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BETHESDA CONFERENCE REPORT

33rd Bethesda Conference: Preventive Cardiology: How Can We Do Better?*

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This Conference, sponsored by the American College of Cardiology, was held at Heart House, Bethesda, Maryland, December 18, 2001.

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33rd BETHESDA CONFERENCE

Preventive Cardiology: How Can We Do Better? Introduction

Gerald F. Fletcher, MD, FACC, *Conference Co-Chair*

Historical medical recordings as early as 2500 BC referred to the practice of Prevention. References to the importance of prevention are found in the writings of Hippocrates and Osler, thus rendering the prevention concept important and certainly "not new" in the practice of medicine (1). Previous Bethesda Conferences 11 (1980) (2) and 27 (1995) (3) addressed Prevention of Cardiovascular Diseases; however, to date, Preventive Cardiology has yet to establish an appropriately strong position in the overall care of patients with cardiovascular disease (CVD).

"Bethesda Conference 33—Preventive Cardiology: How Can We Do Better?" evolved to address specific issues and provide precise recommendations to better implement the prevention of CVD, which is the number one cause of death and disability in the U.S. today. Five task forces of writers and participants with various expertise provided in-depth reports on numerous aspects of preventive cardiology. The following paragraphs cite salient points extracted and paraphrased from each task force.

The first task force addresses in finite detail the magnitude of the overall problem and the opportunities and challenges involved. Cardiovascular disease (CVD) is the leading cause of death and disability; it is increasing in prevalence in many regions of the world; and it includes all ethnic, racial, and gender groups. Risk factors that predispose to CVD have been identified, the modification or alteration of which can result in a significant decrease in morbidity and mortality for CVD. Risk factor categories now addressed are genetic (e.g., abnormal lipids), second level (e.g., endothelial dysfunction), and acute (e.g., plaque rupture perhaps related to nicotine). Obesity and diabetes are emerging as major risks and are increasing in prevalence in America. Primordial prevention (or prevention of risk factors) is being emphasized. These strategies address proper exercise and diet and should focus on early school years. A public health approach to CVD prevention is needed and may require public policy changes and aggressive marketing to the public. An ongoing perceived problem is that "sick care" may not mix well with preventive care.

The second task force considers the cost of prevention: can we afford it; can we afford not to do it? As emphasized, prevention guidelines should reflect economic impacts and value from a societal perspective. As such, a society with limited resources should determine which interventions have the most value. Cost-effectiveness analysis is the most often used approach for economic evaluation of a medical or health care strategy. In concert with this and a "fixed" monetary allocation for health, policy makers want the greatest return on their investment. For example, studies of smoking cessation intervention suggest that cost per year of life saved is small compared with other interventions. In addition, assuming that sedentary behavior increases the risk of CVD by 1.9-fold, $6.4 billion would be saved if all of America began to walk regularly. The prevention of death from one disease may not be a valuable outcome if overall life expectancy is not changed because of another significant illness. An obstacle in an investment in prevention is the public expectation that such an investment should pay for itself.

The third task force discusses "Getting Results: Who, Where, and How?" This component encourages the proposition that physician encounters with patients be broadened to include non-physician personnel and community resources. A combination of community programs, medical referrals and therapy, and mass media for screening and treatment will decrease risk factor levels and CVD. Industries have been supportive of prevention when and if their interests are in accord with national and local organizational guidelines to change knowledge, attitudes, beliefs, and behavior. Community programs involve three models: clinical, public health, and health promotion. Momentum and sustained interventions are crucial to the success with community programs. Case management is effective and involves a nurse in the clinical setting to coordinate the determination of the risk with the treatment plan to reduce risk. In this setting, the guidelines should include outcome assessment and quality assurance. Barriers to implementation of preventive cardiology in medical settings include economics, lack of interest in the patient, and lack of skill and/or motivation of the provider.

The fourth task force addresses adherence issues and behavioral changes and how to achieve a long-term solution. Evidence is presented supporting the involvement of other health care professionals (especially nurses) in treatment plans to improve effectiveness of preventive interventions and increase overall adherence. Brief provider intervention can have a positive effect on adherence. A critical time to target adherence strategies is the early phase of treatment, realizing that poor adherence is higher in those with three or more comorbidities. Awareness of how people reason is important in adherence. Consideration of the stages of change—pre-contemplation, contemplation, preparation, action, and maintenance—which reflect steps of any behavioral intervention process is important in the process.

