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## Living with heart disease after angioplasty: A qualitative study of patients who have been successful or unsuccessful in multiple behavior change

Janey C. Peterson, EdD, MS, RN<sup>a</sup>, John P. Allegrante, PhD<sup>b</sup>, Paul A. Pirraglia, MD, MPH<sup>c</sup>, Laura Robbins, DSW<sup>d</sup>, K. Patrick Lane, BA<sup>a</sup>, Kathryn A. Boschert, MS<sup>a</sup>, and Mary E. Charlson, MD<sup>a</sup>

<sup>a</sup> Center for Complementary and Integrative Medicine, Weill Cornell Medical College, New York, New York <sup>b</sup> Department of Health and Behavior Studies, Teachers College, New York, New York and Department of Sociomedical Sciences, Mailman School of Public Health, Columbia University, New York; New York <sup>c</sup> Program to Integrate Psychosocial and Health Services in Chronic Diseases and Disability, Providence Veterans Administration Medical Center, Providence, Rhode Island and Brown University, Providence, Rhode Island <sup>d</sup> Education Division, Hospital for Special Surgery, New York, New York

### Abstract

**OBJECTIVE**—To document values, attitudes, and beliefs that influence behavior change among a diverse group of patients post-angioplasty.

**METHODS**—Purposive and maximum-variation sampling were used to assemble a demographically diverse patient cohort (N = 61) who had been successful or unsuccessful at post-angioplasty multibehavior change. Semistructured interviews and grounded theory methods were used to collect and analyze qualitative data.

**RESULTS**—Themes showed the following: a) Patients reported surviving a life-threatening event and feared disease recurrence and death; b) the perception of a turning point and self-determination facilitated behavior change; c) social support and spiritual beliefs promoted coping with the uncertainty of living with heart disease; and d) unsuccessful behavior change was related to physical limitations, a sense that “nothing helps,” and the belief that angioplasty “cures” heart disease.

**CONCLUSION**—Lifestyle interventions should be culturally relevant and adapted to physical abilities. Fostering self-determination and social support may promote successful behavior change.

Coronary artery disease affected 16 million Americans at an estimated cost of \$156 billion in 2008.<sup>1</sup> More than 650,000 patients undergo percutaneous transluminal coronary angioplasty (PTCA) or stent procedures annually,<sup>2</sup> representing a 324% increase in PTCA procedures between 1987 and 2002.

A World Health Organization expert committee recommends that cardiac rehabilitation be provided for all patients undergoing PTCA. However, cardiovascular risk assessment and behavioral interventions have not been reliably integrated into practice.<sup>3,4</sup> In an effort to improve post-PTCA interventions, the American College of Cardiology and American Heart Association have issued guidelines to address modifiable risk factors.<sup>5</sup> Despite these

recommendations, research shows that patients often fail to maintain changes in health behaviors after angioplasty.<sup>6</sup> For example, Witt et al<sup>7</sup> found that women are 55% less likely than men to participate in cardiac rehabilitation and that patients aged more than 70 years are 77% less likely to engage in cardiac rehabilitation than younger patients, demonstrating a large gap between what is recommended by health professionals and what behaviors are actually adopted and sustained by patients. Several qualitative studies have also reported that knowledge deficit regarding health behaviors contributes to the lack of behavior change among patients with cardiovascular disease.<sup>8,9</sup>

Several qualitative studies have been conducted among patients with coronary disease;<sup>8,9,11–19</sup> however, most have focused on patients post-myocardial infarction. Few studies have focused on patients post-PTCA.<sup>20–22</sup> Despite the fact that it has been estimated that more than 45% of African-American adults have cardiovascular disease,<sup>1</sup> which is the leading cause of death among women and African-Americans,<sup>1,10</sup> few qualitative studies have examined demographically diverse patient samples with respect to health behavior change. No studies of patients post-PTCA that include ethnically and racially diverse patient samples seem to have been reported. Thus, we sought to address this gap in the literature and advance the science of what is known by studying a diverse sample of patients post-PTCA, 60% of whom were minorities, and focusing specifically on values, attitudes, and beliefs related to cardiovascular behavior change in response to medical recommendation, not the recovery process per se.

