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ERECTILE DYSFUNCTION IN THE CARDIOLOGY PRACTICE

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INTRODUCTION

Erectile dysfunction (ED) and cardiovascular disease (CVD) share common risk factors including age, hypertension, metabolic syndrome and atherosclerosis. Consequently, ED has been shown to be a powerful predictor of future cardiovascular events, myocardial infarction (MI), cerebrovascular events and all-cause mortality. And it shows a trend to increase risk for cardiovascular mortality. The predictive ability of ED is higher in younger ED patients despite the fact that probability of ED increases with age and it most likely identifies a group of patients with early and aggressive vascular disease [1-3]. These findings support implementation of ED assessment into clinical practice and stress the need to establish standardized methods to diagnose ED. Back and Forth, ED is very common in patients with CVDs; prevalence rates up to 75% in men with chronic stable coronary artery disease (CAD) have been shown [4]. Furthermore, a number of medications have been associated with an increased risk for ED, including first- and second generation β -receptor blockers, and thiazide diuretics [5]. Knowing that sexual activity is considered an important component of patients' and their partners' quality of life, independent of age [6;7]. A large body of research in the past decades has led to recommendations and guidelines for safe management of cardiac patients regarding sexual activity and the treatment of ED [8-11]. Recently a consensus document from the American Heart Association and the ESC Council on Cardiovascular Nursing and Allied Professions was published to synthesize and summarize current evidence related to sexual counseling in CVD and to provide direction to health care professionals is sexual counseling [12]. However, despite the abundance of evidence and guidelines, application of this knowledge in clinical practice has been limited[5;13-15]. This appears to be due to a lack of training in raising and discussing the subject sexual dysfunction [15]. Furthermore, it is unknown whether male patients have specific needs and wishes concerning sexual health counseling. Various interventions may improve management of ED in cardiology, some more timely and costly than others. We aimed to assess the burden of ED in a multi centered cross-sectional cohort of males visiting outpatient cardiology clinics in the Netherlands and to assess patients' attitude towards sexual health care in cardiology. We sought to identify male patients' view of possible improvements in sexual healthcare and the preferred forms of sexual counseling in the cardiology practice. Presenting a range of easy-to-use options, our results may contribute to the improvement of patient centered healthcare in cardiology.

METHODS

Setting and participants

In February 2013, a total of 650 surveys were mailed to a cross sectional cohort of adult male patients that consulted a cardiologists in one of two participating 'Cardiology Centers of the Netherlands' (CCN) (G.A.S, I.I.T., CCN location Amsterdam or G. J. d. G., CCN location Voorschoten) between January 2011 and January 2012. Furthermore 200 questionnaires were randomly distributed to adult male patients visiting the outpatient cardiology department of the Leiden University Medical Center (academic hospital) or the Diaconessen Hospital Leiden (local general hospital) between May 2012 and January 2013. The questionnaires were accompanied by a letter explaining the nature, scope, objectives and contents of the questionnaire and ensuring total anonymity. An information sheet indicating participation was voluntary and ensuring confidentiality was provided with each survey. People unwilling to participate could mark the consent form stating their unwillingness; a question was added to obtain their reason(s) not to participate. In the two other outpatient clinics, the questionnaires were distributed by the secretary in closed envelopes. Patients were asked to fill out the questionnaire at home and return it by mail in the provided freepost envelope.

Two independent researchers (M.P.J.N and J.v.B.) were responsible for the processing of the questionnaires. The returned questionnaires could not be traced back to patients' records. Because of this anonymous design, reminders could not be sent out to non-respondents. The protocol was approved by the institutional Committee for Medical Ethics (MEC) at the Leiden University Medical Center and the boards of the three other participating centers. No extramural funding was used to support this work.

All patient presenting with chest pain, hypertension, arrhythmias, dyspnea, dizziness and vascular problems, aged older than 18 years and the ability to understand the Dutch or English language (appendix) were included. While aiming to obtain information about a cross sectional cohort of male patients visiting the outpatient cardiac clinic; patients visiting for a regular check up or medical inspection in which no cardiac problems were found were also included. Because of this design, data from both sexual active and sexually inactive men were obtained. Study flow chart is displayed in Figure 1 to accurately indicate sources and methods of selection of participants.