Another important theoretical approach is the social cognitive theoretical model. Ecological frameworks recognize that human behavior is influenced by intrapersonal, interpersonal, institutional, and community factors as well as public policy.

The fifth task force discusses the role of the cardiovascular (CV) specialist in prevention—trainee to champion. Substantial data confirms that prevention is not taught in most medical schools and less than one-third of CV specialty training programs have formal preventive cardiology. Limited time, lack of curriculum integration, lack of trainee interest, and the focus on critical care are all barriers. A solution is to build prevention-related objectives into global medical curriculum reform with associated faculty development activity. Both cognitive and applied systems training are needed to prepare specialists to establish prevention programs. One problem is that CV specialists typically address the chief complaint and often leave prevention to the primary referral. Cardiovascular specialists must address primary prevention and risk factor control and should use a team approach. Physician advice is especially helpful with diet and exercise. Use of evidence-based prompts and alerts can help guide adherence. In addition, health care system changes and informatics can be valuable in the process. A CV specialist should be a "champion" for prevention. Ideally, such a specialist should have clinical training with a Masters in public health and/or expertise in outcomes research.

In summary, the five task forces have addressed the major concerns in preventive cardiology. The recommendations and in-depth consensus discussions that follow will provide the reader with a thorough understanding of the issues that prevail today in this vastly important domain of health care.

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Summary Recommendations—Preventive Cardiology: How Can We Do Better?

Cardiovascular disease (CVD) prevention can play a dynamic and important role in combating the leading cause of disability and death in America today. The summary recommendations that follow reflect the detailed and resourceful work of the writing groups and participants of the American College of Cardiology (ACC) 33rd Bethesda Conference—Preventive Cardiology: How Can We Do Better? These recommendations highlight the research, funding, policy, and clinical–educational changes needed to effectively implement preventive cardiology in the existing health care system of America.

RESEARCH

- Support intensive research to determine which strategies are most effective in promoting healthy lifestyles and adherence to CVD prevention in the community, in health care organizations, by providers, and by patients in a variety of clinical care settings.
- Promote studies that translate efficacy research into effectiveness trials and community-based demonstration projects in ethnically, geographically, and economically diverse groups. These studies should examine the biases, selection problems, unrealistic intervention intensity, and sequence effects that result in study outcomes failing to translate into real-world outcomes.
- Give a higher priority to research into understanding the barriers associated with adherence to CVD prevention guidelines at the community, health care provider, and patient levels.
- Conduct studies of various risk-factor interventions, including the manner in which interventions should be sequenced with regard to the psychosocial state of the patient (e.g., stage of change and motivation).
- Gain increased understanding of the extent to which patient and provider beliefs, expectations, and preferences influence provider-patient communication.
- Place special focus on vulnerable groups, including the economically disadvantaged, the elderly, and ethnic minorities.
- Encourage the development and testing of creative, nontraditional ways to promote healthy life styles—such as social marketing.
- Study the efficacy of policy and legal changes in reducing CVD risk factors (e.g., tobacco taxes and mandated school-based physical education programs).
- Increase research regarding the cost-effectiveness of CVD prevention.
- Conduct further research to resolve measurement issues. This applies not only to measurement of medication-taking behavior but also to the ability to monitor and verify behavior in other areas such as smoking, diet, and physical activity.

- Develop research proposals that aim to survey the attitudes, beliefs, and behavioral changes of practicing cardiologists and those in training that are used to foster the development of plans for comprehensive cardiovascular (CV) training program change.
- Reinitiate the Preventive Cardiology Academic Awards to foster preventive research, training, and clinical care for the current generation.