This study was made possible because of a unique opportunity to interview patients who had been enrolled in a “parent study” 3 years previously that tested a novel intervention approach to behavior change. In the parent study, patients were provided detailed risk-factor information and education on how to begin cardiovascular risk-factor modification, thereby limiting the impact of any knowledge deficit on behavior change. We believed that studying these patients would enable us to explore the values, attitudes, and beliefs that influence behavior change among patients with coronary artery disease who did not report knowledge deficits with respect to cardiovascular behavior change and thereby contribute new findings to the literature.

Thus, the purpose of this qualitative study was to document the values, attitudes, and beliefs among a demographically and culturally diverse group of patients post-PTCA who had been *successful* or *unsuccessful* at multiple behavior change 3 years after angioplasty. The cohort of patients studied is unique in that all patients had previously participated in an intervention that provided educational materials addressing risk factors for cardiovascular disease. By using a series of open-ended questions that were asked during semistructured interviews, the study explored how the patients perceived living with heart disease and the challenges faced in changing health behaviors in response to medical recommendations. In addition, the study documented whether differences in baseline clinical status existed between patients who were subsequently successful or unsuccessful in multibehavior change post-PTCA.

## MATERIALS AND METHODS

### The parent study: Healthy Behavior Trial

Subjects were drawn from a parent study, the *Healthy Behavior Trial*, a randomized controlled trial of 660 patients who had undergone elective or urgent PTCA and/or stenting at The New York Hospital-Weill Cornell Medical Center between October 1999 and March 2001.<sup>23,24</sup> All participants in the parent trial provided informed written consent in accordance with institutional review board procedures and were enrolled within 1 month of their PTCA and followed prospectively for 2 years.

In the parent trials subjects had a mean age of 62.8 years (standard deviation = 11.5, range 33–92 years) and 27% were female. In the parent study sample, 74.6% were Caucasian, 11.7%

were African-American, and 8.9% were Latino. Forty-three percent were college graduates, and 16% had not completed high school; 43% were working full-time, and 36% were retired.

As participants in the *Healthy Behavior Trial*, all patients received a standardized risk assessment at enrollment and individualized cardiovascular risk profiles. The cardiovascular recommendations were based on the American College of Cardiology and American Heart Association guidelines for modifiable risk factors for patients who have undergone percutaneous interventions.<sup>23,24</sup> The recommendations to patients included increasing overall physical activity, increasing strength training, stopping smoking, decreasing red meat intake, decreasing cholesterol through diet and medication, increasing dietary flavonoid intake, losing weight, increasing fiber intake, improving diabetes control through diet and medication, taking beta-blockers as prescribed, taking blood pressure medication as prescribed, and increasing folic acid intake. At baseline, the patient was shown his or her own individual risk profile and then encouraged to choose 2 to 3 risk factors on which to work. “Tip sheets” for behaviors chosen by patients were provided. Patients were then followed by telephone every 3 months for 2 years.

### The Current Qualitative Study

From the parent trial, 61 patients were contacted by telephone at a mean of 3 years after enrollment in the parent trial and invited to participate in the qualitative study. Only participants who completed a 2-year follow-up in the parent trial were eligible. Participants were recruited using a combination of purposive and maximum variation sampling techniques. Purposive sampling is the intentional recruitment of participants whom the investigator believes are best suited to provide a full description of the phenomenon being studied.<sup>25</sup> To this end, equal numbers of successful and unsuccessful patients were enrolled. Patients were defined as *successful* at changing health behavior if they reported that their stage of change for chosen behaviors had reached action or maintenance according to the Transtheoretical Model<sup>26,27</sup> in 2 or more of the 12 targeted health behaviors at 12 months. Patients were defined as *unsuccessful* at changing health behavior if they had reached action or maintenance in less than 2 of the 12 behaviors.

Maximum variation sampling enabled the identification of any specific variations in beliefs that might be unique to one group or another, while also identifying patterns that might be common to all groups. To be sure that all groups of patients were equally represented in the sample, maximum variation sampling strategies were used to ensure that half of the population sample was female, as well as one-third African-American, one-third Latino, and one-third Caucasian.

