

ORIGINAL RESEARCH—EDUCATION

Evaluating a Continuous Medical Education Program to Improve General Practitioners Awareness and Practice on Erectile Dysfunction as a Cardiovascular Risk Factor

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ABSTRACT

Introduction. The clear link between erectile dysfunction (ED) and cardiovascular disease (CVD) together with the increased potential for effectively treating ED with oral pharmacological agents make the primary care setting the ideal place to detect and treat ED and its potential comorbidities. Given the observed shortcomings in knowledge related to ED among primary care physicians, continuous medical education (CME) on this topic stands out as a potentially effective way to improve patient care.

Aim. To assess general practitioners' (GPs) knowledge, attitudes, and self-confidence about ED management and the relationship between ED and CVD and to test whether these can be improved by means of a brief training program.

Methods. Eighty GPs completed two similar questionnaires on ED issues, one prior to a CME intervention and one following it. The CME program consisted of reading an annotated set of four review articles and six research articles followed by a live half-day seminar conducted by a GP, a urologist, and a cardiologist.

Main Outcome Measures. Changes in the answers to the two questionnaires were evaluated by tests for matched pairs using both statistical significance and effect size estimates, and assessment of different predictors were evaluated by multivariate analysis.

Results. A marked improvement was observed in physician knowledge, attitudes, and self-confidence with regard to diagnosing and treating ED following the CME training intervention.

Conclusions. The present study shows that a relatively simple educational procedure can substantially improve the awareness of primary care physicians about the cardiovascular implications of ED and their self confidence in the management of these patients. **Mas M, García-Giralda L, Rey JR, Martínez-Salamanca JI, Guirao L, and Turbí C. Evaluating a Continuous Medical Education (CME) program to improve general practitioners awareness and practice on erectile dysfunction as a cardiovascular risk factor. J Sex Med 2011;8:1585–1593.**

Key Words. Erectile Dysfunction; Cardiovascular Disease; Continuous Medical Education; Assessment or Evaluation of Educational Programs

Introduction

Study Background

Several factors contribute to the increasing importance of sensitizing primary care physicians/general practitioners (GPs) to better detect and address erectile dysfunction (ED).

There is a growing consensus among specialists that ED represents an important and early marker for cardiovascular disease (CVD) and other pathologies [1–5]. Not only do ED and CVD share all major risk factors (including age, inactivity, smoking, obesity, hypertension, dyslipidemia, diabetes, and depression), but studies have shown

that ED is a sentinel for CVD even in asymptomatic men [3,5–8]. Given the high prevalence of both ED [9,10] and CVD particularly among men over 40, it seems clear that detecting ED and its potential comorbidities at an early stage could not only contribute to better sexual health for men and their partners but also to longer and healthier lives.

The advent of effective oral treatments for ED has heightened this concern, as media coverage and enhanced awareness have prompted many more men to seek treatment for ED. With the perception that the problem can be solved by oral pharmacological treatments, primary care clinics have emerged as the preferred setting to resolve problems associated with ED [11–13].

Yet, the condition has not lost its stigma; one 2003 study reported that 82% of men who admitted suffering from ED would have preferred their GP to raise the subject, and 74% were too embarrassed to mention the problem to their urologist [14]. More recent studies have observed similar patterns; in Italy, the ED Evaluation Network (EDEN) found in 2008 that one in five men waited a year or more before seeking treatment, reflecting a clear discomfort in speaking about the issue with their doctor [15].

The same study reported shortcomings in GP knowledge on ED. Less than 10% of physicians said that they routinely asked men over 40 about ED, and few routinely prescribed oral treatment for men with heart disease, despite established evidence pointing to its safety [15].

Thus, ED emerges as an excellent candidate for a topic of Continuous Medical Education (CME) intervention among primary care practitioners, a cornerstone of maintaining quality care in modern healthcare practice. Because not all CME courses have the same effectiveness, it is important to monitor the results achieved using different CME methodology.

Study Objectives

The objectives of this study were twofold: to assess GPs' knowledge, attitudes, and self-confidence about ED management with especial focus on the relationship between ED and CVD and to determine whether these can be improved by means of a brief training program.