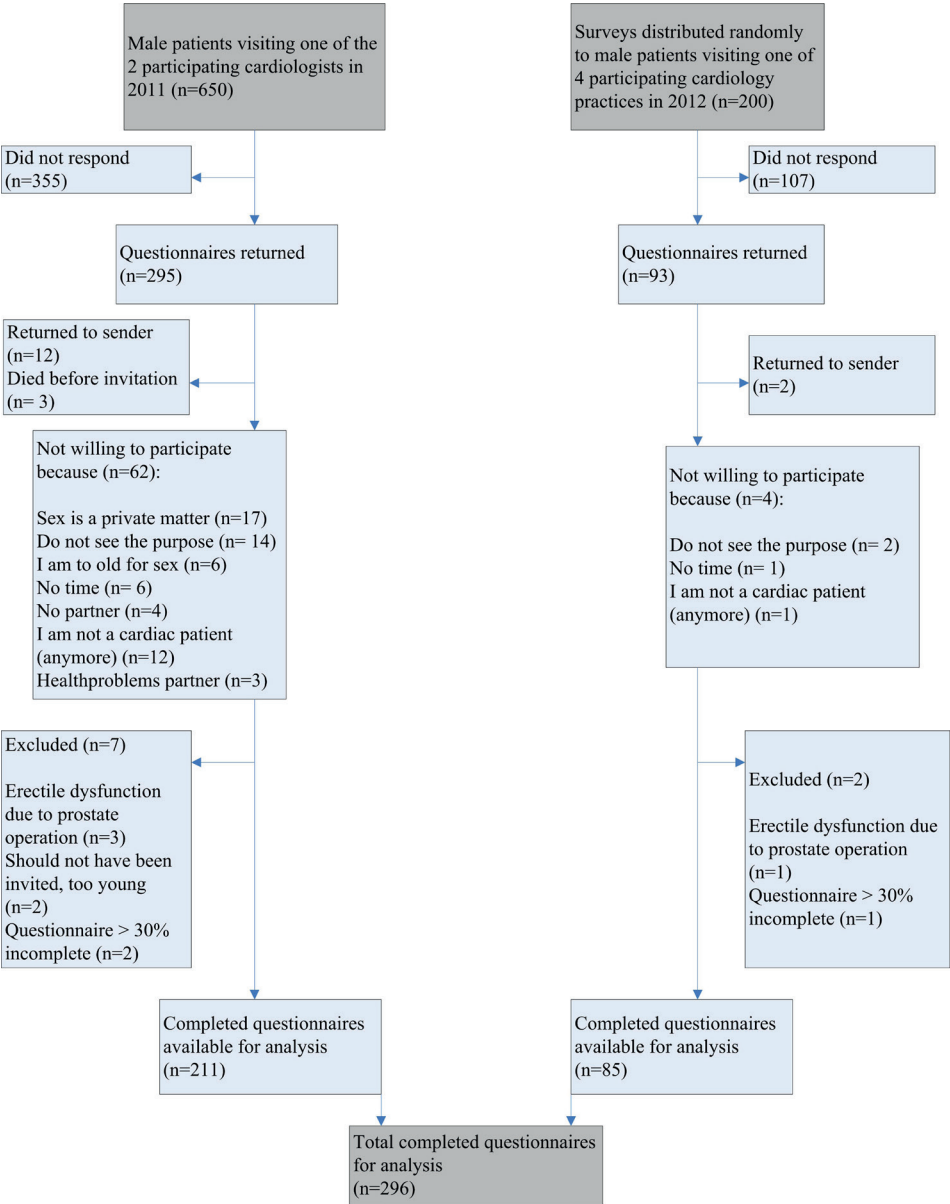
Survey Instrument

Established, validated questionnaires about sexual function and quality of life were used to develop a 25-item gender-specific survey directed towards male patients with all possible indications for consulting a cardiologist. The survey consisted of three sections and was developed to address several aspects of ED, ED-related distress and to gain insight into patients needs regarding availability of sexual health care. The first part was designed to obtain demographic information including the reason(s) for consultation. To obtain information about erectile function, the validated *Sexual Health Inventory for Men* (SHIM) was used for the second part of the questionnaire. Of the SHIM, we used the abbreviated international index of erectile function (IIEF-5) which is a widely used scale for screening and diagnosis of ED and severity of ED in clinical practice and research [16]. Several questions from the validated Female Sexual Function Index were added to obtain information about sexual dysfunction- related distress in life and relationship [17]. Furthermore, information about use of phosphodiesterase inhibitors was obtained. The last part of the questionnaire was designed by our research group in order to assess patients' opinion about discussing sexual health in the cardiology practice, to identify if more attention to ED would be welcomed and, if so, in which form this would preferably be. A multidisciplinary expert panel with experience in developing surveys checked the questionnaire for comprehensiveness and quality. Furthermore, the survey was pilot tested with 10 males consulting one of the participating centers to assess its suitability and comprehensiveness and was adjusted according to the remarks made.

Data Analysis

Results were summarized by reporting responses on all survey items. Frequencies of demographic characteristics, health behaviors, chronic conditions, and aspects of sexual function were presented. Prevalence of ED was based on IIEF-5 score of <21, and severity of ED was assessed following the guidelines [18] with mild 17-21; mild to moderate 12-16; moderate 8-11 and severe 1-7. Numerical demographic values were summarized as mean (SD). Differences in numerical data between demographic groups were analysed with independent sample t-tests, χ^2 tests were used to assess association between categorical respondents' characteristics and categorical responses. Bivariate correlations were used to correlate IIEF-5 scores with bother-scores. Statistical significance was defined as $p < 0.05$, all tests were 2 sided, and confidence intervals were defined as 95%. Analyses were conducted using SPSS release 20 (SPSS Inc., Chicago, IL, USA).