### Procedures

Semistructured interviews were conducted after informed written consent was obtained. Initial interviews were exploratory and served to elicit responses related to the aspects being investigated, including a discussion of the patients’ perceptions of the causes, symptoms, and treatment for cardiac disease and their experiences and attitudes toward the disease. Questions were refined using in-depth patient interviews and formative methods, that is, pilot-testing the questions and revising them in response to feedback before finalizing them for use in the interview. The first set of interviews served an exploratory purpose by eliciting all responses related to the questions being investigated. Interviews continued with question modification and to the point of data saturation or when no new evolving concepts emerged. This method allowed for confirming, refining, or refuting the data that evolved from the formative interviews.<sup>28</sup>

In accordance with standard qualitative methodology, all interviews were conducted by a trained interviewer using an interview guide. Table I contains sample questions from the interview. The interview guide ensured that all questions were covered, providing direction to the discussion without imposing a rigid format. The guide contained a series of probes to ensure that pertinent topics were discussed. Sample probes included asking patients about their experiences living with coronary disease, how heart disease had made their lives better or worse, and what prevented or helped patients to engage in healthy behaviors. Additional probes were used to help respondents report on aspects of their health, social situation, interests, and lifestyle that made it hard or easy to engage in healthy lifestyle behaviors. All patients, regardless of their success with behavior change, were interviewed with the same interview guide.

Interviewers were trained over 3 half-day sessions by an established expert in qualitative research methods. To facilitate training, a series of role-playing exercises, where the interviewers could practice and become familiar with qualitative methods before the actual interviews, were conducted. Interviewers were trained not to ask leading questions and taught techniques such as reflective listening and how to ask for clarification. Any additional questions posed by the interviewer were based on what the patient had said and consisted of asking for clarification and probing for details. The trainer was able to assess verbal and nonverbal ease with the role-playing exercises and address areas that needed further training. All initial interviews were monitored by the expert, and subsequent review of audiotapes was conducted by this individual with the interviewers on an ongoing basis.

## Data analyses

**Quantitative data analysis**—Baseline demographic characteristics were collected as a part of the parent trial. The methods for collection of this baseline quantitative data have been published.<sup>23,24</sup> Data for the 61 patients who participated in the qualitative interviews were analyzed according to whether the patients had been successful in multiple behavior change. To compare successful and unsuccessful patients, categorical data were analyzed using the chi-square and Fisher's exact test, and continuous data were analyzed using *t* tests. The distribution of scores for the Canadian Cardiovascular Scale<sup>29</sup> and the Charlson Comorbidity Index<sup>30</sup> between the 2 groups was analyzed using the Wilcoxon rank-sum test. The level of significance for all comparisons was set at  $P < .05$ .

**Qualitative data analysis**—Data collected in the in-depth, semistructured interviews were analyzed using grounded theory methods. Grounded theory methodology refers to the process of “developing increasingly abstract ideas about research participants’ meanings, actions, and worlds and seeking specific data to fill out, refine, and check the emerging conceptual categories.”<sup>31</sup> According to Strauss and Corbin,<sup>32</sup> “Grounded theories, because they are drawn for data, are likely to offer insight, enhance understanding, and provide meaningful guide to action.” Grounded theories involve having a full understanding of individual experiences before those unique cases are aggregated. Thus, the findings are grounded within specific contexts and lead to the development of theories that are grounded in the context of the real-world experiences of participants.<sup>33</sup>

Interviews were recorded by audiotape and then transcribed and analyzed line-by-line using the software package Ethnograph version 5.0 (Qualis Research Associates, Colorado Springs, CO), a qualitative computer analysis program that facilitates open-coding methods. Open-coding methods allow for the identification of patients’ common concepts. Common concepts can then be grouped into categories with similar properties and dimensions.<sup>28</sup> This process of data analysis and identification of similar concepts was used until data saturation was reached, the point at which no new information was identified from the participants’ responses. This

method allowed for the identification of common themes among the sample of patients interviewed. Four independent, trained corroborators reviewed the transcripts and generated the concepts, categories, and themes.

Triangulation techniques were used in the development of concepts, categories, and themes. First, the qualitative data were compared with the quantitative data that had been collected at baseline in the parent study. In this manner, theme development was informed by comparing and contrasting findings generated by qualitative and quantitative data. Together these data were used to develop a fuller and more comprehensive understanding of the patient perspective than either method alone would have allowed. Second, 4 separate reader/analysts were used to read the transcripts. They reviewed emerging concepts and categories and reviewed individual transcripts and in vivo data in detail to build consensus and corroborate the development of emerging themes. Trustworthiness<sup>34</sup> was established through triangulation techniques, standardized training of the interviewers, and building consensus among the 4 separate reader/analysts by reviewing emerging concepts and categories and reviewing individual transcripts to build consensus.