FUNDING

- Increase funding support for federal agencies, including the Centers for Disease Control (CDC), the Agency for Healthcare Research and Quality, and the National Institutes of Health to promote research and implementation of CVD prevention.
- Structure reimbursement to compensate physicians and other health care providers (nurses, physiologists, physician assistants, and health educators under physician supervision) for the delivery of preventive cardiology services; increase the reimbursement for these allied health care services, motivating physicians to set up programs that are revenue generating rather than cost-neutral or revenue losing.
- Reduce the reimbursement disparity between the technical/procedural and the cognitive CV services delivered by physicians.
- Utilize quality improvement indicators of adherence to preventive care and financially reward providers and institutions that effectively implement prevention.
- Fund the development and provision of informatics for CV risk assessment and care delivery which are user-friendly and transportable to clinicians.
- Fund more population-wide prevention strategies for a broader variety of risk factors.
- Fund the implementation of community health care initiatives, projects, and programs.
- Fund programs to support faculty innovations in the improvement of preventive education, and support teaching of prevention in medical and other health science schools.
- Reinstate reimbursement for cardiac rehabilitation/secondary prevention programs for fee schedules existing prior to the cutbacks that occurred in year 2000 related to the ambulatory payment classification initiative. These cutbacks led to program closures in some states and, because of low reimbursement status, reduced the fiscal motivation to start new programs.
- Fund CDC/National Heart, Lung, and Blood Institute (NHLBI)/American Heart Association (AHA)/ACC sponsored preventive cardiology applied training, as additional training after CV fellowship and/or as a summer two-week applied course, similar to the AHA/NHLBI-sponsored CV epidemiology annual course.

POLICY

Health care providers, the ACC, and other professional organizations should advocate for measures that promote CV health and reduce CVD risk factors. These are outlined under the key area "Funding" and also include:

- Reimbursement for preventive strategies, including screening and treatment of CV risk factors and cardiac rehabilitation for heart failure and all coronary artery disease patients.
- Implement preventive interventions that are economically attractive (e.g., offer good value), when compared with widely adopted health care choices.
- Foster the concept that cost-effectiveness analysis should be used as a component of policy making but that budget neutrality for prevention is not reasonable and is "bad" public policy.
- Promote a universal public health infrastructure that is integrated with health care services.
- Provide access to care for all members in society including full insurance for all citizens and legal immigrants.
- Implement procedures to monitor racial and gender bias in CV care and ensure that such bias is eliminated.
- Encourage employers and insurers to provide incentives for healthy lifestyles and health-promotion program participation.
- Foster healthy lifestyles and behaviors in schools.
  - Improve education in prevention and nutrition in schools.
  - Promote daily physical activity, healthy nutrition, and smoke-free campuses.
  - Increase opportunities for physical activity in community, school, and work settings (e.g., the provision of incentives to employers who offer appropriate recreational facilities or physical activity opportunities).
- Change food policy to foster the reduction of sodium in the food supply leading to a 5% per year decline, the labeling of the nutritional content of menu items in national restaurants, and the support of legislation to limit the sale of junk food in schools and enhance the quality of food provided in schools.
- Eliminate opportunities for exposure to second-hand smoke.
- Foster social marketing.
  - Promote the value of a prevention-oriented lifestyle.
  - Create an environment wherein stairs are more attractive than elevators and portion sizes are not inversely related to caloric expenditure.
- Increase the visibility of preventive cardiology at national meetings of the ACC and other organizations whose attendees include CV specialists and/or primary care providers.
- Encourage coordination between professional organizations such as the ACC, AHA, Preventive Cardiovascular Nurses Organization, American Association for Cardiovascular and Pulmonary Rehabilitation, and American Public Health Association to develop policies and programs in preventive cardiology.

- Mandate that the American Council on Graduate Medical Education requirements are consistent with ACC Core Cardiology Training Symposium Guidelines for Training in Adult Cardiovascular Medicine (COCATS) and that both subspecialty board certification and fellowship training program certification are linked with these requirements.
- Strengthen ACC COCATS preventive training for all fellows to include a mandatory one-month block on prevention.
- Encourage the American Board of Internal Medicine to increase the CVD prevention content to a minimum of 15% for internal medical and CV subspecialty board examinations.
- Develop an annual ACC Prize for Excellence in Preventive Cardiology.