Figure 1. Study flow diagram



RESULTS

Demographic data

Mean age of the 296 respondents was 62.9 years (± 11.1). For 86.1% of these men, a cardiac diagnose was made. The other 13.9% came for cardiac screening or check-up, and no cardiovascular problems were found. Of the respondents, 16.1% used one, 26.5% used two, and 29.9% used 3 $\geq$ cardiac agents (see Table 1).

Erectile function and sexual activity

ED, as defined by an IIEF-5 score of <21 , was prevalent in 165 (65%) of the 255 men that completed the IIEF-5 questionnaire. Of these, 240 had been sexually active in the past year and 15 had been sexual inactive. An IIEF-5 score <21 was significantly associated with current and former smoking (linear-by-linear association, $p=0.001$) and body mass index (BMI) $>25 \text{ kg/m}^3$ ($p=0.007$). The prevalence of ED increased with age starting from age 40 (Figure 2).

Almost three quarters of patients with CAD had ED (74.3%, $p=0.049$) and the majority of patients which had a myocardial infarction (MI) (83%) or heart failure (86%) scored <21 points on the IIEF-5 scale ($p=0.031$). In contrast, patients in which no cardiac diagnosis was made, ED was seen significantly less often (39%, $p=<0.001$); for more details see Figure 3. Of the respondents 81% had been sexually active in the past 12 months. The number of respondents that was sexual active diminished with age, of men >80 years 22% had been sexual active. The men who had not engaged in sexual activity ($n=86$) were prompted to state one or multiple reasons. Lack of interest was reported by 15% ($n=13$) and 23% ($n=20$) mentioned physical problems or insufficient condition. The most stated reason not to be sexually active was ED (43%; $n=37$).

To the question "Did you reckon the cardiac medication you take influences your sexual life?" 53% of the respondents that used one or more cardiovascular agents ($n=202$) answered with "no influence", 4% noticed a positive influence, 36% noticed a negative influence of the medication and 7% did not know.

Respondents were asked to score discomfort experienced due to sexual dysfunction on a scale from 0 to 10. The mean bother score was 5.9 (± 2.6). This bother was negatively correlated to the IIEF-5 scores ($r=-0.63$; $p<0.001$; figure 4). Mean influence of sexual dysfunction on respondents' marriages/relationships was 3.3 (± 3.3) on a 0 to 10 scale. The IIEF-5 score was weakly negative correlated with experienced influence on the relationship ($r=-0.30$, $p=0.003$).

