

## Optimal Healing Environments for Chronic Cardiovascular Disease

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### ABSTRACT

A substantial increase in chronic cardiovascular disease is projected for the next several decades. This is attributable to an aging population and accelerated rates of obesity and diabetes. Despite technological advances that have improved survival for acute events, there is suboptimal translation of research knowledge for prevention and treatment of chronic cardiovascular illness. Beginning with a brief review of the demographics and pathogenesis of atherosclerotic cardiovascular disease, this paper discusses the obstacles and approaches to optimal care of patients with chronic cardiovascular disease. The novel concept of an optimal healing environment (OHE) is defined and explored as a model for integrative cardiac health care. Aspects generally under-examined in cardiac care such as intrapersonal/interpersonal characteristics of the health care provider and patient, mind/body/spirit wholeness and healing versus curing are discussed, as is the impact psychosocial factors may have on atherosclerosis and cardiovascular health. Information from research on the impact of an OHE might renew the healing mission in medicine, reveal new approaches for healing the heart and establish the importance of a heart–mind–body connection.

### INTRODUCTION

Cardiovascular disease, predominantly represented by hypertension, coronary heart disease, heart failure and stroke, is the leading cause of disability, death, and health care expenditure with a prevalence of 61.8 million in the United States.<sup>1</sup> Demographic projections for the interval between 2000 and 2040 suggest a 16% per decade increase in chronic cardiovascular disease. While this increase is attributed to an aging population and accelerated rates of obesity and diabetes,<sup>2</sup> the under-65 age group comprised 59% of people with one or more types of cardiovascular disease in 2000.<sup>1</sup> The shift to chronic from acute disease is a testimony to dramatically improved survival from acute illness by therapeutic advances made possible by the explosive growth of twentieth century cardiology research and tech-

nology. In-hospital mortality from myocardial infarction decreased from 30% before 1962 to less than 7% currently.<sup>3</sup> Table 1 shows the most recent prevalence, mortality, and cost data for the principal cardiovascular diseases.

Atherosclerosis is the common pathway to the most frequent chronic cardiovascular diseases; hypertension, most often of unknown cause, is itself an established risk factor in the atherosclerotic process. Largely preventable if the major risk factors could be reduced, the atherosclerotic process can be detected in youth, years before a clinical cardiovascular event occurs.<sup>4-6</sup> In the current paradigm<sup>7,8</sup> (Fig. 1), atherosclerosis results from complex interactions between dyslipidemic, inflammatory, and thrombotic abnormalities that evolve from modifiable (hypertension, diabetes, atherogenic diet, tobacco, obesity, physical inactivity, psychosocial) and nonmodifiable risk factors (age, gender, genetic

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TABLE 1. CARDIOVASCULAR DISEASES

	Prevalence	Mortality	Cost (billions)
Total	61,800,000	945,836	\$351.8
Coronary heart disease	12,900,000	515,204	\$129.9
Stroke	4,700,000	167,661	\$ 51.2
Hypertension	50,000,000	44,619	\$ 50.3
Heart failure	4,900,000	51,546	\$ 24.3

Source: American Heart Association. Heart Disease and Stroke Statistics—2003 Update.