CLINICAL–EDUCATIONAL

- Familiarize and equip ACC members and other health care organizations with materials and skills to implement CVD prevention programs (critical pathways) in the hospital and out-patient setting.
  - Encourage clinicians to use global risk-assessment tools.
  - Encourage clinicians to follow ACC/AHA and other evidence-based guidelines for the prevention of CVD.
  - Make the ACC membership aware of the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) criteria for CVD prevention.
  - Foster the development of cardiologists and primary care physicians to be medical champions and community leaders in the preventive effort.
- Establish systems to address the multilevel contexts that influence the development and maintenance of prevention-related health behaviors.
- Develop mechanisms for the systematic integration of social, health, governmental, and policy-level factors with individual-level approaches.
- Encourage hospitals and health care systems to develop and provide preventive cardiology services and systems for the community.
- Develop a partnership between ACC and JCAHO/National Committee for Quality Assurance/Centers for Medical and Medicaid Services to recommend that those hospitals/health care organizations providing interventional CV care (cardiac surgery and cardiac catheterization) should also provide a Director of Cardiovascular Preventive Services. Such a person will serve to develop, coordinate, and supervise the implementation and growth of preventive CV services.

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Task Force #3—Getting Results: Who, Where, and How?

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The provision of preventive cardiology services in the U.S. will require a combination of the medical model of care and of community preventive health programs. These approaches are complementary, synergistic, and each essential, with a goal of "getting results" in the broadest possible population. Organizations such as the American Heart Association (AHA) and the National Heart, Lung, and Blood Institute (NHLBI) have outlined algorithms for the primary and secondary prevention of coronary heart disease (CHD) (1–3), but it is a combination of medical-model and community program approaches that will deliver preventive care. In that the mortality from heart disease has dropped by 40% since 1970, the present approach is not without positive results (4). The goal of this discussion is to describe the types of clinical, community, and media programs that have been effective in decreasing coronary risk in the general public. Because an understanding of the principles of media and communication are crucial to the success of any health promotion program, the principles of effective media and communication are briefly reviewed.

Physicians are generally well trained in defining the presence of coronary risk factors and in the medical management of hyperlipidemia, hypertension, and diabetes. Further training of cardiovascular (CV) specialists as leaders in prevention (see Task Force Report #5) will assist in this effort. Physicians are, however, far less capable of managing and influencing lifestyle-related risk factors such as tobacco use, diet, physical inactivity, and the consequences of obesity. In addition, a brief office encounter does not lend itself to the counseling and follow-up necessary to initiate a change in unhealthy lifestyles. Broadening the physician encounter to include non-physician personnel and community resources will yield a greater impact in reducing coronary risk. Furthermore, a high percentage of young adults do not regularly visit physicians until the presence of lifestyle-related conditions such as CHD or type II diabetes are detected; thus, the role of public policy, school and worksite programs, and mass-media should be emphasized. Physicians, as role models and opinion setters, play a crucial role in supporting the design and development of community programs.

Numerous documents and position statements define treatment goals for the prevention of CHD (2,5). Less clear are the processes by which Americans might reach these goals. It is only through a combination of community programs, medical referral and treatment, and mass media approaches to screening and therapy that the majority of Americans will attain appropriate risk factor levels to significantly reduce the incidence of CHD.

PROGRAMS OF GOVERNMENTAL AND NON-GOVERNMENTAL ORGANIZATIONS

National Cholesterol Education Program. The National Heart, Lung, and Blood Institute (NHLBI) of the National Institutes of Health (NIH) launched the National Cholesterol Education Program (NCEP) in November 1985 (5).

The goal of the NCEP is to contribute to the reduction of illness and death from CHD in the U.S. by reducing the percentage of Americans with high blood cholesterol. Through educational efforts directed at health professionals and the public, the NCEP aims to raise awareness and understanding about high blood cholesterol as a risk factor for CHD and the benefits of lowering cholesterol levels as a means of preventing CHD. The NCEP has organized a number of panels, including the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel) that developed guidelines for the identification and treatment of hyperlipidemia, most recently updated in 2001 (3).

The NCEP also organized several other expert panels: the Laboratory Standardization Panel that developed guidelines for standardizing laboratory measurements and reporting blood cholesterol tests; the Expert Panel on Population Strategies for Blood Cholesterol Reduction (Population Panel) that developed recommendations for reducing blood cholesterol levels by adopting population-wide eating patterns that are low in saturated fat and cholesterol; the Expert Panel on Blood Cholesterol Levels in Children and Adolescents that developed recommendations for heart-healthy eating patterns for children and adolescents and recommendations for detecting and treating high blood cholesterol in children and adolescents from high-risk families; and the Working Group on Lipoprotein Measurement that developed recommendations on lipoprotein measurement to improve the determination of low-density lipoprotein-cholesterol, high-density lipoprotein-cholesterol, and triglycerides.

