, and performed the statistical data analysis, contributed to the paper draft, and revised the paper. PAAPS, MLGDdC, AMRdCP and AAOPH contributed to the questionnaire design and revised the paper.

Competing interests

None.

Funding

None.

Data Sharing Statement

No additional data are available.

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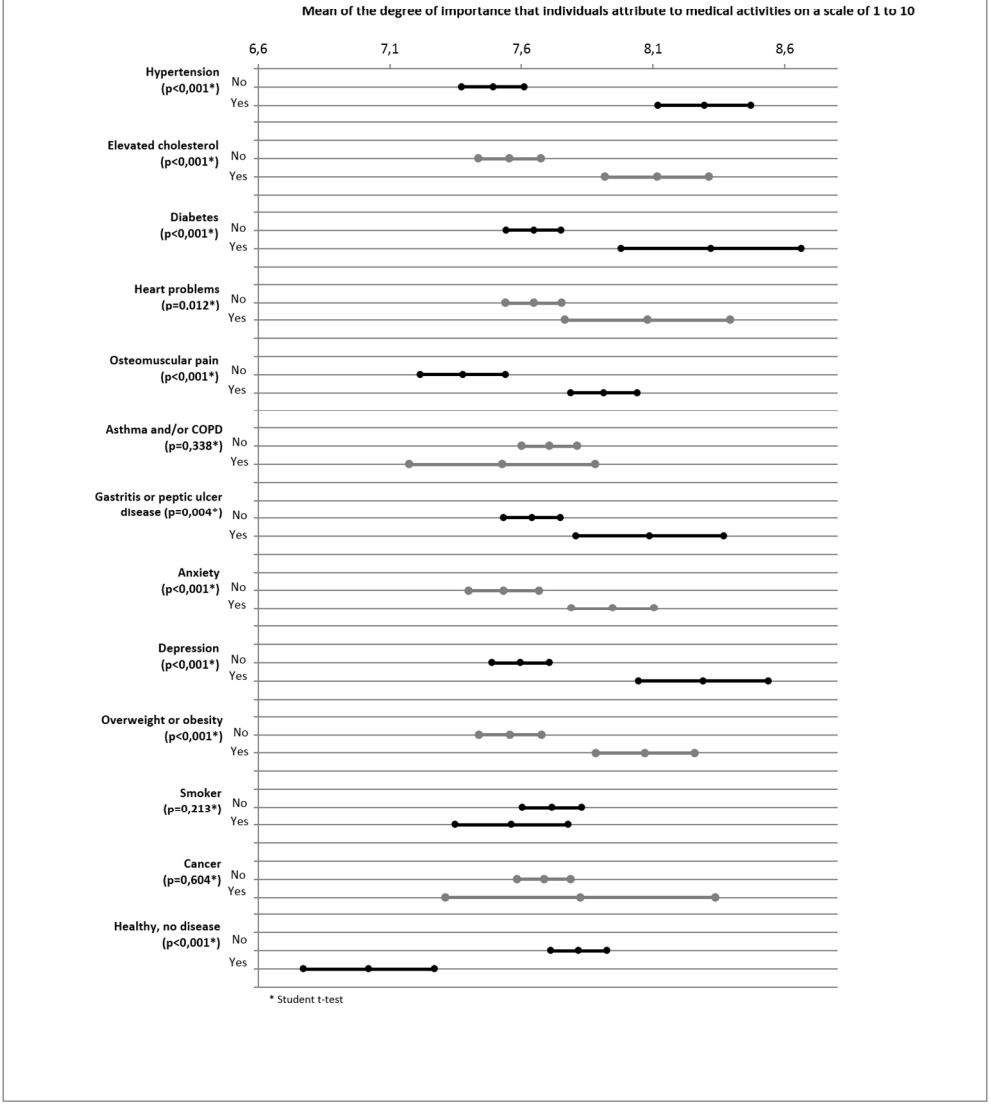
Figure legends

Figure 1. Factors influencing the level of importance attributed to medical activities

Figure 2. Medical conditions influencing the level of importance attributed to medical activities