## RESULTS

A total of 61 patients were interviewed; of these, 32 (52%) had successfully changed 2 or more health behaviors and 29 (48%) had been unsuccessful at multiple behavior change. Patients participated in the qualitative interviews without knowledge of their classification into the successful or unsuccessful group.

### Characteristics of the study sample

Table II displays the baseline characteristics for the successful and unsuccessful patients, as well as the total group of patients in the qualitative study, at enrollment in the parent trial. The mean age was 64 years (standard deviation = 9.1) and ranged from 46 to 86 years. Seventy-two percent of patients completed high school, and more than 60% of patients were not working. Forty-eight percent of participants were female, and one-third were African-American, one-third were Latino, and one-third were Caucasian. More than 80% of participants were overweight or obese.

As shown in Table II, more successful patients were obese, had undergone previous CABG surgery, and had insulin-dependent diabetes when compared with unsuccessful patients at baseline. Unsuccessful patients reported a higher incidence of previous PTCA, unstable angina, hypertension, diabetes with end-organ damage, and a smoking history. Overall, baseline comorbidity was similar between the 2 groups, as assessed by the Charlson comorbidity index.

In terms of procedural characteristics, 41% of patients underwent angioplasty without stenting, whereas 39% received 1 stent, 17% received 2 stents, and 3% received 3 stents. Overall, patients had a median of 2 coronary vessels treated during the angioplasty procedure. The mean angiographically determined ejection fraction was 50%. There were no differences in procedural characteristics between the successful and unsuccessful groups.

With respect to which risk factors patients elected to work on after PTCA, successful patients were most likely to choose and succeed at taking blood pressure medications (46.9%, n = 15), followed by increasing overall physical activity (43.8%, n = 14), smoking cessation (34.4%, n = 11), and decreasing cholesterol through diet and medication (34.4%, n = 11). In contrast, unsuccessful patients were more likely to choose and succeed at smoking cessation (13.8%, n = 4), taking blood pressure medication as prescribed (13.8%, n = 4), and increasing overall physical activity (10.3%, n = 3).

The frequency with which each of the 12 risk factor recommendations was provided at baseline is shown in Table III for the successful and unsuccessful patients. There were no differences in the rates of recommendation of the various risk factors between the 2 groups.

### Qualitative interviews

Open-coding methods were used to identify common concepts that were then grouped into categories with similar properties and dimensions. This permitted us to identify the common themes that emerged. The 4 independent and trained readers reviewed the raw data, and each developed concepts and categories to ensure that the data were representative of the participants' responses. The trained readers then came together to reach consensus on and corroborate the thematic results that were generated.

**Theme 1**—Patients undergoing angioplasty have survived a traumatic and life-threatening event that causes patients to respond with feelings of vulnerability, fear of death, and disease recurrence.

Patients expressed an overwhelming fear of death and disease recurrence. The following are illustrative of this theme: "... it is scary not to know if it is going to work or if it is not going to work." Also, "*I never thought of death as I do now. That's disturbing to me. It crops up once in awhile. I thought I was one of these Greek gods in marble. I find that's not to be true.*"

Fear of death and vulnerability also caused patients to share regrets over past behavior. One patient offered, "*You know, I have really been blessed and you know in the famous words of Mickey Mantle, 'If I knew I was going to live this long, I would have taken better care of myself ...'*" Similarly another patient stated, "*I am angry and I don't know who to be angry at. You know, am I angry at the guys who gave me all those hamburgers, am I angry at myself for eating them?*"

However, the same sense of mortality that frightened patients also caused some to cite a renewed sense of appreciating life. Patients used the angioplasty as a turning point in their lives to make changes and have a new outlook on life. These responses led to the development of the next theme.

**Theme 2**—In response to undergoing angioplasty, patients expressed that they had experienced a turning point in life after angioplasty. Turning points coupled with self-determination were essential components of successful behavior change.

