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Authors

Eastwood, Jo-Ann
Doering, Lynn V
Dracup, Kathleen
et al.

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Care of Patients with Coronary Heart Disease

Health-related quality of life: The impact of diagnostic angiography

Jo-Ann Eastwood, PhD, RN, CCNS, ACNP-BC, CCRN^{a,b,*},
Lynn V. Doering, RN, DNSc, FAAN^a, Kathleen Dracup, RN, DNSc, FAAN^c,
Lorraine Evangelista, PhD, RN^a, Ron D. Hays, PhD^d

^a School of Nursing, University of California Los Angeles, Los Angeles, California

^b Women's Heart Program, Cedars-Sinai Medical Center, Los Angeles, California

^c School of Nursing, University of California San Francisco, San Francisco, California

^d School of Public Health and David Geffen School of Medicine, Health Services Research, University of California Los Angeles, Los Angeles, California

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ABSTRACT

BACKGROUND: Little is known regarding the effects of index angiograms on health-related quality of life related to angiographic outcome, that is, positive or negative for coronary heart disease (CHD).

METHODS: A longitudinal, comparative design was used. Ninety-three patients underwent initial angiography and completed questionnaires (Cardiac-Quality of Life Index, Short Form-36 mental and physical, and Cardiac Attitudes Index) before, 1 week and 1 year after angiography. Data were evaluated with linear regression and analysis of variance.

RESULTS: Fifty-five patients were CHD positive (age 65.3 ± 10.7 years, 49% were female), and 38 patients were CHD negative (age 59.5 ± 12 years, 53% were female). Compared with CHD-positive patients over 1 year, CHD-negative patients reported lower scores on the Cardiac-Quality of Life Index ($P < .008$), Short Form-36 mental and physical measures ($P = .004$), and Cardiac Attitudes Index ($P = .05$).

CONCLUSION: CHD-negative patients experienced lower health-related quality of life and lower perceived control than CHD-positive patients. After an index angiogram, a negative finding may not be sufficient to relieve negative emotions.

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* Corresponding author: Jo-Ann Eastwood, PhD, RN, CCNS, ACNP-BC, CCRN, Factor Building, UCLA Office 4-254, 700 Tiverton Avenue, Los Angeles, CA 90095-1702.

E-mail address: jeastwoo@sonnet.ucla.edu (J.-A. Eastwood).

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Cardiovascular disease is among the most prevalent, costly, and preventable of all health problems and contributes heavily to death, illness, and disability in the United States.¹ As the US population ages, the incidence and prevalence of coronary heart disease (CHD) are growing at an exponential rate. A multitude of widely used treatments are available to patients newly diagnosed with CHD, and research regarding the physical and psychologic effects of treatments is growing.

After positive results are obtained in a noninvasive study, the next diagnostic step is angiography, which remains the gold standard for the diagnosis of CHD. From 1979 to 2004, the number of cardiac angiograms increased 334%. In 2004 alone, an estimated 1,297,000 inpatient cardiac angiograms were performed. Treatment interventions have also increased. An estimated 664,000 percutaneous coronary interventions (PCIs), including 615,000 stent placements, were performed nationally.¹ It is evident that the number of patients undergoing PCIs will continue to increase.

After an angiogram, an important aspect of a positive diagnosis of CHD is the effect it may have on one's health-related quality of life (HRQOL). In the last decade, effectiveness of cardiovascular therapies has frequently included the measurement of HRQOL.^{2–5} There is compelling and increasing evidence that HRQOL, which includes physical, psychologic, and social domains, is associated with the diagnosis of CHD, its progression, and outcomes of its treatment.^{5,6} Even when procedures, such as PCI or coronary artery bypass graft (CABG) surgery, provide effective revascularization of the heart, residual physical or psychosocial limitations and the diagnosis of CHD itself may alter patients' HRQOL.^{3,5,7–9}

Several factors are known to moderate HRQOL in the context of chronic disease, including CHD. After being diagnosed with CHD, patients experience lower levels of perceived control and higher levels of depression and anxiety.^{10,11} The uncertainty and change associated with the diagnosis of CHD are believed to threaten a patient's sense of control over health and life in general. In diverse populations, researchers have shown that this loss of control is associated with impaired psychosocial adjustment, including more anxiety and depression, and diminished self-esteem.^{12–14} In turn, the effects of low perceived control, depression, and anxiety are associated with the decline in social relationships and higher rates of mortality.^{15–17} Additional factors, such as divorce or the loss of a loved one, are considerable life stressors and may negatively affect one's recovery and HRQOL.