Table 1. Characteristics of study sample

Patients Characteristics	n=296 ^a
Age, mean (range), years	62.9 (20-94)
Weight, mean (SD), kg	85.9 (±13.7)
Height, mean (SD), cm	180.3 (±6.9)
BMI, mean, (SD), kg/m ³	26.4 (±3.6)
Nationality	n (%)
Dutch	268 (91.5)
Other western country	10 (3.4)
Non-western country	13 (4.4)
Cardiovascular agents^b	n (%)
α-receptor blocker	13 (4.4)
ACE inhibitor	95 (32.4)
ARB	57 (19.5)
β-receptor blocker	103 (35.2)
Calcium-antagonists	44 (15.0)
Digoxin	11 (3.8)
Loop diuretic	11 (3.8)
Thiazide diuretic	33 (11.3)
Nitrate	20 (6.8)
Statin	112 (38.2)
Other	16 (5.4)
Co-medication^b	n (%)
Coumarin derivatives	37 (12.5)
Platelet Aggregation Inhibitors	90 (30.5)
Diabetes medication	13 (9.4)
Anti-depressants	4 (2.1)
Smoking	n (%)
Yes	31 (10.5)
No	140 (47.5)
Quited < 1 year ago	10 (3.4)
Quited >1-5 years ago	13 (4.3)
Quited >5-10 years ago	15 (5.1)
Quited >10-20 years ago	27 (9.2)
Quited >20 years ago	59 (20.0)
Cardiac diagnose^b	n (%)
Coronary Artery Disease	86 (29.2)
Hypertension	90 (30.5)
Arrhythmias	87 (29.5)
Myocardial infarction	34 (11.5)
Heartfailure	10 (3.4)
Valvular Heart Disease	25 (8.5)
Primary Myocardial Disease	5 (1.7)
Congenital Heart Disease	4 (1.4)
No cardiac diagnose	41 (13.9)

Abbreviations: ARB, angiotensin receptor blocker; ACE, Angiotensine converting enzyme; BMI, body mass index. ^a Columns may not add to 296 due to missing value. ^b Multiple answers were possible, total exceeds 296

Figure 2. Prevalence of erectile dysfunction (ED) by age group

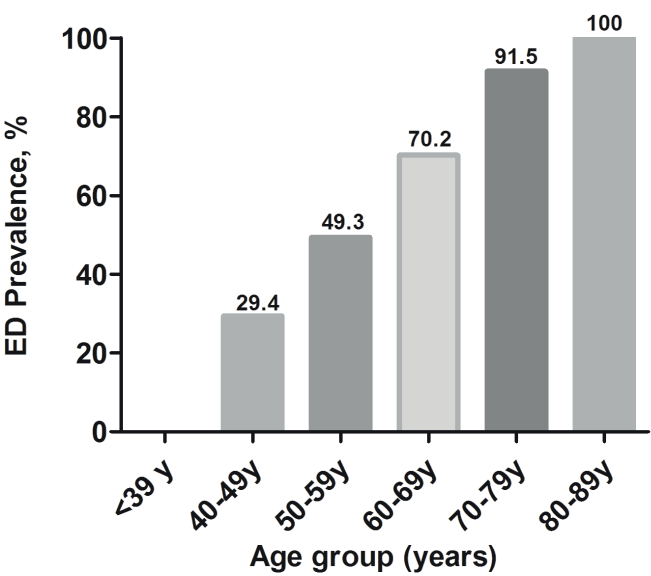
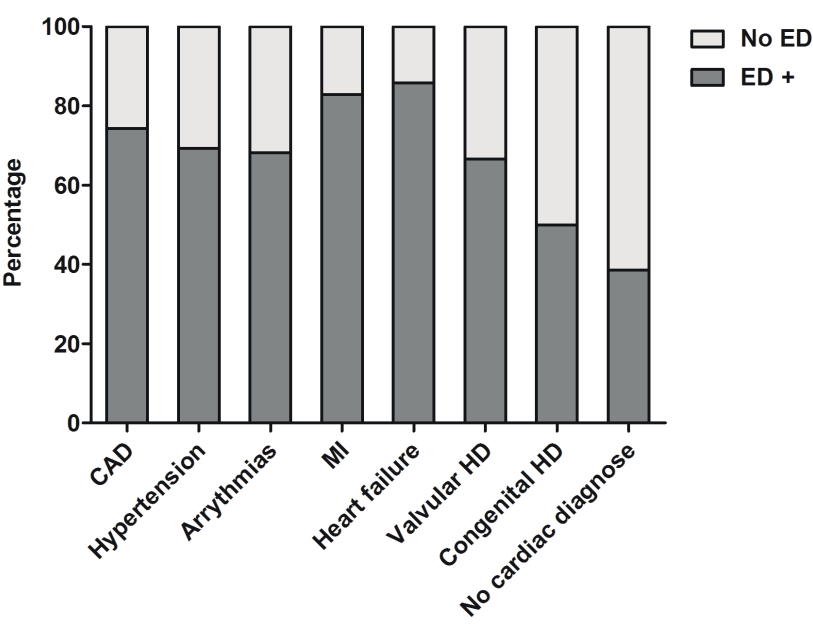
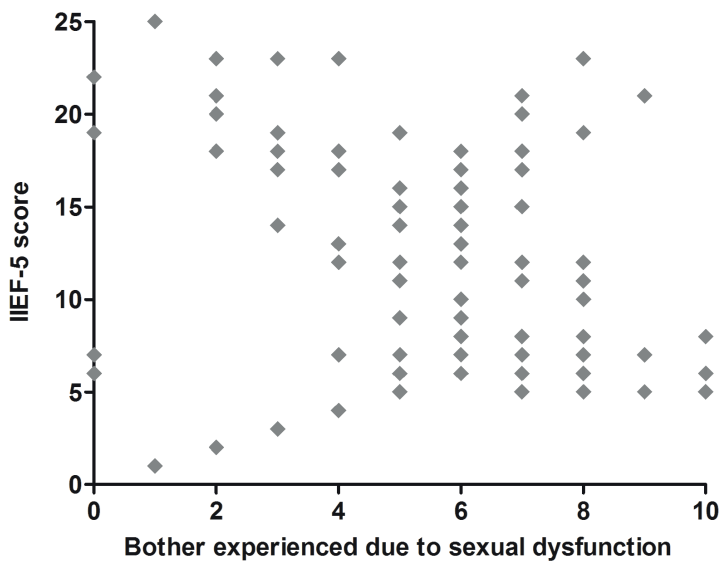