Many patients cited a renewed sense of appreciating life as a result of having undergone angioplasty. Thus, patients seemed to think of the angioplasty as a turning point to make changes, have a new outlook, or re-prioritize. One patient stated, "*I am still here because I got a good attitude and I think that is the whole key. There are a lot of people that have had heart problems and they have lousy attitudes, 'Why me?' You have learned from something that you would take better care of yourself.*" In response to having a mild heart attack, another patient stated, "*You have to rethink how you are going to run the rest of your life.*" Another patient stated that as a result of his heart condition, he had to quit work. Of his new life, he stated, "*I decided to become Mr. Mom. At the time, I had a 2-year-old at home. And since I had to walk, we walked. And so I was pushing her all over the park and stuff like that. It gave me a whole new sense of the life process because I never had the ability to spend time with my 3 older children and watch them discover the world.*"

Self-determination represented a will to succeed that was sometimes motivated by a fear of death or disease recurrence. Self-determination was frequently coupled with a reorganization of life priorities. One patient stated, "*What helped me most? Yeah, my determination.*" Another

patient who had experienced many setbacks and was undergoing hemodialysis 3 times per week stated, *“I mean like I said, you gotta help yourself, you know. You just can’t go to the doctor and say ‘Oh, the doctor says I’m fine’ and just sit there and watch television and do nothing. You’ve got to help yourself, you know, and make yourself healthier.”* Similarly, another patient stated, *“There’s a determination. A person must decide ‘I am going to do it’ or ‘I am not going to do it.’”* Self-determination also lent a sense of control over the disease.

**Theme 3**—Patients undergoing angioplasty used strategies such as social support from family, friends, and other patients and their spiritual belief system to cope with the uncertainty of living with heart disease.

Patients drew on social support to achieve self-determined behavior change. This included social support from family, friends, and other patients with cardiac disease, as well as formal and informal spiritual practices, which facilitated the ability to stay on track through moments of potential relapse. Further, individual experiences and those of other patients with cardiac disease shaped perceptions that patients had concerning the course and consequences of their heart disease.

Support from family members was common. One patient commented about support he received from his sister, *“Knowing that there is someone there caring and that person cares about you, then why shouldn’t I care about myself. It’s a drumbeat, and eventually you come out and you follow the beat.”* Another patient stated, *“My grandson, he is 9 now, and he gives me my medicine and he is on me to check on my diabetes that I check it out on my fingers, and he says, ‘Grandma, I’ll help you.’”* Social support was also received from other patients with cardiac disease. One patient shared, *“I found out more from other patients sitting in the cardiologist [waiting room] than I did from the doctors. Somebody said ‘Don’t be surprised if this happens, this happens and this happens.’”*

Patients conveyed that being alive to share time with family was a major motivation to engage in behavior change. One patient offered, *“... I want to be around with my family .... So that is why I want to live longer, so this way I see my children grow up and once they get their degrees, then I say my job is done.”* Another patient shared, *“When I see my grandchildren and whatever. Like, you want to be able to do things with them like I used to.”*

Spiritual beliefs and practices were also frequently cited as helpful when coping with living with heart disease. According to one patient, *“And sometimes you have to believe in miracles. So there are so many things in daily life that help you. So I have some kind of prayer book.”* Another patient stated, *“I go to churches, to the God. [And I say] ‘Please God help me because I can’t get through this.’”*

**Theme 4**—Factors that were associated with unsuccessful behavior change included physical disabilities, a sense that “nothing helps” with heart disease progression, or a perception that heart disease is cured through angioplasty.

Unsuccessful patients frequently talked about how their inability to engage in physical activity was either the result of limitations related to coronary disease or other comorbid conditions. Of physical limitations, one patient commented, *“I will do whatever I want, but I just run out of gas .... You get to the end of the road a lot quicker.”*

Sexual limitations were also revealed. One patient commented, *“Well, the only thing is with the diabetes and the heart attack, it sexually makes you kind of leery. Because you, that’s when you get short of breath and whatnot, you know. You don’t know what can happen.”* Another

patient commented, “*My lover (sic) life is different. Well, it is that you can put it this way. I don’t have sex like I used to. You know, you have to be careful.*”

As a result of physical limitations, some patients cited fatalistic views about their health and future. In this manner, a sense that “nothing helps” was communicated. For these patients, behavior change was perceived as futile. This view was predominantly expressed by unsuccessful patients. One patient stated, “*It is wearing me down, really ... you know, in fact I don’t even use the telephone, because I don’t know, I just lost interest in all of that. I am losing interest in a lot of things.*” Another patient stated, “*I hate to say this, but my outlook in life is what will be will be.*” Another variation of this concept is that the disease affects everyone sooner or later. One patient stated, “*And I guess my basic view is that it can hit anybody at anytime and it is just a matter of how the dices (sic) are thrown.*”

Finally, some patients reported surprise at how simple the angioplasty was. These patients believed that angioplasty could be used as an effective strategy to treat their heart disease again in the future. One patient expressed, “*I always questioned whether, I went on a Monday morning and had the procedure done, and could have come home the same night. How serious could this be?*” Another patient stated, “*Angioplasty, I don’t think it was a dangerous thing. I mean, this is half an hour to an hour job. This is one thing if I had to go again, I would go with no problem.*” These patient responses underscore how some patients minimized the seriousness of their disease, citing the ease and brevity of the angioplasty intervention as a “cure.”