Factors influencing the level of importance attributed to medical activities

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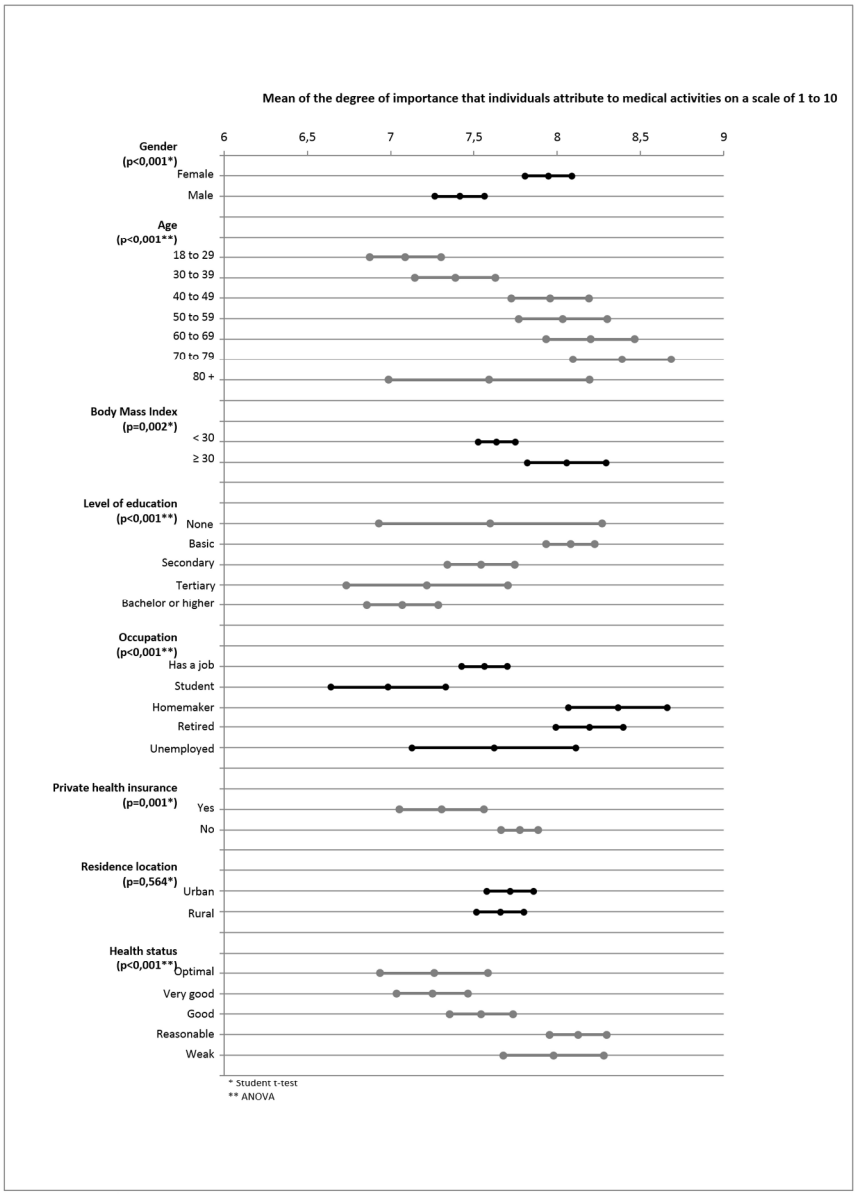

Medical conditions influencing the level of importance attributed to medical activities

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STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract **[page 1]**
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found **[page 2-3]**
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported **[page 5-6]**
Objectives	3	State specific objectives, including any prespecified hypotheses **[page 6]**
Methods		
Study design	4	Present key elements of study design early in the paper **[page 7]**
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection **[page 7-9]**
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants **[page 7-8]**
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable **[page 8-9]**
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group **[page 9-10]**
Bias	9	Describe any efforts to address potential sources of bias **[page 7]**
Study size	10	Explain how the study size was arrived at **[page 7-8]**
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why **[page 8-9]**
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding **[page 10]**
		(*b*) Describe any methods used to examine subgroups and interactions **[N/A]**
		(*c*) Explain how missing data were addressed **[N/A]**
		(*d*) If applicable, describe analytical methods taking account of sampling strategy **[page 10]**
		(*e*) Describe any sensitivity analyses **[N/A]**
Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed **[page 11]**
		(b) Give reasons for non-participation at each stage **[page 11]**
		(c) Consider use of a flow diagram **[N/A]**
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders **[page 12-13, tables 1 and 2]**
		(b) Indicate number of participants with missing data for each variable of interest **[page 13-15, table 2 and 3]**
Outcome data	15*	Report numbers of outcome events or summary measures **[N/A]**
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included **[pages 13-16, tables 3 and 4, figures 1 and 2]**
		(*b*) Report category boundaries when continuous variables were categorized **[N/A]**
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period **[N/A]**
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses **[page 14-16, table 3, figures 1 and 2]**

Discussion		
Key results	18	Summarise key results with reference to study objectives **[page 16-21]**
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias **[page 21-22]**
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence **[page 20-21]**
Generalisability	21	Discuss the generalisability (external validity) of the study results **[page 22]**
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based **[N/A]**

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.