Figure 3. Cardiac diagnose made and distribution of erectile dysfunction



Abbreviations: CAD = coronary artery disease; MI, Myocardial infarction; HD = Heart Disease; No ED, No erectile dysfunction; ED +, Erectile dysfunction;

Figure 4. Bother experienced due to sexual dysfunction versus IIEF-5 score

Based on data from 212 men. Bother was expressed on a scale from 0 to 10

Patients' perception: care for ED in the cardiology practice

None of the respondents stated it would annoy them if the cardiologist would ask about sexual function; 1 patient said this question would offend him. Most respondents considered a question about sexual health as something positive (Table 2). Respondents' opinions regarding several possibilities for the improvement of sexual healthcare in cardiology were summarized in Table 3. Of men with ED ($n=165$), 46% ($n=75$) would like to have a conversation with the cardiologist about possibilities to improve sexual function, 55% ($n=90$) would be helped if questions could be asked during consultation with a nurse and 58% ($n=95$) with written information. Of those that stated cardiologists do not have to ask about sexual health ($n=55$), 27% ($n=15$) said not to believe the cardiologists could help and 24% said sex was not important for them ($n=13$). Five men (9%) felt too old to have sex; all of them were older than 80 years. Other reasons for not being willing to discuss sexual function were: "Sex is a private matter" (5%; $n=3$), "I do not want to claim my doctors' time for something like that" (5%) and "there is no relationship with my complaints" (18%; $n=10$).

Table 2. Patients’ opinion about discussing sexual function with the cardiologist

If the cardiologist would ask you about your sexual function during a consultation, how would you feel about that?	n(%), n=290 ^a
Uncomfortable	19 (6.6%)
Annoyed	0 (0)
Offended (sex is a private matter)	1 (0.3%)
I do not think the cardiologist can help me with sexual problems	19 (6.6%)
I would not mind	132 (45.5%)
It seems logical to ask	90 (31%)
I would be happy if the cardiologist started about it	45 (15.5%)
Relieved	17 (5.9%)
I think it is necessary for a complete consultation	95 (32.9%)

^a Multiple answers were possible.