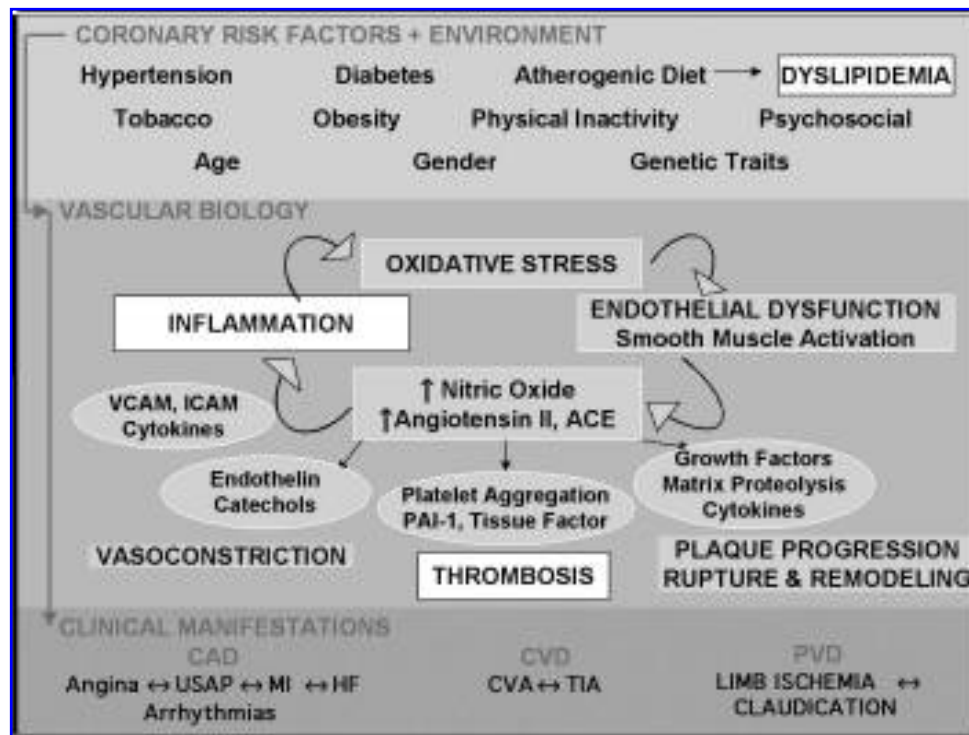
traits). Oxidative stress and endothelial dysfunction are two key mechanisms that initiate and amplify this process through induction of many bioactive mediators. The impact of atherosclerosis on the coronary, cerebral, and peripheral vessels is manifest clinically as a dynamic lifetime spectrum shifting between acute and chronic disease states such as stable angina to acute coronary syndromes, chronic myocardial dysfunction to acute heart failure, transient ischemic attack to stroke, and claudication to acute limb ischemia.

The National Heart Act of 1948 ushered in three decades of abundant funding for cardiovascular research and training of specialists. It launched a cardiovascular medical care trajectory focused on technology, procedures, pharmacologic agents, and acute care.<sup>9</sup> The major therapeutic milestones of

the past 50 years include cardiac catheterization and coronary angiography; coronary care units and emergency cardiac care protocols; mechanical revascularization—first coronary artery bypass grafting; percutaneous coronary interventions (performed nearly 600,000 times yearly and now exceed the volume of bypass surgery<sup>1</sup>); and major drug classes such as  $\beta$ -blockers, thrombolytic and antiplatelet agents, inhibitors of the renin-angiotensin system, and lipid-lowering drugs.

The twenty-first century promises even more advances in diagnosis and treatment based upon emerging research in molecular and cellular cardiology that could make possible more effective, individually customized therapies. Notwithstanding the many contributions of science and technology to cardiovascular medicine, substantial morbidity and mortality persist, in part, because of suboptimal clinical implementation or “treatment gap.” Almost 50% of patients given coronary risk-factor therapies discontinue their medications or behavioral changes within a year.<sup>10</sup> Optimal blood pressure control is achieved in only 35% of patients.<sup>11</sup> Fewer than 50% who qualify for lipid-lowering treatment receive it, and of those who are prescribed treatment only 30%–40% are still taking it at 1 year.<sup>12</sup> Approximately 20% of myocardial infarction patients do not receive aspirin.<sup>13</sup>

Obstacles to optimizing cardiovascular care are multifactorial (Table 2).<sup>14–16</sup> There is suboptimal coordination of



**FIG. 1.** Pathophysiology of atherosclerosis. VCAM, vascular cell adhesion molecule; ICAM, intercellular adhesion molecule; CAD, coronary artery disease; USAP, unstable angina pectoris; MI, myocardial infarction; HF, heart failure; CVD, cardiovascular disease; CVA, cardiovascular accident; TIA, transient ischemic attack; PVD, peripheral vascular disease; PAI-1, plasminogen activator inhibitor-1; ACE, angiotensin converting enzyme. Adapted from Ref. 7.