Methods

In February 2009, GPs working at different locations throughout Spain were invited to participate

in a CME course on male sexual health issues and cardiovascular function/disease. The inclusion criteria specified lack of CME training on these topics.

Initially, the participant GPs completed a web-based multiple choice questionnaire (QN1), which established physician data (age, sex, and professional experience) as well as health center data (public vs. private, size of population covered, and number of patients attended weekly). Clinical knowledge and attitudes regarding the management of ED patients were also assessed, and special considerations were made to evaluate the link between ED and CVD risk factors. A set of 14 multiple choice questions dealt with the relationship between ED and CVD as well as other health problems (depression, prostate disease, dyslipidemia, hypertension, metabolic syndrome), knowledge of adequate questionnaires and complementary lab tests, whether they should proactively inquire about ED in patients presenting with these conditions, and self confidence in treating ED patients with low to moderate risk for CVD (Table 1).

Subsequently, they took part in a brief training course consisting of reading an annotated and CME-accredited set of articles followed by attendance at a live half-day seminar. The reading materials included four review articles [1–3,16] plus six research papers [9,17–21] translated into the Spanish language, each including a one-page comment by the senior author. Selection criteria for the review articles included recent publication (up to March 2009), while the research papers included were either conducted in Spain [9,17–19] or described prospective studies [20,21]. An expert team including a GP, a cardiologist, and a urologist conducted the seminar at four locations throughout the country. The seminar's contents particularly emphasized the epidemiological evidence and pathophysiological mechanisms linking ED and CVD, with especial focus on the Princeton II guidelines. The seminar included discussion of several relevant clinical cases. Following the intervention, physicians were allowed an 8-week period to complete a similar set of questions on ED and CVD (QN2). Complying participants obtained CME credits.

Main Statistical Analyses and Outcome Measures

Changes in the answers to the two questionnaires were assessed by two methods: (i) by comparing the frequency of answers with each multiple choice

Table 1 Questions regarding knowledge, attitude, and self-confidence in QN1 and QN2

1. Do you think you should ask your male patients about the presence of ED even though neither they nor their partners raise the issue?
A. Always, B. Almost always, C. Sometimes, D. Rarely, E. Never
2. Do you think that ED represent an early indicator of cardiovascular risk?
A. Fully agree, B. Agree, C. Neutral, D. Disagree, E. Fully disagree
3. Do you think it would be useful to include a question on ED in the electronic medical records?
A. Fully agree, B. Agree, C. Neutral, D. Disagree, E. Fully disagree
4. For which of the following diseases/conditions could ED be regarded as a sentinel symptom? (Yes/No):
 - Diabetes Mellitus
 - Metabolic syndrome
 - Dyslipidemia
 - Hypertension
 - Aortic stenosis
 - Coronary artery disease
 - Atrial fibrillation
 - Anxiety-depression disorder
 - Chronic pulmonary obstructive disease
 - Prostate cancer
 - Benign prostatic hyperplasia
5. Do you think you should routinely ask about ED in your diabetic patients?
A. Always, B. Almost always, C. Sometimes, D. Rarely, E. Never
6. Do you think you should routinely ask about ED in your hypertensive patients?
A. Always, B. Almost always, C. Sometimes, D. Rarely, E. Never
7. Do you think you should routinely ask about ED in your patients with dyslipidemia?
A. Always, B. Almost always, C. Sometimes, D. Rarely, E. Never
8. Do you think you should routinely ask about ED in your patients with anxiety/depression disorders?
A. Always, B. Almost always, C. Sometimes, D. Rarely, E. Never
9. Which of the following validated questionnaires are useful to evaluate ED? (Yes/No)
 - IPSS
 - AUA-SI
 - IIEF
 - SHIM
 - SF-12
10. You have a 50 years old patient, smoker, apparently healthy that presents with ED lasting from 5 months. Which of the following lab tests do you think would be more appropriate for an initial evaluation of his condition? (Yes/No)
 - Full blood count
 - Lipid profile
 - Basic biochemistry (including blood glucose, creatinine, and liver enzymes)
 - Thyroid profile
 - Prolactin
 - FSH
 - LH
 - Progesterone
 - Testosterone
 - PSA
 - Chest X-ray
 - Resting ECG
 - Stress test
11. Before prescribing one of the available PDE-5 inhibitors do you think you should explain to your patient their differences regarding efficacy, time to onset of action, duration of action and possible side effects.
A. Always, B. Almost always, C. Sometimes, D. Rarely, E. Never
12. You have an ED patient with a low-medium cardiovascular risk who wants to start therapy with a PDE-5 inhibitor, what would you do?
 - Prescribe a PDE-5 inhibitor under your supervision, controlling cardiovascular risk factors
 - Refer the patient to a cardiologist for further evaluation before starting therapy
 - Refer the patient to a urologist
 - Refer the patient to a cardiologist because this therapy represents an unacceptable added cardiovascular risk
13. Which of the following patients with ED would you refer to specialists?
 - Patient presenting with severe psychiatric disorder
 - Patient presenting with hypogonadism
 - Patient presenting with dyspnea on exertion
 - Patient unresponsive to PDE-5 inhibitors
 - Patient with clinical ischemic heart disease
14. For which of the following patients with cardiovascular disease do you think PDE-5 inhibitors are absolutely contraindicated?
 - Previous myocardial infarction but able to climb two flights of stairs easily
 - Stable angina
 - Treatment with nitrates
 - Treatment with beta-blockers
 - Previous coronary revascularization