Of the 296 participants, 50% (n=149) considered themselves to have a sexual dysfunction, 62 would like to try treatment for it (42%), see Table 3. No significant differences were seen regarding questions about sexual health care between the different age categories. But the older the patients, the lower was his wish for treatment (linear-by-linear-association $p=0.001$).

Phosphodiesterase 5 inhibitors

Of all respondents (n=296), 28% (n=83) tried a PDE5 inhibitor at least once. Of the sexual active men with ED (n=152), 37% tried or used it and of the sexual active men without ED (n=89), 11% did. Of patients that indicated not to have been sexual active the past year, 32% (n=53) tried a PDE5 inhibitor.

Most (65%; n=56) of the respondents that used a PDE-5 inhibitor, got it prescribed by the general practitioner, 8% (n=7) obtained it from a friend or family member and 2% (n=2) ordered it on the internet. Almost a quarter (24%) obtained the prescription from a medical specialist, of which 4% from the cardiologist.

Table 3. Wish for treatment of ED and preferred forms of care as can be offered in the cardiology practice

If there would be a treatment option for your sexual problem (ED), would you be willing to try this?	n (%) n=296
Yes	62 (20.9)
No	39 (13.2)
Maybe	48 (16.2)
Not applicable (no sexual dysfunction)	147 (49.7)
Would be helped with written information about sexual dysfunction and its possible solutions?	n (%) n=296
Yes	117 (39.5)
No	79 (26.7)
Not applicable (I do not have a sexual problem)	100 (33.8)
Would you be helped if you could ask questions about sexual dysfunction during consultation with a specialized nurse?	n (%) n=296
Yes	124 (41.9)
No	54 (18.2)
Not applicable (no sexual dysfunction)	118 (39.9)
Would you like to have a conversation with the cardiologist about possibilities to improve your sexual life?	n (%) n=296
Yes	88 (29.7)
No	109 (36.8)
Not applicable (no sexual dysfunction)	99 (33.4)
What would you like the cardiologist to do regarding your sexual problem (ED)?	n (%) n=110*
Just listen to me	5 (4.5)
Give me some advise how to deal with it	37 (33.6)
Give me explanation about how it works	25 (22.7)
Refer me to an urologist	15 (13.6)
Refer me to a sexologist	15 (13.6)
Refer me to a psychologist	9 (8.2)
Give me information so I can read about it	30 (27.3)
Give me some information and let me think about treatment options at home	34 (30.9)
Change my medication if possible	10 (9.1)

Based on answers of 110 patients which stated to have a wish for treatment (yes or maybe), data from two respondents are missing. Multiple answers were possible.

DISCUSSION

This study characterized male patients visiting general cardiac outpatient clinics in terms of demographics, cardiac diagnosis, erectile function and attitudes towards sexual counseling. It adds to the literature as it is the first study to describe views and preferences of sexual health care in a cross-sectional cohort of males visiting an outpatient cardiology practice. ED was prevalent in more than half of men in this cohort and the most stated reason not to be sexual active. Patients experienced significant bother due to the ED. Half of men with ED would feel helped discussing it with the cardiologist and the majority indicated both written information about treatment options and consultation with a nurse would be helpful options.

In 1980, the Massachusetts Male Aging Study (MMAS) reported prevalence's for complete ED ranging from five percent at age 40 years to fifteen percent at age 70 years. For mild and moderate ED, prevalence estimates were 17% and 25%, respectively [19]. In men with CVD, prevalence rates of ED are much higher ranging from 42 to 75% [4;20]. In accordance with our results, in literature ED was found in up to three quarters of patients with established CAD [4] and in as much as 84% of men with heart failure [21]. In a study evaluating the view of patients with chronic CAD regarding the discussion of sexuality with the cardiologist, 73% of responding men indicated they were comfortable with that. Our results were similar, showing that most respondents would feel comfortable and would appreciate discussion about sexual function [13].

Findings should be considered in the light of potential study limitations. On the one hand, the sensitive nature of the topic explored may have led to non-response bias. Especially widowers, singles and patients in poor mental or physical health may have elected not to participate. On the other hand, non-respondents may have been content with their erectile function and considered their participation irrelevant. Our findings were consistent with prior research and the demographic data were comparable with statistics from general cardiological clinics [22;23]. However, non-respondents have been shown to have worse health status than the population average and to be less satisfied with medical care [24]. To minimize potential biases, we provided detailed assurances of confidentiality, pilot tested and refined the instrument and used balanced keying.