TABLE 2. OBSTACLES TO OPTIMAL LONG-TERM CARDIOVASCULAR CARE

Health care provider
Autonomous—suboptimal communication/care coordination between providers
Limited use of multidisciplinary teams
Competition and focus on economic survival in a managed care world
Cure/technology-oriented training
Time pressures in patient contact—limited rapport building
Loss of healing mission—“burnout”
Patient
Adverse effects of treatment, including cost
Personal, family, cultural habits
Education
Inadequate long-term support, monitoring, reinforcement → poor adherence
Emotional and/or social distress
Lack of empowerment for self-care
Social/environmental/political
Medicine as a business, not a healing profession
Litigation orientation
Inertia for improvement in organization and delivery of care
Fragmentation and unequal access to care; disruption of provider-patient continuity
Reimbursement system favoring “high-tech” over “high-touch”
Conflict between goals of healthcare payors and patients
Loss of leisure time—“24/7” workplace
Lack of marketplace and community support for heart-healthy environment

care promoted by autonomously functioning providers, poor communication and frequent patient transitions between acute and outpatient facilities or between primary and specialty providers. The competitive spirit of health care facilities and providers is often based on economic gain and survival in the face of declining reimbursement. Physician training that has been predominantly cure and technology oriented limits physician skills in implementing nonprocedural preventive therapy for which reimbursement generally has been poor or nonexistent. A cardiologist’s time is often spent in the acute or procedural settings with long-term outpatient care a lower priority. Growing administrative and documentation burdens compete with the already brief time allocated for individual patient encounters. High-volume practice settings, overreliance on practice guidelines not tailored for individual needs, and defensive medicine strategies contribute to professional “burnout” and disconnection from medicine as a healing art.

In addition to adherence issues, obstacles from a patient perspective include adverse experiences with treatment (including financial hardship), education, personal–family–cultural habits, emotional and social stressors, and lack of motivation/empowerment for self-care. The larger, sociopolitical obstacles faced are that medicine is now viewed as a business, not a healing profession, and that there is a high degree of inertia for improving the organization and deliv-

ery of health care. For optimization of cardiovascular health and healing, alternative approaches to our current health care model deserve investigation. Specifically, models of patient-centered health care that integrate the best of both traditional and complementary medicine into cardiology practice are needed.

### OPTIMAL HEALING ENVIRONMENTS AND CHRONIC CARDIOVASCULAR DISEASE

According to Dossey,<sup>17</sup> healing is a dynamic process of recovery, repair, restoration, renewal, and transformation that increases resilience, coherence, and wholeness, involving a person’s entire system—physical, mental, social, spiritual, and environmental. Recovery is incomplete in two thirds of patients after a myocardial infarction and they are at 1.5–15 times higher risk than the general population for another cardiac event.<sup>1</sup> Therefore, expectation of cure is unrealistic in advanced cardiovascular disease, and emphasis on healing is more appropriate. Healing for patients with chronic cardiovascular disease means prevention of further acute cardiovascular events and symptomatic relief. It also means learning adaptive strategies that promote living an extended, high-quality life in emotional, vocational, social, and physical dimensions. Other than consideration of the higher probability of acute events and sudden death in cardiovascular disease, these goals for healing are equally applicable to other chronic diseases such as arthritis, chronic obstructive pulmonary disease, obesity, diabetes and nonvascular neurologic diseases. Moreover, cardiovascular disease rarely occurs in isolation from some of these other chronic conditions. Common concerns for both cardiovascular and other patients with chronic diseases are fatigue, deconditioning, mobility problems, anxiety, depression, and isolation.

An optimal healing environment (OHE) and its components are described in this supplement by Jonas and Chez (pp. S-1–S-6) and by Jonas et al.<sup>18</sup> Cardiac rehabilitation programs have been the predominant model for long-term cardiovascular care, but they encompass few elements of an OHE. They focus on exercise and health promotion education, and have been poorly utilized, with only 15%–20% of eligible patients referred to them.<sup>19</sup> Despite the limited scope of cardiac rehabilitation, meta-analysis of several studies does demonstrate their benefit in physiologic and psychosocial variables, in association with a 20% all-cause mortality reduction, a 22% reduction for cardiovascular mortality, and a 25% reduction in the risk for fatal reinfarction.<sup>20,21</sup> Some cardiac rehabilitation programs are now evolving into “integrative medicine” or “integrative cardiology” programs. These programs have more diverse offerings including exercise, dietary modification, stress reduction, and behavioral change techniques in conjunction with facilities for diagnosis, assessment, and conventional treatments alongside complementary treatments.