ED = erectile dysfunction; IPSS = International Prostate Symptom Score; AUA-SI = American Urological Association Symptom Index; SHIM = Sexual Health Inventory for Men; SF-12 = Short-Form 12-Item Health Survey; FSH = follicle stimulating hormone; LH = luteinizing hormone; PSA = prostate specific antigen; ECG = electrocardiogram; PDE = phosphodiesterase.

question and (ii) by combining them—after being assigned different weights according to the most or least appropriate answer—to form three composite scores reflecting the participant knowledge (questions 2, 4, 9, 10, 14, Table 1), attitude (questions 1, 3, 5–8, 11), and self-confidence (questions 12, 13), as previously suggested [22]. Data were analyzed by tests for matched pairs using both statistical significance testing and effect size estimates [23,24], and assessment of different predictors by multivariate analysis.

Data were initially introduced in Excel (Microsoft Corp, Redmond, WA, USA), and then the statistical analyses were carried out using the SPSS (SPSS Inc., Chicago, IL, USA) and GraphPad Prism statistics software packages (GraphPad Software, San Diego, CA, USA). The Kolmogorov–Smirnov test was used to check normality, and results were analyzed using McNemar’s or chi-square tests for categorical data and for quantitative data, paired-samples *t*-test or Wilcoxon signed-rank tests were used depending on normal distribution or not. The limit for statistical significance was set at 0.05. The effect size of the observed changes between QN2 and QN1 were assessed by standardized measures including the odds ratio for the categorical measures and Cohen’s *d* for the score changes. The latter was calculated from the paired *t* values and correlation coefficients between QN2 and QN1 scores [24]. For the multivariate analyses, collinearity analyses, analysis of variance contrasts, and linear regression models were carried out.

Results

Physician and Health Center Characteristics

Of the 96 primary care physicians who were invited to take part in the study, 89 responded to the first questionnaire and 85 to the second, while 80 responded to both. The average age among the 80 GPs was 47.9 years (age range 33–62 years), while the average professional experience reported was 21.5 years (range 5–32). Sixty percent had between 10 and 25 years of experience, and 30% had over 25 years. Participants included 62 men (77.5%) and 18 women (22.5%).

Most of the physicians (73, 91.3%) worked exclusively in public health centers, while a small number (6, 7.5%) worked in both public centers and private practice. One physician (1.3%) worked only in a private center. With regards to the size of the population, nearly half (35, 43.8%) worked in cities with more than 200,000 people, while 17 (21.3%) worked in midsized cities (50,001 to

200,000 inhabitants). Furthermore, 22 physicians (27.5%) worked in towns with a population between 10,000 and 50,000 people, and six physicians (7.5%) practiced in villages with less than 10,000 inhabitants. Most of the physicians surveyed (77%) saw more than 150 patients per week (at least 30 patients per day); the average number of patients attended by each GP weekly was 227.25.