Although studies of HRQOL in patients with CHD have reported clinical end points of treatments,^{18–20} few studies have examined the role of the angiogram experience in relation to HRQOL. Initial longitudinal studies of HRQOL in patients post-angiogram followed only patients with positive test results, that is, clinically significant CHD.^{7,21} Virtually nothing is known about the effects of the angiogram experience on

HRQOL in individuals whose test results are negative, which in this study is defined as a finding of normal coronary arteries or clinically insignificant disease. Such individuals may remain symptomatic with chest pain but are left with no identified cause of their symptoms.

The overall goal of this study was to understand the angiogram experience and its relationship to HRQOL in patients undergoing a clinically indicated first-time angiogram. The first aim of this study was to compare the HRQOL of patients who received a positive diagnosis of CHD with the HRQOL of patients who received a negative diagnosis of CHD before the procedure and 6 weeks and 1 year after the test. On the basis of the assumption that patients who were diagnosed with obstructive disease would have more symptoms, we hypothesized that HRQOL would be lower before the angiogram for those with a subsequent diagnosis of CHD than for those without, or subclinical CHD. We also hypothesized that those with CHD would have less improvement in HRQOL at 1 year than those without CHD. The second aim was to identify correlates of change in HRQOL from pre-coronary angiogram to 6 weeks post-coronary angiogram and from pre-coronary angiogram to 1 year post-coronary angiogram (age, gender, educational level, marital status, perceived control, social support, life stress, CHD diagnosis, and anginal pattern) in patients undergoing initial angiography. Finally, we examined whether demographic variables of age, gender, educational level, marital status, psychosocial variables of life stress, perceived control and social support, and clinical variables of CHD diagnosis and anginal pattern were related to change in HRQOL. Many have studied the effects of CHD on HRQOL; however, this study was unique in that we studied patients before and after the diagnosis of CHD.

MATERIALS AND METHODS

Design and Study Population

A 2-group longitudinal, comparative, and correlational design was used. The independent variable was CHD status, either positive or negative, based on the results of an index angiogram. The dependent variable was HRQOL. Covariates included in the model were age, gender, educational level, marital status, perceived control, social support, and life stress.

A convenience sample of adult patients was drawn from private cardiology practices from 2 academic and 2 community hospitals in the Los Angeles vicinity between December 2002 and February 2004. After informed consent, patients were enrolled in the study if they were aged more than 18 years and scheduled for a clinically indicated initial diagnostic angiogram in the upcoming 2 weeks. Enrollment was limited to those

patients who could speak and read English and those who had not had a previous angiogram. Potential subjects were excluded if they had significant debilitating comorbidities, such as severe chronic obstructive pulmonary disease, renal failure requiring dialysis, or current malignancy requiring treatment.

An a priori sample size of 100 was selected on the basis of estimates of relevant effect sizes from related studies of HRQOL.^{20,22} As noted in an earlier report,²³ 103 subjects were recruited and 100 were enrolled, only 93 completed all 3 assessments (pre-angiogram, 6 weeks and 1 year post-angiogram) and are the subject of this report. With a sample of 93 participants, a general estimation of 10 subjects per variable for multivariate analyses supports adequate power for examination of up to 9 variables. Because previous studies have had inadequate numbers of women, our recruitment activities included emphasis on enrollment of women. Thus, 51% of the final sample were female. There were no demographic or clinical differences between those who completed the 1-year follow-up and those who did not.

Measures

The following 5 self-administered surveys were included in the study.