A detailed review of complementary medicine approaches for cardiovascular disease is beyond the scope of this paper. In general, complementary treatments can be grouped into one of four categories: biology-based (chelation for coronary artery disease, herbal supplements, special diets), manipulative (massage, chiropractic), Mind–Body (yoga, prayer, meditation, biofeedback) and energy-based (*Reiki*, *tai chi*, qigong, acupuncture, magnet therapy). A recent review<sup>22</sup> of complementary therapies in cardiovascular disease reported that 64% of patients used one or more of these treatments. The relevance of an OHE is attested to by the most commonly cited reasons that patients seek complementary treatments: dissatisfaction with the limitations of conventional medicine; desire to be treated as human beings rather than as disease cases; awareness of complementary practices and potential benefits; awareness that many chronic diseases are being linked to lifestyle factors; and desire to take fewer medications and undergo fewer procedures and decrease health care spending.<sup>23</sup>

Common needs of patients with chronic diseases that have been identified and used to develop a self-management program<sup>24</sup> are also relevant for developing an OHE. They include: recognizing and acting on symptoms, proper medication use, managing emergencies, maintaining nutrition and exercise, tobacco cessation, stress reduction, interacting effectively with health care providers, using community resources, adapting to work, managing relations with significant others, and managing significant response to illness. Community-based programs that include patients with a variety of chronic diseases have reported success improving health status.<sup>25</sup> Other than a core of health care providers with training in the treatment of cardiovascular disease and access to the conventional therapies for cardiovascular care, an OHE for patients with cardiovascular disease would be similar to one for patients with other chronic conditions.

While the relative importance of each of the seven OHE components is as yet unknown, the first three elements that are oriented toward personal self and awareness may be the most important and underexplored, particularly for cardiovascular healing. As Pearsall discusses in his book, *The Heart's Code*, there is increasing evidence for a heart–mind–body connection within and between individuals,<sup>26</sup> with the heart functioning as more than just a physiologic pump. Sullivan<sup>27</sup> has proposed that physicians need to strengthen their inner resources in order to reconnect with their original purpose in medicine, which is to heal and care for patients, in order to improve professional satisfaction for themselves and their patients. In this paradigm, development of self-knowledge, self-care, life balance, spirituality, and collaborative skills are essential to facilitate the patient's healing journey. While anecdotally supportable, there are few formal investigations of these approaches. One small, randomized study of daily mindfulness practice in medical trainees demonstrated improved patient empathy and decreased provider distress.<sup>28</sup>

It is widely known that holistic care is the hallmark of osteopathic medicine. The importance and value of healing relationships and a holistic view of patient care has been emphasized throughout the history of the nursing profession. In cardiovascular care, research has demonstrated improved outcomes through nurse or other non-physician managed programs. A Veterans Affairs study in patients with coronary as well as other chronic diseases demonstrated that frequent telephone contact over 2 years improved medical outcomes and reduced medical care costs by approximately 25%.<sup>29</sup> In a randomized clinical trial at a large health maintenance organization (HMO), nurse-initiated risk-factor modification interventions, primarily by phone or mail, were significantly more effective than usual medical care after myocardial infarction.<sup>30</sup> A notable feature of this study was that on average, only 9 hours of nursing time per patient annually achieved the improved outcomes. Patients in the nurse-managed program in the Stanford Coronary Risk Intervention Project (Palo Alto, CA) demonstrated improved risk factors, less progression of coronary atherosclerosis, and fewer hospitalizations for cardiac events compared to those with usual care.<sup>31</sup> Higher intensity risk factor reduction was associated with reduced cardiovascular morbidity and mortality in a recent study in which 6.6% of patients with maximal treatment had events over 5 years compared to 30.6% of those with poor treatment.<sup>32</sup> Two recent reviews well summarize the contributions of nurses and community health care workers in improving outcomes for patients with cardiovascular disease,<sup>33</sup> and the role of nurses in delivering complementary therapies for cardiovascular disease.<sup>34</sup>