## DISCUSSION

This study sought to document values, attitudes, and beliefs that influenced behavior change among culturally diverse patients who had been *successful* or *unsuccessful* at multi behavior change after PTCA. The thematic results that were generated are broadly applicable to all patients and represent the experiences and beliefs of both successful and unsuccessful patients in multibehavior change. Notably, one of the themes that emerged focused on the experiences and beliefs of successful patients (theme 2), whereas another theme that emerged focused on the experiences and beliefs of unsuccessful patients (theme 4). Because there were no clinical differences between the successful and unsuccessful patient groups at baseline, we believe the differences in thematic results by group are unlikely to be related to differences in comorbidity or disease severity at the time of the PTCA procedure.

### What unsuccessful patients tell us

Our findings suggest that patients who do not make behavioral changes may well be experiencing physical limitations in their activities of daily living. Patients who were unsuccessful in behavior change frequently cited physical and sexual limitations. We also found that the perception that PTCA was a relatively quick and simple treatment of heart disease led patients to believe their heart disease had been cured by PTCA. This was commonly cited among unsuccessful patients. In a study by Gaw,<sup>20</sup> 14 patients who underwent PTCA were interviewed to better understand why patients do not engage in cardiac rehabilitation. Gaw hypothesized that patients viewed themselves as cured of heart disease after angioplasty and, thus, were not motivated to engage in lifestyle changes. Knowledge deficit was reported to play an important role in the lack of motivation to change. Our study, which enrolled patients who received individualized cardiovascular risk factor assessment and education for areas of chosen behavior change, did not support the assertion that knowledge deficits are responsible for patients’ perceptions of being cured of heart disease with PTCA.

Despite what we know from the literature and patients themselves, interventional cardiologists often tell their patients that the problem is “fixed” after PTCA. This kind of statement to patients, however, may serve to undermine the patient’s motivation to undertake behavioral



change. In fact, nearly all of the interventional cardiology literature demonstrates a singular focus on finding a magic bullet that will cure the patient of restenosis of target lesions. However, over 5 years, there is a progressive increase in repeat revascularization from 24% to 41% because of progression of coronary disease at other sites.<sup>35,36</sup> In a recent report by Alderman et al,<sup>37</sup> the participants of the BARI trial exhibited greater progression of coronary disease in untreated vessels compared with the vessels that had received PTCA, and the rate of revascularization at 5 years was 53% for those who had initially received PTCA.

The fact remains that most patients do not make long-term behavior changes after PTCA. One possible explanation for this is that patients undergoing PTCA, a relatively noninvasive procedure, may not consider themselves to be disabled by their coronary disease.<sup>38</sup> Because unsuccessful patients may not view themselves as at-risk for future events, they see no need to engage in lifestyle modification. The belief that they are not disabled or vulnerable may lead to a continuation of the behaviors that initially contributed to their coronary disease.<sup>20,39,40</sup> In fact, studies have shown that patients make most behavioral changes after the initial diagnosis of coronary disease, rather than after an intervention.<sup>41</sup> However, it is not simply recurrence of stenosis in the original target vessel, but the progression of disease and new lesions in other vessels that results in recurrent morbidity and mortality. For this reason, engaging patients in efforts to adopt and maintain behavior changes designed to reduce cardiovascular risk is critical.

### What successful patients tell us

We identified several key components of successful behavior change. First was the perception that the angioplasty was a life-threatening event that became a “turning point.” Patients often cited a fear of death and of recurrent events in the context of discussing turning points. The sense that they would and could re-prioritize their lives was another important component of successful change. This involved things such as retiring, spending more time with family, and avoiding stress. Second, behavioral change was accomplished through what patients referred to as “self-determination” or the idea that they could make up their minds to affect a major lifestyle change. Successful patients seemed to be able to mobilize internal resources to enact self-determined change to cope with challenging lifestyle modifications. Self-determination also seemed to give patients in our study a sense of control over their illness. Third, patients cited social support from family, friends, and other patients with cardiac disease, as well as spiritual beliefs, as important adjuncts to maintaining changes.