1. SF-36 Health Survey Version 2 (SF-36 v2.). The SF-36 v2 was used to measure generic HRQOL. The SF-36 v2 yields a physical health composite summary (PCS) and mental health composite summary (MCS) indices that are weighted combinations of the 8 SF-36 scale scores. The scale scores are transformed to T-scores with a mean of 50 and a standard deviation of 10 for the 1998 US general population.²⁴ Higher scores indicate a better HRQOL.²⁴ In the current study, internal consistency of the MCS and the PCS was supported with Cronbach alpha coefficients of .68 and .78, respectively.
2. Ferrans and Powers Quality of Life Index–Cardiac III (CQLI-III). The CQLI-III was used to examine disease-targeted HRQOL. The CQLI-III is divided into 2 parts, satisfaction and importance, with 36 questions in each part. Satisfaction and importance are assessed through examination of the domains of physical functioning, socioeconomic status, psychologic/spiritual state, and family life. For part 1, a 6-point scale is used with responses ranging from “very satisfied” (6) to “very dissatisfied” (1). For part 2, the 6-point scale ranges from “very important” (6) to “very unimportant” (1). Each part 1 (satisfaction) item is weighted with its paired response from part 2 (importance).

From these weighted pairs, the subscale and overall HRQOL scores are calculated. According to Ferrans and Powers,²⁵ this weighting reflects individual values and satisfaction. Scores on each of the scales range from 0 to 30, with the highest scores produced by highest satisfaction/highest

importance. In the current study, tests of internal consistency yielded Cronbach alpha coefficients of .94 and .98 at baseline and 1 year, respectively.

3. Perceived Control Cardiac Attitudes Index (CAI). The CAI measures the degree to which patients perceive that they have control over their cardiac disease. Higher scores on the CAI indicate higher feelings of control. There are 19 belief statements measuring perceived control and its converse, helplessness, in the context of cardiac disease. Patients rate their agreement with 15 statements on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) and 4 statements on a similar 7-point scale.²⁶ In the current study, tests of internal consistency yielded Cronbach alpha coefficients of .83 and .86 at baseline and 1 year, respectively.
4. Perceived Social Support. The Blumenthal Perceived Social Support Scale was used to measure perceived social support from 3 sources: family, friends, and significant others. The scale consists of 12 items rated on a 7-point scale, with 1 indicating “very strong disagreement” and 7 indicating “very strong agreement.” Possible scores range from 12 to 84, with higher scores indicating greater support.²⁷ In the current study, tests of internal consistency yielded Cronbach alpha coefficients of .93 and .95 at baseline and 1 year, respectively.
5. Life Stress Test. This instrument is a checklist of 42 stressful life events and was administered to discern whether changes in HRQOL were influenced by other important life events.²⁸ Scores that range from 0 to 149 are indicative of low susceptibility to stress-related illness, 150 to 299 are indicative of medium susceptibility to stress-related illness, and 300 or more are indicative of high susceptibility to stress-related illness.²⁸ In the current study, tests of internal consistency yielded Cronbach alpha coefficients of .73 and .67 at baseline and 1 year, respectively.

Both demographic and clinical factors, such as age, marital status, income, education, employment, and type of procedure, were collected by direct subject interview and verified by medical record review. Body mass index was calculated from height and weight measured clinically and recorded in the medical record. Patients were asked whether they were diagnosed as hypertensive by their healthcare provider. Verification of diagnosis and treatment for hypertension was obtained from a medical record review in the cardiologist's office. In accordance with the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure,²⁹ hypertension was defined as a sustained blood pressure of greater than 140/90 mm Hg.

Procedures

After approval from the participating institutional review boards, cardiologists and nurse practitioners

identified patients who met the initial study criteria, informed them of the study, gave them a study flyer, and determined their willingness to speak to study personnel. After patients' care providers ascertained their agreement to hear about the study, the research investigator explained all study procedures and obtained informed consent. Patients were approached only after the decision for elective cardiac catheterization had been made. After informed consent was obtained, the research investigator collected demographic information using a standardized data-collection tool and the scheduled date of the procedure by face-to-face interview.

Patients were asked to complete baseline questionnaires and provided with a preaddressed, stamped envelope to return questionnaires before the diagnostic procedure. Post-test questionnaires were mailed to subjects at 6 weeks and 1 year after the procedure. Follow-up telephone contacts as reminders and encouragement were used to ensure completion. Patients were compensated \$25 after completion of each of the post-test questionnaires.