Little is known about spirituality and cardiovascular disease. This is true not just in cardiology, but in general as reflected by Boudreaux et al.<sup>35</sup> in a review on the spiritual role in healing: "Physicians have transformed themselves from healers of whole patients into surgical and pharmacologic technicians paying little attention to the psychological and spiritual aspects of a person." One observational study reported a threefold higher 6-month survival rate in coronary bypass patients who described themselves as deeply religious before their surgery.<sup>36</sup> Two other studies in coronary care unit patients demonstrated a less complicated hospital course in patients randomly assigned to receive intercessory prayer.<sup>37,38</sup> A more recent randomized study on the impact of distant prayer and/or music–imagery–therapeutic (MIT) touch compared to usual care in 750 patients with unstable angina undergoing percutaneous coronary intervention, while not demonstrating any significant difference between groups in the primary endpoint of major adverse cardiac events, showed reduced mortality in the prayer plus MIT group versus standard care (1.6% versus 4.7%).<sup>39</sup>

Of the proposed OHE elements, health-promoting behavior has been given the most emphasis in cardiovascular research. Single- and multicomponent lifestyle intervention studies have reported definite efficacy, but many fall short in optimal effectiveness largely because of implementation

and adherence issues.<sup>40–45</sup> In our military health care beneficiary population, an Ornish-type lifestyle intervention effectively reduced coronary risk factors provided there was strict adherence to the four program components (10% fat vegan diet, yoga for 1 hour daily, exercise for 3 hours weekly, and group support meeting participation). It has yet to be determined whether this “bootcamp” type of lifestyle intervention has a lasting impact on healthy lifestyle behaviors. The appeal of this program to the population was low, with only one third of those screened and eligible agreeing to participate. Even with highly motivated volunteers, 22% dropped out of the program, primarily within the first 3 months. Major obstacles to effectiveness of this lifestyle intervention are the large time commitment to meet program goals and the rigidity of the program components. Both participants and their health care providers understandably question the requirement for extreme fat reduction and prohibition of “good” dietary fats, nuts, oils, and fish in terms of what has been learned about optimal diets for cardiovascular disease.<sup>58</sup>

However, through this experience, we have been able to develop a model of care for our population that involves long-term support and coaching by a multidisciplinary team that we believe embodies an OHE (Fig. 2). The long-term relationship is important because adherence to lifestyle changes declines without some degree of ongoing staff contact but this does not necessarily imply a long-term intensive time and cost investment. Our model acknowledges the need to individualize care

plans and creates a patient-centered care environment in which each participant is empowered to interact with a team comprising a cardiologist, nurse practitioner, clinical psychologist, stress management practitioner, exercise physiologist, and nutritionist. The participants are provided with a tool kit to support continuous education and to promote adherence to an integrative cardiac care plan of health and wellness. The nurse–practitioner serves as the primary case manager for the patient. However, each clinical expert provides individualized management and monitoring of the patient, keeping in mind the patient’s physical, emotional, and spiritual strengths and/or limitations. Each team member offers a unique aspect to the assessment, planning, education, and monitoring of the patient. Ongoing assessment of external factors such as work environment, psychosocial support, and lifelong habits are key in designing and implementing successful care plans. Our current research interest is in evaluating the impact of stress management strategies on maintenance of lifestyle change behaviors and reduction of coronary heart disease risk.

Facilitation of mind–body–spirit integration in healer and healee in an OHE may indirectly promote health and healing through improved implementation of and adherence to effective therapies. However, with increasing evidence and plausible mechanisms for the impact of emotional and spiritual factors on physical health, an OHE may directly influence the brain–body interconnections via the neuroendocrine and autonomic nervous systems (Fig. 3).<sup>46</sup>