The efforts of the NCEP have been associated with significant reductions in the prevalence of high blood cholesterol in the U.S. and increases in the treatment of hyperlipidemia (6). Since 1978, average total cholesterol levels among U.S. adults have fallen from 213 mg/dl to 203 mg/dl and the prevalence of cholesterol of 240 mg/dl or higher has declined from 26% to 19%.

Office on Smoking and Health and Agency for Healthcare Research and Quality. The lead government agency for the control of tobacco is the Office on Smoking and Health at the Centers for Disease Control and Prevention (CDC) (www.cdc.gov/tobacco). The Office on Smoking and Health provides a vast array of educational materials in the form of printed materials and videos. It also conducts surveys on tobacco use and expenditures for tobacco control. The Agency for Healthcare Research and Quality recently updated their Clinical Practice Guideline on Smoking Cessation (http://www.surgeongeneral.gov/tobacco).

National High Blood Pressure Education Program. The National High Blood Pressure Education Program (NHBPEP), established in 1972 (7), is a cooperative effort among professional and voluntary health agencies, state health departments, and many community groups. The NHBPEP is coordinated by the NHLBI of the NIH (www.nhlbi.nih.gov). The goal of the NHBPEP is to reduce death and disability related to high blood pressure (BP) through programs of professional, patient, and public education. The NHBPEP also strives to achieve the heart disease and stroke Healthy People 2010 objectives for the nation. Strategies to achieve the program goals include developing and disseminating stimulating educational materials and programs that are grounded in a strong science base and developing partnerships among the program participants. Throughout its history, the NHBPEP has employed a comprehensive strategy to mobilize, educate, and coordinate resources of groups interested in hypertension prevention and control. The NHBPEP comprises a network of federal agencies, voluntary and professional organizations, state health departments, and numerous community-based programs. At the core of the program is the NHBPEP Coordinating Committee, composed of representatives from 38 national professional, public, and voluntary health organizations and seven federal agencies.

The consensus document on hypertension, the "Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure" (JNC), first published in 1976, has had five subsequent updates (7). The JNC reports serve as guidelines for clinicians and community groups. The reports have been distributed to all state health departments, nearly every primary care clinician, and all hypertension control programs in the nation and have been translated into foreign languages as well. Identification, treatment, and control of high BP improved significantly between the time that the NHBPEP was organized and the early 1990s (8). More recently, however, control of high BP has declined significantly in at least some venues (9).

Since their inception, the NHBPEP and the NCEP have conducted aggressive mass-media campaigns. Using TV, radio, print, and outdoor media, the campaigns have helped keep the issues of high BP and high blood cholesterol on the public agenda and may have contributed to the detection and control of these conditions.

Federally-sponsored physical activity and physical fitness programs. The President's Council on Physical Fitness and Sport has as its mission: "To coordinate and promote opportunities in physical activity, fitness, and sports for all Americans, as directed by Executive Order 12345, as amended." The major functions include the promotion of community and school physical activity and fitness programs, dissemination of information, and raising of public awareness about the importance of physical activity and fitness. The leadership of Healthy People 2010 priority area on physical activity and exercise developed a major Youth Fitness Campaign with the Advertising Council. In addition, the President's Council promotes the conduct of the school-based President's Challenge Physical Fitness Awards Program, the President's Fitness Awards Program, the President's Sports Award Program, the conduct of Healthy American Fitness Leaders recognition program, and the Silver Eagle Corp program for older Americans. The CDC has proposed strategies to increase physical activity with its

Task Force on Community Prevention Services (10) and with its Healthy People 2010 Program (11).

Programs of non-governmental organizations. Voluntary organizations play several important roles in the prevention of heart disease. In addition to creating an organizational focus, they sponsor research, provide education, and generate advocacy for the financing of both federally supported research programs and service programs. While both the ACC and the AHA include in their mission the prevention and treatment of heart disease through education and advocacy, with the ACC focusing its educational efforts on practitioners of cardiovascular disease (CVD) and the issues that affect them directly. The AHA (www.americanheart.org) has a more broadly based constituency that includes the lay public. In addition to the prevention and treatment of heart disease, the AHA includes the prevention and treatment of stroke in its mission. Organizations that are primarily non-physicians, such as the American Association of Cardiovascular and Pulmonary Rehabilitation, the American College of Sports Medicine and the Preventive Cardiology Nurses Association, also play an important role. The greatest likelihood of substantial impact may proceed from the teamwork among the disciplines.