Statistical Analysis

All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) version 16 (SPSS Inc, Chicago, IL). Descriptive statistics (frequencies and percentages, means and standard deviations) were used for reporting demographic, clinical, and psychosocial variables. Analysis of variance (ANOVA) or chi-square test was performed to compare CHD-positive and CHD-negative groups. Differences in HRQOL over time between CHD-positive and CHD-negative groups were evaluated by using repeated-measures ANOVA to compare the 2 groups at 3 time points: pre-procedure and 6 weeks and 1 year postprocedure. Multiple linear regression analyses were used to examine correlates of HRQOL. To select models for multivariate regression analysis, Pearson's correlations for continuous variables and Spearman's rho for categorical variables were used to estimate associations of interest. Changes in HRQOL domains (baseline to 6 weeks and baseline to 1 year) were assessed with each of the following variables: age, educational level, and respective changes in perceived control, social support, and life stress. Following bivariate correlations, multivariate models at each time point were evaluated for each of the following dependent variables: pre-procedure—PCS score, MCS score, CQLI-III score; pre-procedure to 6 weeks—changes in PCS, MCS, and CQLI-III scores; pre-procedure to 1 year—changes in PCS, MCS, and CQLI-III scores. Each model included variables that were correlated with HRQOL at the .10 level of significance or less. For 6-week and 1-year data, catheterization outcome (CHD positive or negative) and treatment (medical management, PCI, CABG) were also included.

RESULTS

Clinical and Demographic Characteristics

After initial angiography, patients were classified into 2 naturally occurring groups: those who required therapeutic attention for CHD and those who did not. For the 93 subjects in this study, 38 had no clinically significant CHD and 55 had angiographic evidence of occlusive disease (blockage $\geq 50\%$),³⁰ critical disease of the left main coronary artery, diffuse microvascular disease, or definitive interventional, surgical, or medical therapy for CHD.³¹ At each facility, determinations were made by the interventional radiologist, interventional cardiologist, or both. Data were extracted from the catheterization laboratory report from subjects' medical records.

Pre-angiogram demographic and clinical characteristics for the 93 participants are shown in Table 1. The CHD-positive patients were older (age 65.3 ± 10.7 years) than the CHD-negative group (59.5 ± 12 years, $P = .02$). Notably, all 10 of the African-Americans in the study were found to have clinically significant CHD.

Of the 93 subjects, 38 (41%) had a negative angiogram, which denoted normal coronary arteries or arteries that did not require an intervention for atherosclerosis. The patients who were positive for CHD underwent various treatment options. Of the 55 (59%) CHD-positive subjects, 23 (25%) underwent an angioplasty with stent implantation in at least 1 coronary artery, 10 (18%) underwent CABG surgery, 16 (18%) received medical treatment, and 6 (6%) received elective medical management despite a recommendation for bypass surgery.

Health-Related Quality of Life

There were significant differences noted between the CHD-positive and CHD-negative groups on some of the HRQOL instruments. However, the first hypothesis that before the angiogram HRQOL would be lower for those who were diagnosed as having CHD when compared with those who were negative for CHD was not supported. Repeated-measures ANOVA indicated that the pattern of SF-36 MCS scores over time differed between the CHD-positive and CHD-negative groups, with CHD-negative patients having MCS scores lower than community norms of 50²⁴ at each time point. Their MCS scores were lower than those of CHD-positive patients before the procedure, but increased more from baseline to 6 weeks. Data across all time points for MCS and CQL-I are shown in Figure 1. There was no significant difference in PCS scores between the CHD-positive and CHD-negative subjects at baseline and 6 weeks and 1 year (data not shown). Changes in time for summary component scores and related psychosocial variables (life stress, perceived control, and social support) are shown in Table 2.

Table 1 – Demographic and clinical characteristics by angiographic outcome (N = 93)

Characteristics	CHD positive N = 55	CHD negative N = 38	P
	Mean (SD)	Mean (SD)	
Age (y)	65.3 ± 10.7	59.5 ± 12.0	.02
BMI	29.9 ± 6.2	30.1 ± 6.6	.90
	No (%)	No (%)	
Female	27 (49)	20 (53)	.74
Married or with a partner	35 (64)	26 (68)	.63
High school education or less	16 (29)	11 (29)	.98
Employed	23 (42)	21 (55)	.20
Hypertensive	33 (60)	22 (58)	.84
Diabetic	14 (25)	9 (24)	.85
History of angina	29 (53)	17 (45)	.45
Family history of heart disease	33 (60)	20 (53)	.48
Ethnicity:			.019
Caucasian	31 (56)	29 (36)	
Hispanic	5 (9)	3 (8)	
Asian	9 (16)	4 (11)	
African American	10 (18)	0	
Other	0	2 (5)	

CHD, coronary heart disease; BMI, body mass index; SD, standard deviation; CHD negative, normal coronary arteries or no clinically significant CHD requiring intervention; CHD positive, angiographic evidence of occlusive disease (blockage ≥ 50%), critical disease of the left main coronary artery, or diffuse microvascular disease.