GPs Knowledge, Attitudes, and Confidence in QN1 and QN2

A marked improvement was observed in physician knowledge, attitudes, and self-confidence with regard to diagnosing and treating ED following the CME training intervention (summarized in Figures 1 and 2).

Diagnosis of ED and Potential Comorbidities

First of all, physicians became more active in their beliefs that it is necessary to proactively diagnose ED. Following the CME intervention, physicians were much more likely to enquire regularly about ED, even in asymptomatic men; in QN1, only four GPs (5%) said they “always” asked about ED issues, even if the patient did not exhibit any related symptoms, while 15 GPs (18.8%) said they “almost always” asked. In QN2, these figures jumped to 22 (27.5%) and 34 (42.5%), respectively (Figure 1C). In addition, more doctors considered that it would be useful to include a question on ED in electronic medical records programs: 70 GPs (87.5%) thought this would “definitely” or “probably” be useful in QN1, compared with 75 GPs (93.8%) in QN2. Most notably, though, the number of doctors who had answered that this would “definitely” be useful nearly doubled from 26 (32.5%) to 49 (61.3%; $P < 0.001$).

Convictions about the link between ED and heart disease were also reinforced. Most physicians (71, 88.8%) already agreed or strongly agreed that ED was a sentinel syndrome for CVD in QN1. However, after the intervention, only two of the 80 participants did not agree with the statement, and the number of physicians that “strongly agreed” rose from 27 (33.8%) in QN1 to 56 (70%) in QN2 (Figure 1A). Survey results also showed a consistent improvement in doctors’ ability to identify other potential comorbidities, as shown by questions inquiring on links between ED and diabetes mellitus, metabolic syndrome, dyslipidemia, hypertension, ischemic heart disease, depression, and prostate disease. Likewise, GPs learned to