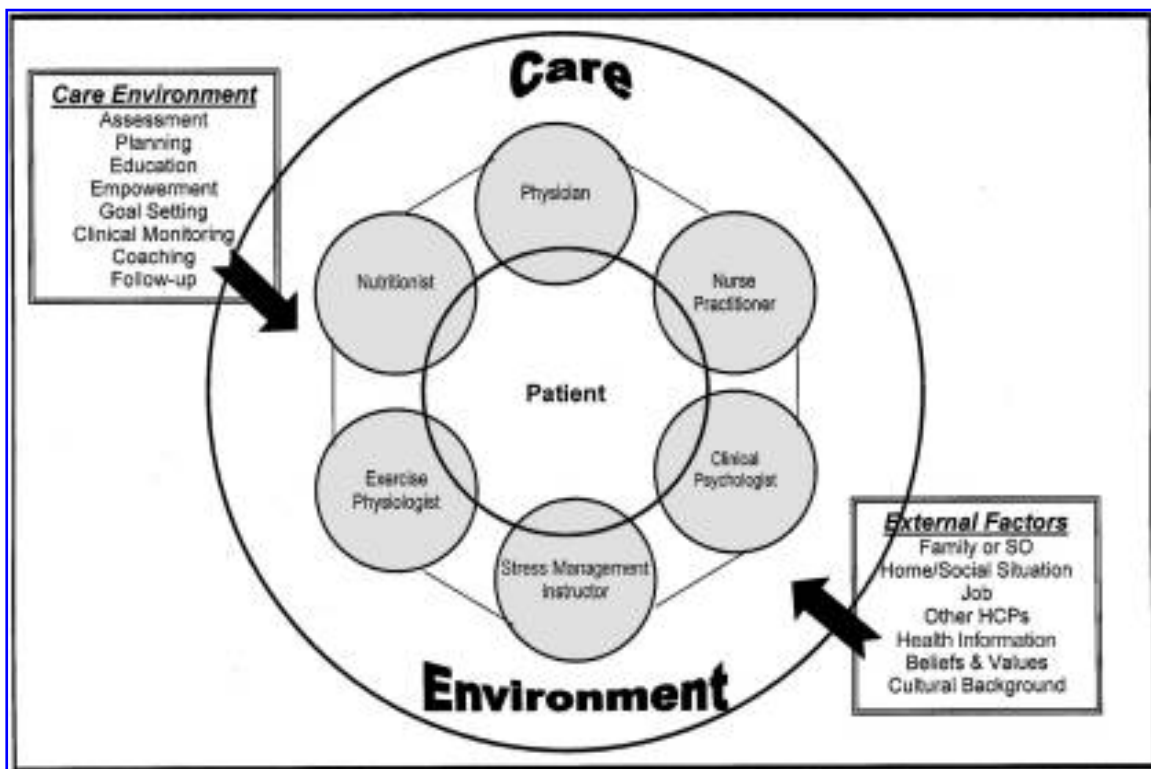


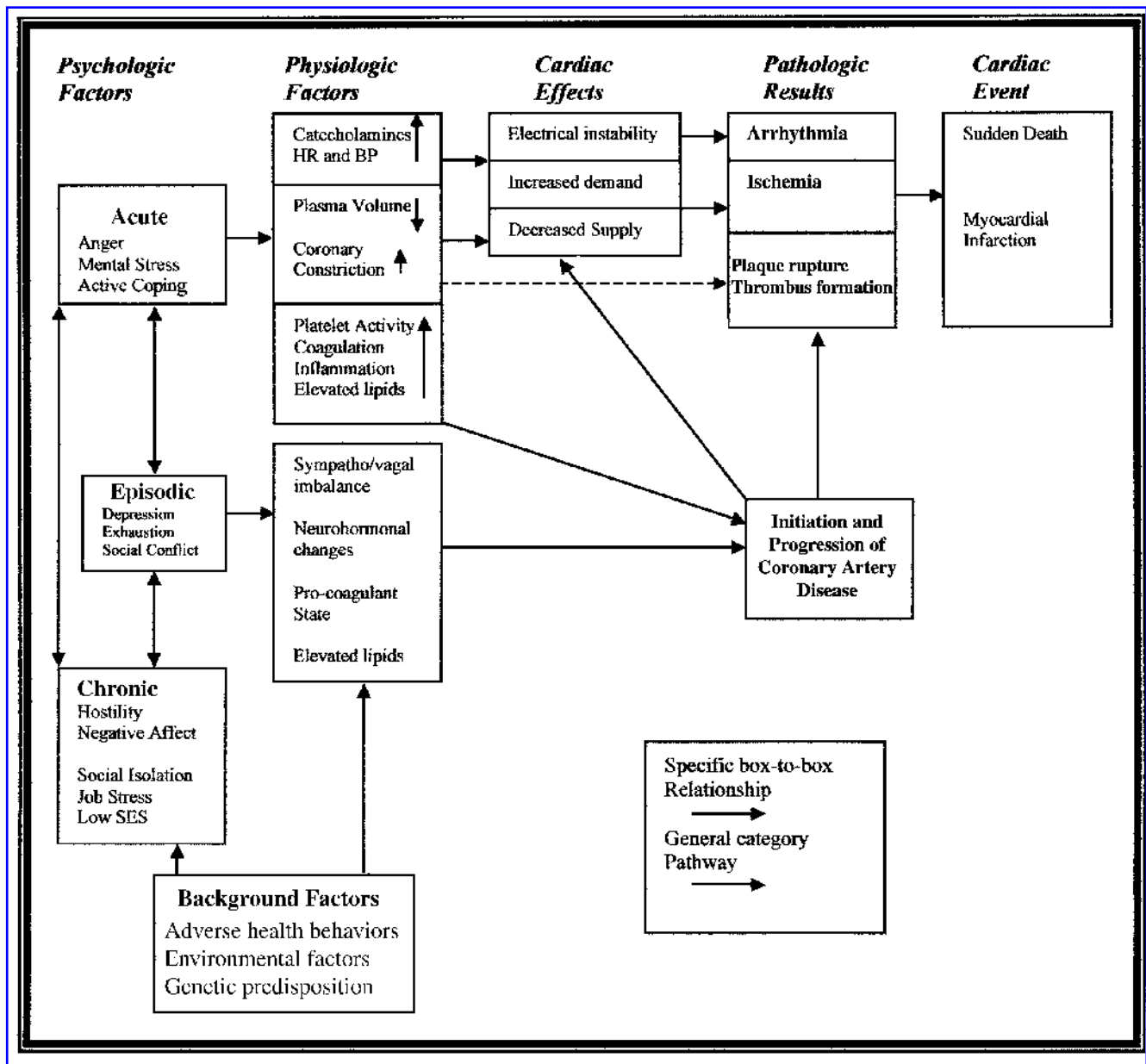
FIG. 2. Integrative cardiac health project model of care. SO, significant others; HCPs, health care providers.

That emotions could trigger release of chemical messengers in the brain, which then have an impact elsewhere in the body, was first established for the immune system (psychoneuroimmunology).<sup>47,48</sup> One recent study demonstrated a nearly fivefold greater antibody response to flu vaccine in patients undergoing stress management intervention.<sup>49</sup> These connections are also relevant for cardiovascular disease<sup>50-53</sup> particularly in view of the fact that some of these chemical messengers are released not only from the brain, but directly from the heart.<sup>26</sup> Any of a variety of psychosocial factors could affect the release of catecholamines, adrenocorticotrophic hormone (ACTH), or

antidiuretic hormone (ADH), all of which have their cardiovascular consequences through pathways that generate cortisol, inflammatory cytokines, vasoconstrictors, thrombotic agents, endothelial dysfunction, and metabolic abnormalities.

### DEVELOPING AN OHE FOR CARDIOVASCULAR DISEASE

A conventional outpatient cardiology program offering therapeutic lifestyle intervention services could be devel-



**FIG. 3.** Impact of psychosocial factors and coronary artery disease. HR, heart rate; BP, blood pressure; SES, socioeconomic status. Source: Smith JM, Ruiz JM. Psychosocial influences on the development and course of coronary heart disease: Current status and implications for research and practice. *J Consult Clin Psychol* 2002;70(3):548-568. Reprinted with permission of the publisher.

oped into an OHE for chronic cardiovascular disease by incorporating the additional desired OHE elements. Although there are examples of some programs combining OHE elements of health promotion, healing collaborations, treatments and healing spaces, developing the first three elements will be a pioneering effort in cardiology<sup>54–56</sup> the essence of which is embodied in Fox's<sup>48</sup> comment: "It is ultimately only the patient who can heal emotional and spiritual dimensions. Physicians' responsibility, therefore, might not be to consider how they can use alternative approaches to heal their patients, but rather to consider whether they can accept that the definition of health care is expanding to one that acknowledges the patient's role in healing, acknowledges the benefits of patients uncovering an inner life and resolving emotional issues, acknowledges the value of spiritual dimensions, and acknowledges the physician's role as a caring support to the whole person while using technical advances to heal the physical."