Figure 1 – Negative for CHD (triangles). Positive for CHD (squares). Error bars equal standard deviations. MCS, mental health composite summary; CQLI, Quality of Life Index–Cardiac III.

Multivariate linear regression models were evaluated for MCS and CQLI, because they differed over time between groups. At the pre-procedure time point, no tested models (described in the analysis plan) were significant. The model of change in MCS from pre-angiogram to 6 weeks revealed that only the presence/absence of CHD was a significant correlate of MCS ($P = .030$) (Table 3). Changes in perceived control and social support were significantly associated with change in MCS (Table 4) and change in CQLI score (Table 5).

DISCUSSION

This study begins to fill a gap in knowledge regarding how the experience of an initial angiogram

is associated with changes in HRQOL up to 1 year after the event. This is one of limited reports²³ to date that has compared the HRQOL of patients with a positive diagnosis of and treatment for CHD with that of patients with a negative initial angiogram.

Historically, women have not participated in cardiac research studies in adequate numbers, resulting in a paucity of data on women.^{32,33} A major strength of the present study is that 51% of the sample was female. Women who present with symptoms of CHD are usually a decade older than their male counterparts.¹ This finding was not true in the present study (female 62.8 ± 10.2 years, male 63 ± 12.8 years), which suggests that women undergoing initial angiogram may represent a younger cohort than women who already have CHD.

Table 2 – Differences in health-related quality of life and correlates of health-related quality of life at baseline and 1 year after angiogram in patients positive and negative for coronary heart disease (N = 93)

	CHD positive N = 55		CHD negative N = 38		P baseline	P time	P group × time
	Baseline mean ± SD	1 y mean ± SD	Baseline mean ± SD	1 y mean ± SD			
General HRQOL:							
MCS	49.8 ± 9.8	52.0 ± 11.0	42.0 ± 14.5	48.8 ± 12.4	<.01	<.01	.16
PCS	43.0 ± 10.7	45.6 ± 12.0	44.8 ± 12.3	47.5 ± 10.5	.45	.02	.71
Disease-specific HRQOL (CQLI-III)	23.3 ± 4.4	24.2 ± 4.8	20.8 ± 5.7	22.8 ± 5.2	.02	<.01	.49
Life stress	84.8 ± 83.2	67.7 ± 69.9	111.4 ± 108.8	82.2 ± 71.7	.17	.02	.61
Perceived control	65.7 ± 13.8	69.4 ± 15.2	59.6 ± 13.0	68.7 ± 17.1	.03	<.01	.05
Social support	71.4 ± 11.5	71.7 ± 10.9	70.0 ± 12.1	70.6 ± 10.6	.54	.63	.26

MCS, Mental Health Composite Summary (SF-36v2); PCS, physical health composite summary (SF-36v2); CQLI-III, Quality of Life Index–Cardiac III; SD, standard deviation.

Table 3 – Regression analysis of change in mental health composite summary from pre-angiogram to 6 weeks (N = 93)

	Total sum of squares	R ²	Degrees of freedom	F statistic	Significance
Model	15,499	.071	92	2.77	.032
Variables in final model	Standardized beta	Significance		95% CI	
Age (y)	–.190	.071		–.445 to .019	
Gender	–.057	.578		–6.68 to 3.75	
CHD Positive/negative	–.234	.030		–11.71 to –.605	

CI, confidence interval; CHD negative, normal coronary arteries or no clinically significant CHD requiring intervention; CHD positive, angiographic evidence of occlusive disease (blockage ≥ 50%), critical disease of the left main coronary artery, or diffuse microvascular disease.