Time after a cardiac event and the New York Heart Association classification for heart failure have been shown to be important factors in sexual function [12;25], our data would have been more complete if we could have included that information. However, because of restrictions imposed by the Committee for Medical Ethics, we could not link questionnaires with patient files and therefore were unable to obtain these data.

In the past years, since ED has been shown to be an important sentinel marker for CVD, several reviews and guidelines for the management of ED in patients with CVD have been proposed [5;9;11;26]. Consequently, cardiologists should be aware that ED is part of their responsibility. As ED is predominantly a vascular disease and associated with an increase in cardiovascular events, CVD and all-cause mortality, cardiologists have to recognize ED within their remit and must routinely ask about it. If followed by appropriate preventive action, this can improve and may save lives [11]. Vice versa, this study showed that ED is highly prevalent in patients with a variety of cardiovascular diagnosis, and it influences quality of life. Indicating that care for ED in the cardiology practice is important as well. Jackson et al. proposed a flowchart for cardiovascular risk assessment in men with ED and known cardiovascular risks factors, starting with “sexual inquiry of all men” [11]. However, exactly this seems to be the crux of the matter: the problem is the translation of knowledge about the importance of ED in cardiology into actions in daily practice. Recently, a survey among Dutch cardiologists showed inquiry about ED is not yet routine. Many cardiologists (61.5%) reported not to feel responsible for this part of patient care. Nevertheless, 41.9% indicated they would benefit from training regarding treatment of sexual dysfunction in patients with cardiovascular disease and stated the necessity of a referral directory [15]. Present study showed sexual counseling and attention for ED is required for ambulant cardiology patients. Although it may be unrealistic to expect all cardiologists to have the time and expertise to provide adequate sexual counseling; the results of this survey indicate that small adjustments can enable cardiac clinics to provide their patients with sufficient information. Patients indicated that consultation with a nurse and written information would be helpful, even more so than consultation with the cardiologist. For nurses in cardiology, guidelines summarizing approaches to discuss sexuality and advises for follow-up are already available [27].

Explanation and advice about the mechanisms behind ED and its treatment options should be available for all men with CVD. Providing leaflets with information about ED may be convenient and will lower the threshold for patients to bring up the subject during consultation. Information for the partner should not be forgotten. Partners often have considerable concerns, often more so than patients [28;29]. Most of the time information is for the person with the cardiac disease and partners may feel their needs are pushed aside [30], guidelines therefore indicate the importance for partner information as well [12]. In patients indicating to be bothered by ED, several steps can be taken to improve erectile function. As stated in the guidelines, advising about lifestyle modification (i.e. reduced caloric intake and smoking cessation) is a rational first step because next to prevention of cardiovascular events, lifestyle changes may improve erectile function [10;11]. It should

be emphasized that a sedentary lifestyle is a potential modifiable risk factor in men with ED and empirical studies provide support for the beneficial role of increasing exercise [12;31;32].

Furthermore, a switch in antihypertensive medication may significantly ameliorate sexual and erectile function. If possible, prior antihypertensive therapy should be switched to either a third-generation β -1 blocker or an angiotensine receptor blocker [33;34]. If no other options are available, use of ACE inhibitors or calcium-channel blockers is not associated with ED; agents from these classes can be prescribed safely [35;36]. Prescription of a PDE5 inhibitor should be the next step. If erectile dysfunction persists after correct PDE5 inhibitor use, referral to an urologist should be considered for further diagnosis and other therapeutic options (e.g. testosterone suppletion or intracavernosal prostaglandin E1). In patients with other sexual dysfunction and in those in need for advice to improve their sexual life otherwise, referral to a sexologist is useful.

In conclusion, next to the necessity of cardiovascular risk assessment in men with ED, ED is highly prevalent in ambulant cardiac patients, and information regarding ED and its treatment is mandatory. This information and sexual counseling can be provided in several ways; both consultations with the cardiologist or a (specialized) nurse, as well as written information would be accommodating.

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