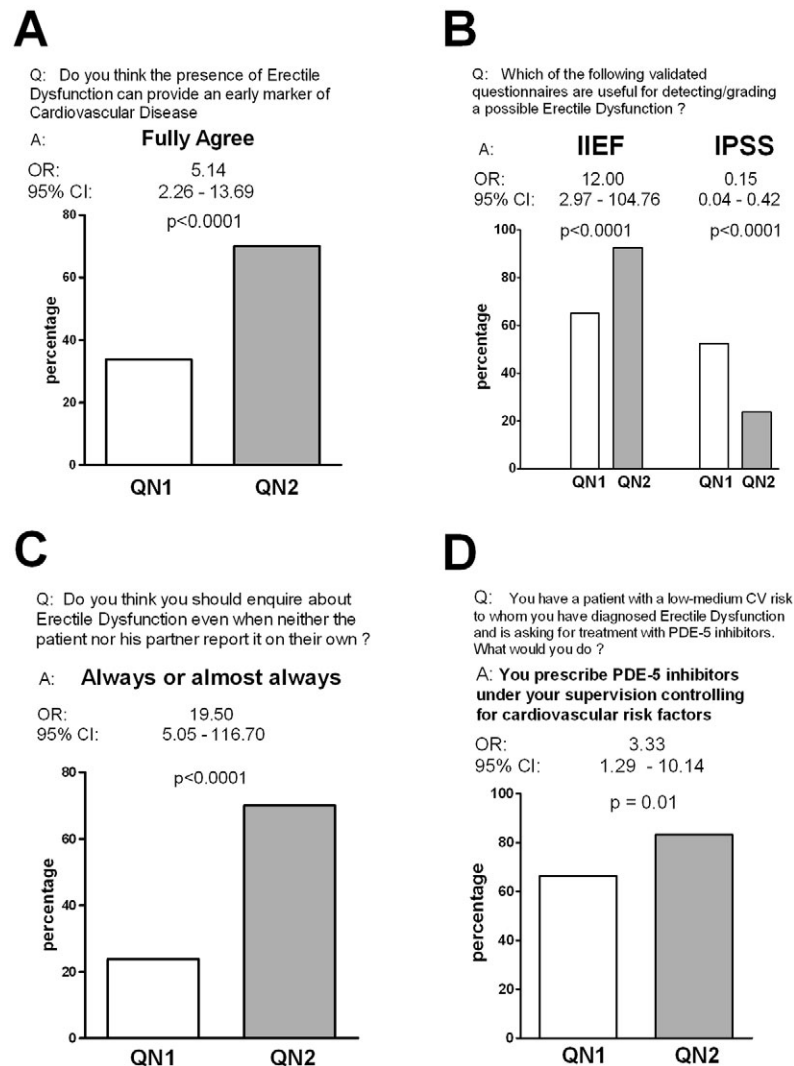


Figure 1 Representative answers of participating general practitioners (GPs) to some of the questions reflecting knowledge, attitude, and self-confidence before the educational intervention (QN1) and after it (QN2). *P* values calculated with the McNemar’s test. OR: odds ratio, CI: Confidence interval. (A) Knowledge. (B) Knowledge. (C) Attitude. (D) Self-confidence.

identify the best questionnaires for assessing ED (Figure 1B).

Physicians were also asked whether they considered it advisable to ask patients with diabetes, hypertension, dyslipidemia, and anxiety/depression about ED issues. In this case, as in others, there were marked and statistically significant improvements in beliefs on the importance of proactive diagnosis. For diabetics, the number of doctors who would “always” ask about ED rose from seven (8.8%) in QN1 to 57 (71.3%) in QN2 (*P* = 0.044). For hypertensive patients, these figures were four (5%) and 54 (67.5%) in QN1 and QN2 (*P* = 0.027), respectively; and for patients with dyslipidemia, they were two (2.5%) and 52 (65%) (*P* = 0.015). Finally, for patients with anxiety/depression, the number of GPs that would always ask about ED rose by 40, from seven (8.8%)

in QN1 to 47 (58.8%) in QN2 (*P* = 0.009; Table 2).

ED Treatment Choices, before and after the Training Intervention

GPs’ knowledge, attitudes, and use of phosphodiesterase type 5 inhibitors (PDE-5 inhibitors) were also positively modified by the training intervention. First of all, GPs showed an increased likelihood of discussing differences in efficacy, response time, duration of action, and side effects of different treatments with the patient. In QN1, 36 doctors (45%) said they always involved patients in treatment decisions, while 28 doctors (35%) reported almost always doing this. However, the former figure jumped to 62 (77.5%) in QN2 (14 doctors responded that this was the case “almost always,” for an accumulated percentage of 95%).

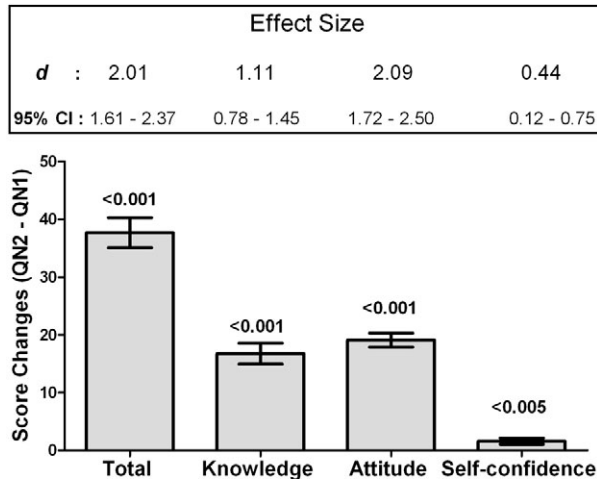


Figure 2 Changes in scores following the educational intervention (QN2—QN1). *P* values for paired *t*-tests. Effect size (*d*) was calculated from the paired *t* values and the correlation coefficients between scores at QN1 and QN2. The scores reflect the weighed responses to the questions listed in Table 1. Thus, total score: all the 14 questions; Knowledge score: questions 2, 4, 9, 10, and 14; Attitude score: questions 1, 3, 5–8, and 11); Self-confidence score: questions 12 and 13.