Table 4 – Regression analysis of change in mental health composite summary from pre-angiogram to one year (N = 93)

	Total sum of squares	R ²	Degrees of freedom	F statistic	Significance
Model	14987.9	.179	92	5.003	.000
Variables in final model	Standardized beta	Significance		95% CI	
Age (y)	–.202	.051		–.445 to .019	
Social support (change)	.235	.018		.056 to .584	
Perceived control (change)	.305	.003		.085 to .389	
CHD positive/negative	–.076	.456		–7.126 to 3.223	

CI, confidence interval; CHD negative, normal coronary arteries or no clinically significant CHD requiring intervention; CHD positive, angiographic evidence of occlusive disease (blockage ≥ 50%), critical disease of the left main coronary artery, or diffuse microvascular disease.

Clinical and Demographic Characteristics

When demographic characteristics of CHD-positive and CHD-negative patients were compared, several differences were noted (Table 1). Among demographic characteristics, age and employment differed. Patients with CHD were approximately 5 years older and more likely to be unemployed or retired. The older age of CHD-positive patients is consistent with current knowledge: CHD is a chronic disease that manifests in the fourth decade of life or later.³⁴ The CHD-positive group included a larger percentage of African Americans than the CHD-negative group. These findings are consistent with previous information and

American Heart Association statistics regarding the increased risk of CHD in African-Americans.¹

Health-Related Quality of Life

The findings regarding HRQOL indicate that differences between CHD-positive and CHD-negative patients are confined primarily to generic mental health aspects of HRQOL (MCS) and to the disease-targeted aspects of HRQOL (CQLI). The MCS responses of CHD-positive patients were consistent with population norms.²⁴ In contrast, despite improvements over time, CHD-negative patients remain below MCS population norms at all time points (Figure 1). Similar patterns

Table 5 – Regression analysis of change in Quality of Life Index–Cardiac III from pre-angiogram to one year (N = 93)

	Total sum of squares	R ²	Degrees of freedom	F statistic	Significance
Model	1357.112	.158	6	3.874	.002
Variables in final model	Standardized beta		Significance		95% CI
Age (y)	–.121		.245		–.109 to .028
Gender	–.005		.961		–1.516 to 1.44
Social support (change)	.298		.004		.041 to .203
Perceived control (change)	.311		.003		.026 to .119
CHD positive/negative	–.031		.760		–1.820 to 1.334

CI, confidence interval; CQLI-III, Quality of Life Index–Cardiac III; CHD negative, normal coronary arteries or no clinically significant CHD requiring intervention; CHD positive, angiographic evidence of occlusive disease (blockage $\geq 50\%$), critical disease of the left main coronary artery, or diffuse microvascular disease.

were noted for the disease-specific HRQOL (CQLI). A possible explanation for these patterns is that younger patients, later found to be CHD negative, may have questioned assumptions about their health more than older patients, in whom catheterization results were positive. If CHD-negative individuals had symptoms before the angiogram, receiving negative results on the heart catheterization rendered them no definitive answers. Thus, CHD-negative patients may have interpreted their angiogram results as bad, rather than good, news.

In contrast, CHD-positive patients may have experienced a different trajectory because the solution to their symptoms was clear and definitive treatment was offered. It has been reported that patients undergoing revascularization treatments share the perception that the treatment is curative.^{35–37} It is possible that they did not understand the chronic nature of their illness.

Between-group differences over time in the physical health component of HRQOL for CHD-negative and CHD-positive patients were not significant. Unlike previous studies, there was no significant improvement in physical health scores after receiving medical, interventional, or surgical treatment. This finding was surprising in light of previous studies. Most trials have shown a greater increase in physical health status in CABG compared with PCI; however, both procedures have been reported to improve physical function in patients with CAD.³⁸ One of the most important determinants of physical health status is angina.³⁹ In the present study, there was no difference in anginal frequency between CAD-positive and CAD-negative patients. Previous studies have drawn on samples of patients from a previous generation of revascularization technology. Within the course of this study, drug-eluting stents were approved for use in the United States, so many of the patients had the benefit of newer technologic advances. In addition, adjunctive medication is now on the market, which dramatically decreases the likelihood of angina and restenosis in the patients who undergo PCIs. The interaction of age, hypertension, depression, and anginal symptoms may have played a factor in the low scores in the CAD-negative group. The mean age of patients in the CAD-

negative group was 59.5 ± 12.0 years, approximately 5 years younger than the CAD-positive patients. Although they were negative for CAD post-procedure, many presented at baseline with angina (45%). Patients who have angina report lower HRQOL.² In addition, 58% of this group also had hypertension. Patients with hypertension report lower physical health than those without hypertension.⁴⁰