These findings are consistent with those of King et al,<sup>42</sup> who conducted a qualitative study of 15 adults with chronic conditions to better understand barriers and facilitators to coping with a major turning point. King et al defined turning points as “emotionally compelling experiences and realizations that involved meaning acquired through the routes of belonging, doing or understanding the self or the world.”<sup>42</sup> Protective factors included social support, perseverance and determination, spiritual beliefs, self-understanding (recognizing new aspects of oneself), and accommodating (deciding to give up things in one’s life). By identifying concepts of self-determination, social support, and spiritual beliefs, our study supports the findings of King et al, with angioplasty representing a potential turning point in the lives of patients. Our data suggest that successful patients are able to mobilize internal resources and self-determination to take on challenging lifestyle changes. Self-determination fosters a sense of control over the illness and thus constitutes an important strategy that successful patients used to frame and persevere in pursuing behavioral self-management strategies. In our study, social support and spirituality were also important components to maintaining self-determined behavior change.

## LIMITATIONS

One limitation is worth noting. The cohort of patients we studied was unique to the extent that they had participated in a previous intervention study. The fact that it is possible that their experience was different from patients who had not had previous experience with behavior change potentially limits the generalizability of our findings.

## CONCLUSIONS

It is well established that the presence of risk factors at the time of angioplasty puts patients at high risk for restenosis.<sup>43–46</sup> Recent studies also document the benefit of cardiac rehabilitation among patients undergoing PTCA, including improvements in self-reported function,<sup>47–50</sup> peak oxygen consumption,<sup>47</sup> weight and exercise capacity,<sup>48,49</sup> and long-term cardiac morbidity and mortality.<sup>51</sup> However, female and elderly patients are significantly less likely to participate in cardiac rehabilitation programs than other patients.<sup>7</sup> Thus, although intensive lifestyle modification programs have shown encouraging results, only a fraction of patients who can benefit are willing to pursue and maintain aggressive lifestyle modifications.

Why, then, do patients fail to engage in behaviors that have been shown to reduce the occurrence of future cardiovascular events? Several qualitative studies have documented that patients lack adequate knowledge to engage in healthy lifestyle behaviors.<sup>8,9,15,20</sup> In our study, patients had received individualized risk profiles and chose specific areas for behavior change as a result of participating in a larger intervention study. In essence, patients who completed these qualitative interviews received information to overcome the knowledge barrier. For this reason, our cohort was well suited to discuss the challenges and rewards of engaging in long-term behavior change efforts.

Our study used a combination of quantitative and qualitative data to provide a broad range of demographic, clinical, psychosocial, and narrative data from which we developed concepts, categories, and themes that can inform intervention approaches. Our study underscores the need to better assess and take into account the values, attitudes, and beliefs of post-angioplasty patients. With this understanding, clinicians can present health information and work to develop individualized behavior change plans. It is important to consider adapting intervention approaches according to a patient's physical and emotional abilities and disabilities, as well as conditions, and beliefs regarding the impact the behavior change will have on cardiovascular health. For some patients, additional education may be helpful in reinforcing the importance of behavior modification in cardiovascular risk reduction and may ultimately lead to successful behavior change. Finally, fostering self-determination and social support may be particularly helpful in promoting successful behavior change.

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**Table I**

## Sample angioplasty qualitative interview questions

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*“While doctors have special ways of understanding illness, you also may have ideas, which may be different from what doctors think. It will help people with heart disease if we understand how it has affected you, and what heart disease means to you.”*

- 1 In your own words, how would you describe heart disease/angioplasty/stent? Tell me what that means to you.
  - 2 What does heart disease/angioplasty/stent mean to you?
  - 3 How does heart disease affect your life?
  - 4 Tell me in what ways has heart disease/angioplasty/stent changed your life?
  - 5 In what ways has heart disease/angioplasty/stent made your life better/worse?
  - 6 Tell me what you believe about heart disease and the things that your doctor has told you to change.
  - 7 What type of things do you do now that you may not have done before your angioplasty or stent?
  - 8 What do people in your family or community think about [the behavior]?
  - 9 What prevents you from doing [the behavior]?
  - 10 In addition to heart disease, what makes it hard for you to do [the behavior]?
-