Moreover, GPs' confidence in treating ED patients without specialist referral saw a significant rise. Before the training intervention, over a quarter of the physicians (23, 28.8%) would recommend referral of a patient with low to medium

Table 2 Frequency of inquiries on erectile dysfunction (ED) when patient suffers from potentially related pathologies

Disease	Answers	Percentage	
		QN1	QN2
Diabetes	Always	8.8	71.3
	Almost always	41.3	23.8
	Sometimes	45.0	2.5
	Hardly ever/never	5.0	2.6
Hypertension	Always	5.0	67.5
	Almost always	21.3	23.8
	Sometimes	57.5	7.5
	Hardly ever/never	16.3	1.3
Dyslipidemia	Always	2.5	65.0
	Almost always	7.5	23.8
	Sometimes	35.0	10.0
	Hardly ever/never	55.0	1.3
Anxiety/depression	Always	8.8	58.8
	Almost always	42.5	30.0
	Sometimes	38.8	10.0
	Hardly ever/never	10.0	1.3

cardiac risk to a cardiologist and three (3.8%) would refer him to a urologist for treatment. However, in QN2, only 10 (12.5%) would recommend seeing a cardiologist, and one (1.3%) would insist on specialist referral (Figure 1D).

These results were analyzed for differences according to the physicians' sex, age, and experience. In QN1, there were statistically significant differences between male and female physicians with regard to specialist referral for men seeking PDE-5 inhibitors treatment. Men were more likely to refer a patient with low to medium cardiac risk to a cardiologist, while women tended to refer them to a urologist (*P* = 0.008); these differences were not observed in QN2. PDE-5 inhibitors prescription habits were neither influenced by the sex of the physician (*P* > 0.05), nor were significant differences found according to physician age (*P* = 0.084) or practice years (*P* = 0.388).

Physicians' responses on questions about potential contraindications for PDE-5 inhibitors prescriptions improved notably. In QN1, 87.3% responded that treatment with nitrates was a contraindication, while 7.6% believed this was the case if the patient had had a heart attack and was able to climb two flights of stairs. In addition, stable angina and coronary revascularization were believed to be contraindications for 3.8% and 1.3% of the physicians, respectively. Following the training course, 97.5% (N = 78) of the GPs answered that treatment with nitrates should preclude a PDE-5 inhibitor prescription, and only one physician (1.3%) believed that a previous heart attack (with the ability to climb two flights of stairs) was a contraindication for taking PDE-5 inhibitors.

Confidence in the Training Received on ED

Finally, physicians were asked about their confidence in the training they had received on ED. In QN1, 70.9% (56 physicians out of a total of 79 who answered these questions in both QN1 and QN2) expressed a desire to deepen their training, while 24.1% thought they had sufficient training but would like to improve, and 2.5% did not consider ED to be a priority for their continued medical education. After the training intervention, the percentage of physicians who saw themselves as sufficiently prepared almost doubled to 47.5%, while the percentage of those who did not believe they had sufficient training decreased to 46.3%.

Multivariate Model

Three multivariate linear models were calculated: one for each questionnaire (in which the scores

were explained) and another that modeled the differences between the two.

The first model explains 84.7% of the variability of the QN1 scores, with variables such as age, years of experience, questions during the patient visit, tests requested depending on the patient profile, questionnaires to detect ED, and the clinical record. The second model explains 95.7% of the total variability of QN2 scores. This was formulated with some of the same variables from the first model such as age or frequency of questions to detect ED, as well as with other variables like the characteristics of the medical center, the belief that ED is an early marker for CVD, the considerations on what is an absolute contraindication for treatment with a PDE-5 inhibitor, and the attitude regarding certain pathologies and patient profiles.

Finally, the third multivariate model used the differences in scores between QN1 and QN2 as a dependent variable, with the objective of assessing what may influence the fluctuation in points. With this third model, 85.5% of the change variability is explained. Variables included the following: treatment for hypertensive patients; ED as an early marker for CVD; consideration of absolute contraindications for the use of PDE-5 inhibitors; and inclusion of ED detection mechanisms in electronic medical records. Some complementary tests and questionnaires used to detect ED were also included as variables.

Multicollinearity diagnosis and other analyses for measurement error were carried out in all the models.