Although there have been no previous studies that compare HRQOL in pre- and post-angiogram patients with and without diagnosed CHD, several large clinical trials testing specific treatments have evaluated changes in HRQOL over time. Although these studies were designed to test specific treatments (ie, revascularization by PCI vs CABG), they may inform the current findings. In these studies, investigators reported that pre-PCI appraisal of HRQOL predicted later post-PCI adverse outcomes.⁴¹ The present study identified psychosocial variables as being influential, which is novel compared with previous studies.

Multivariate analyses of factors associated with changes in MCS and CQLI from pre-procedure to 1 year were significantly associated with changes in perceived control and social support. Of note, the outcome of the cardiac evaluation seems to influence HRQOL only in the short term, as evidenced by its association with changes in MCS from pre-procedure to 6 weeks. These findings demonstrate that feelings of control and support from others are consistently related to HRQOL for up to 1 year after a cardiac evaluation, regardless of the outcome. Given these strong, enduring relationships, development of interventions to improve perceived control and social support in this population are warranted.

LIMITATIONS

Limitations in the current study include inability to randomize, responder bias, and generalizability of the findings beyond this convenience sample. Because the nature of the study precluded randomization, an assumption of equality between CHD-positive and

CHD-negative groups cannot be made. Because most initial angiograms are performed on an emergency basis, it may be difficult to generalize the results of the present study to all patients undergoing initial angiograms. This sample was restricted to those patients experiencing an initial elective angiogram. The majority of this population was drawn from the practices of private cardiologists, so patients seen in other settings may differ, limiting the generalizability of the findings to patients seen in underserved clinics or large academic medical centers.

CLINICAL IMPLICATIONS FOR NURSING PRACTICE

Findings from this study are important to advanced practice nurses and bedside nurses responsible for educating and assisting patients before discharge and through the recovery phase after angiogram. In a study by Astin and colleagues,³⁵ the majority of patients with acute myocardial infarction treated with primary PCI “viewed their illness as an acute event cured by their treatment, rather than as an acute “marker” of a long term condition.” Being aware of patients’ perceptions of their physical and mental health may assist all patients, regardless of angiogram outcome, to set realistic goals for their future. Because mental health dimensions of HRQOL were lower than those of the normal population in both of these groups before the initial angiogram, advanced practice nurses in the clinic have an excellent opportunity to provide information and interventions to reduce anxiety and uncertainty. Emphasis should be placed on educating patients early and correcting misconceptions regarding treatments as opposed to “cures.” Given the brief length of hospital stays after angiograms, these findings reinforce the importance of early evaluation and ongoing assessment of patients’ concerns, regardless of the angiographic outcome.

A major strength of this study is the focus on HRQOL outcomes, which is consistent with the Institute of Medicine’s goal of promoting patient-centeredness to improve the quality of care in the United States. To date, this is the only study that compares the psychosocial and functional status of patients who are positively diagnosed and treated for CHD with those of patients who have a negative result on initial angiogram. Additional strengths of this study were that it had a high survey response rate, included an adequate proportion of women, and used widely accepted tools for the assessment of physical and mental health status in the population with cardiac disease.

CONCLUSIONS

This study is the first to characterize the HRQOL of CHD-positive and CHD-negative patients before and

after an index angiogram. The patterns of HRQOL over time differed between CHD-positive and CHD-negative patients. Of note, patients later found to have no clinical CHD had lower pre-angiogram mental health scores and disease-targeted HRQOL than those whose angiograms were positive for CHD. Clinicians should be aware that a finding of no CHD after an index angiogram may not be sufficient to relieve negative emotions in patients. Energies traditionally are focused on educating patients with known CHD. However, further assessment of individual patients, regardless of angiographic outcome, is needed. Particular attention is warranted for those patients who continue to have undiagnosed symptoms after a negative angiogram.

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