**Table II**

Baseline demographic and clinical characteristics (n = 61)

Characteristic	Successful N = 32	Unsuccessful N = 29	All patients N = 61
Demographic			
Age (mean y $\pm$ SD)	59.9 $\pm$ 9.7	60.9 $\pm$ 8.5	63.8 $\pm$ 9.1
Female	40.6 (13)	55.2 (16)	48. (29)
Caucasian	40.6 (13)	27.7 (8)	34.4 (21)
African-American	31.3 (10)	34.5 (10)	32.8 (20)
Latino	28.1 (9)	37.9 (11)	32.8 (20)
Completed high school or beyond	81.3 (26)	62.1 (18)	72 (44)
Working full or part-time	34.4 (11)	41.4 (12)	37.7 (23)
Married	50 (16)	48.3 (14)	49.2 (30)
Clinical			
Body mass index (mean kg/m <sup>2</sup> $\pm$ SD)	27.3 $\pm$ 5.2	27.1 $\pm$ 6.3	29.3 $\pm$ 5.7
Overweight (25.0–29.9)	34.4 (11)	58.6 (17)	45.9 (28)
Obese (>30.0)	43.8 (14)	24.1 (7)	34.4 (21)
Previous PTCA	34.4 (11)	44.8 (13)	39. (24)
Previous CABG	21.9 (7)	13.8 (4)	18.0 (11)
MI	34.4 (11)	37.9 (11)	36. (22)
Stroke	6.3 (2)	10.3 (3)	8.2 (5)
No angina	37.5 (12)	31.0 (9)	34.4 (21)
Canadian cardiovascular class			
1	12.5 (4)	3.4 (1)	8.2 (5)
2	6.3 (2)	13.8 (4)	9.8 (6)
3	3.1 (1)	3.4 (1)	3.3 (2)
4	40.6 (13)	48.3 (14)	44.3 (27)
Hypertension	46.9 (15)	65.5 (19)	55.7 (34)
Diabetes	40.6 (13)	27.6 (8)	34.4 (21)
Insulin	46.2 (6)	37.8 (3)	14.8 (9)
End-organ damage	38.5 (5)	62.5 (5)	47.6 (10)
Cancer	6.3 (2)	10.3 (3)	8.2 (5)
Smoking	59.4 (19)	75.9 (22)	67.2 (41)
Quit	79.0 (15)	72.7 (16)	75.6 (31)
Current	21.1 (4)	27.3 (6)	24.4 (10)
Charlson comorbidity index			
0–1	53.1 (17)	58.6 (17)	55.7 (34)
2–3	21.9 (7)	24.1 (7)	23.0 (14)
$\geq$ 4	25.0 (13)	17.2 (5)	29.5 (18)

SD, standard deviation; PTCA, percutaneous transluminal coronary angioplasty; CABG, coronary artery bypass grafting. Data presented as % (n), except where otherwise noted.

**Table III**

Prevalence of risk factors at baseline (n = 61)

Health behavior	Proportion of patients who received the recommendation at baseline		
	Successful	Unsuccessful	Total
Increase overall physical activity	87.5 (28)	82.8 (24)	85.3 (52)
Increase strength training	84.4 (27)	86.2 (25)	85.3 (52)
Smoking cessation	34.4 (11)	27.6 (8)	31.2 (19)
Decrease red meat intake	37.5 (12)	55.2 (16)	45.9 (28)
Decrease cholesterol through diet and medication	90.6 (29)	89.7 (26)	90.2 (55)
Increase dietary flavonoid intake	34.4 (11)	31.0 (9)	32.8 (20)
Lose weight	50.0 (16)	48.3 (14)	49.2 (30)
Increase fiber intake	28.1 (9)	20.7 (6)	24.6 (15)
Take diabetes medications as prescribed	15.6 (5)	3.5 (1)	9.8 (6)
Take beta-blockers as prescribed	28.1 (9)	24.1 (7)	26.2 (16)
Take blood pressure medication as prescribed	62.5 (20)	69.0 (20)	65.6 (40)
Increase folic acid intake	43.8 (14)	31.0 (9)	37.7 (23)

Data presented as % (n), except where otherwise noted.