Discussion

ED is a particularly sensitive subject for men. Studies have confirmed that patients overwhelmingly prefer medical practitioners to initiate conversations about ED [5] and sexual health in general [25], making proactive diagnosis of ED a priority issue. This is doubly important given what we know about the link between ED and CVD. Because there is generally a 2–3 year lead time from the appearance of ED to a coronary event, early diagnosis of ED emerges as a highly promising strategy to diagnose CVD and to prompt potentially life-saving cardiovascular risk reduction interventions [3].

Both the studies cited above and others [22,26,27] have alluded to the insufficient preparation that most primary care physicians receive in the field of sexual health, presenting effective CME initiatives as necessary programs to

complement their knowledge and to enhance their capacity to both detect and treat ED. This study focused on one such training exercise; questionnaires distributed among 96 physicians aimed to assess their knowledge, attitudes, and confidence with regard to ED issues, both before and after taking part in a training seminar and obtaining CME credits. Special attention was paid to the following: (i) the importance of routinely raising the subject with older patients, without being asked; (ii) GPs' knowledge on the link between ED and CVD; and (iii) best practices to detect and treat ED.

Prior to the intervention, less than a quarter of GPs "always" or "almost always" asked asymptomatic men about ED, and less than half reported asking about this issue with patients that had related risk factors. These results are generally consistent with the Italian EDEN study, which found that 9.6% of GPs routinely asked men older than 40 about ED, and 45.2% investigated the presence of ED for men with identifiable risk factors [15]. In the present study, after the training intervention, substantial improvements were observed in the proactive diagnosis of ED, both in patients at risk and for apparently healthy men. Results also showed a marked improvement in their knowledge on the link between ED, CVD, and other potential comorbidities. While most physicians agreed before training that ED could be a sentinel syndrome for other serious but sometimes "silent" health issues, this conviction was strongly reinforced over the course of the study. Finally, doctors showed greater ability and confidence in using the tools available to them to both detect (through questionnaires) and treat ED (with PDE-5 inhibitors).

Unlike the EDEN report [15], the present study found no differences in physician attitudes or knowledge based on gender or experience other than the likelihood of referring the patients to a cardiologist or a urologist in QN1, although they were no longer found after the training. This could be a result of different country contexts or a relatively small sample size in both investigations, especially the low number of women physicians enrolled in both studies.

Study limitations include the small sample size, although that was partly compensated by the repeated measures design. The study participants were self-selected on the basis of being interested on learning about male sexual health issues as related to CVD, which translated into a majority of participants being male physicians, whereas

over 50% of GPs in Spain are women. Indeed, the physician's gender is an important component for the evaluation and management of sexual dysfunctions as surveys show that physicians report greater discomfort when interviewing opposite gender patients [28]. The difficulty for addressing this issue when conducting CME activities is inherent to the attendants' self-selection based on interest about the topic being offered; for instance, an overwhelming majority of GPs attending courses on gender violence detection in this country are women. In order to improve compliance, we limited the learning materials distributed to the participating GPs to 10 papers, which excluded many valuable reviews and research papers, although many additional data including the Princeton II guidelines were presented and discussed at the seminars. Finally, the 8-week interval time between QN1 and QN2 was too short to show effects in the long run; that should be addressed by further studies assessing long-term effects of the training.

Conclusion

The link between ED and other potentially fatal pathologies such as CVD (even in sometimes asymptomatic men) makes ED management a priority for men's health. Currently, there are many physicians whose skills could be enhanced to deal with this pathology more effectively. The present study shows that a relatively simple educational intervention can substantially improve the awareness of primary care physicians about the cardiovascular implications of ED and their self-confidence in the management of these patients. Our results justify the implementation of similar CME training programs in Spain in order to adequately prepare physicians to detect and treat ED and related pathologies.

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Conflict of Interest: Dr. Turbí is an employee of Eli Lilly Spain.

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(b) Acquisition of Data

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(c) Analysis and Interpretation of Data

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Category 3

(a) Final Approval of the Completed Manuscript

Manuel Mas; Luís García-Giralda; Juan Ramón Rey; Juan Ignacio Martínez-Salamanca; Carmen Turbí

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