Supporting cardiovascular health care professionals in developing self-awareness, personal wholeness, and in building healing relationships is a prerequisite to supporting an OHE for our patients. Recognizing that providers will enter into the project at various stages of self-awareness and personal wholeness, the goal of these first efforts would be to create an environment that will initiate or support this evolving journey. This might take the form of an initial retreat led by a psychologist to inventory individual needs, followed by a plan and practical instruction for integrating a number of tools for healthy living such as meditation, relaxation, imagery, yoga, nutrition, and exercise into daily life. Regular gatherings would be held to foster mutual support, learning, and life balance. It would be most interesting to determine the impact of these efforts on patient satisfaction with care and clinical outcomes.

The core staff of an OHE for cardiology would include an integrated team of nurses, nurse practitioners or physician assistants, pharmacists, cardiologists and primary care physicians, psychologists, social workers, and practitioners of complementary medicine, particularly in those areas suitable for stress management. To facilitate research endeavors, it would be ideal for these OHEs to be self-contained units supported by one administrative structure. The OHE model could be set up as an oasis of care within an established care system such as the military health system or HMO. This approach would maximize recruitment of patients and facilitate the long-term follow-up that are needed to answer meaningful questions in clinical care and health policy. The outcomes for the OHE model could be compared with "usual" care in the same facility.

Once established, the OHE could be used to conduct "practical clinical trials"<sup>57</sup> that differ from explanatory clinical trials. The goal is to better understand how and why an intervention works by evaluating it in a diverse

population with study outcomes including more than morbidity and mortality endpoints. Endpoints to assess in patients with cardiovascular disease include assessing the severity and frequency of anginal or heart failure symptoms, impact on quality of life, and satisfaction with and use of health care resources, in addition to the major adverse cardiac events of myocardial infarction, revascularization, stroke or cardiac death. With regard to choice of trial design, the main options are randomized clinical trials or prospective cohort studies. There have been no large randomized controlled trials on lifestyle intervention in cardiac patients to assess coronary or all-cause mortality. While a randomized trial design is preferred, such trials are problematic and expensive because of the difficulty in obtaining substantial differences between the experimental (the OHE) and the "usual care" groups. Trying to avoid carryover of various OHE components between patients randomized to OHE and usual care groups would also be problematic within the same institutional sites. Also, with an OHE type of intervention, blinding of subjects and research staff is not possible although interpretation of endpoints could be. The advantages of a dual (or multiple) prospective cohort study is that intervention carryover between OHE and non-OHE cohorts would be minimized and the effectiveness of the OHE and/or its individual elements could be analyzed for various surrogate or hard morbidity and mortality endpoints given a long enough duration of study of preferably 5–10 years to obtain meaningful data. The main weakness of this approach is unrecognized confounding factors inherent in the nonrandomized design. When comparing randomized and nonrandomized studies evaluating the same research questions, the nonrandomized studies generally overestimate the benefit of an intervention. Recruitment for the non-OHE cohorts may also be problematic, but might be facilitated by delivering an intensive case management model in those cohorts.

The potential hypotheses to be tested in an OHE are myriad. The paucity of research on the spiritual and emotional factors and their impact on cardiac health presents great opportunity for study in an OHE. Determining whether an OHE improves adherence to guidelines for cardiovascular care with improved long-term healing is another potential area for research. Other possible questions for exploration include: How do gender-specific or cultural/ethnic differences impact the design/effectiveness of an OHE? What characteristics of health care providers improve patient outcomes? Are outcomes of patients whose providers practice stress management and have healthy lifestyles better than for those who do not?

The possibilities for cardiovascular research in an OHE are exciting. The information gained from these studies could renew the healing mission in medicine, reveal new approaches for healing the heart and more firmly establish the importance of the heart–mind–body connection.

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