Pharmaceutical corporations and food corporations, much the same as commercial news services, are oriented toward generating a profit for shareholders, although many of their products may have favorable effects on CV health. Their prominent involvement in media-based advertising programs tends to be influenced by opportunities to generate interest in and markets for their products rather than by any role in overall preventive cardiology efforts. Nonetheless, these industries have been very supportive of many preventive efforts when their interests are coincident with the efforts of national and local organizations to change knowledge, attitudes, beliefs, and behavior.

The American Legacy Foundation was formed as a result of the master settlement agreement between the Attorneys General of 46 states and five territories and the tobacco industry. The American Legacy Foundation (www.americanlegacy.org) is a national, independent, public health foundation located in Washington, DC. Among Legacy's top priorities are the reduction of tobacco use by young people and support of programs that help people—whether young or old—to quit smoking. Legacy is also interested in working to limit people's exposure to smoke from other people's cigarettes. A major part of Legacy's work includes explaining how smoking or chewing tobacco damages an individual's health and how tobacco use costs society. Legacy's work to date includes a major tobacco youth prevention and education effort known as the Truth Campaign. Grassroots and promotional events, advertising, and an interactive web site allow teenagers to get the facts about tobacco use and tobacco marketing and get involved in the effort to do something about it.

COMMUNITY PROGRAMS

Cardiovascular disease has strong environmental, cultural, lifestyle, and behavioral components. Coordinated community approaches that support the preventive efforts of the health care sector may promote an environment and an educated population that makes prevention possible (12). Community programs provide an opportunity to address the large population-attributable risk of mild elevations of various risk factors, the interrelation of several health-related behaviors, and the potential efficiency of large-scale interventions not limited to the medical care system (13).

Major community trials. The prevention of CVD through community interventions makes theoretical sense but has been difficult to demonstrate (12). The community prevention concept has been tested in at least six major trials, which are summarized in Tables 1 and 2.

The North Karelia Project (1972 to 1997) served a mainly rural population with low socioeconomic status, high unemployment, and very high ischemic heart disease mortality relative to other areas of Finland (14). Among its diverse strategies, the project solicited community input, emphasized client risk-factor tracking and follow-up, employed a professional nursing staff, and promoted the integration of public health interventions with primary medical care (15). The project was associated with significant reductions in smoking, serum cholesterol, and BP, and an accelerated rate of decline of CHD and cancer mortality. North Karelia remains a world leader in community health promotion (http://www.cvhpinstitute.org/).

The Stanford Three Community Project (1972 to 1975 in northern California), which targeted smoking, high blood cholesterol, and high BP, emphasized non-clinical settings (home, worksite, community) as optimal for learning and the maintenance of learning. Results show that although mass-media campaigns are cost-effective in promoting awareness and can change many health habits in the short-term, the addition of personal interaction promotes long-term change. Predicted CV risk decreased by 15% to 20% (16).

During the 1980s, the NHLBI funded three major demonstration studies to evaluate the effectiveness of comprehensive, community-wide health education in reducing the risk of CVD. The *Stanford Five-City Project* (17), the *Minnesota Heart Health Program* (18), and the *Pawtucket Heart Health Program* (19) had many features in common (20). All used public health intervention models to facilitate the adoption of health practices at community and individual levels that would have an impact on hypertension, smoking, and high cholesterol. Each included multifactorial campaigns of education and risk reduction, lasting from five to eight years, and simultaneously addressed the prevention, treatment, and control aspects of hypertension, smoking, high dietary fat, obesity, and sedentary lifestyle. The three projects aimed at primary prevention through direct education of health professionals, education of the public through

Table 1. Features and Outcomes of Six Major Community CVD Prevention Trials

Trial/Reference	Years	Location	Intervention Community	Population	Comparison Community	Study Design	Unique Focus	Associated Outcomes Relative to Comparison Populations
North Karelia (14)	1972–1997	Rural Finland	North Karelia	180,000 in region	Similar region and Finland	Prospective controlled	Indigenous impetus. Community ownership. Integration with health care. Sustained focus on risk factors among individuals.	Improved risk factors. Reduced cardiovascular and cancer deaths.
Stanford 3-CP (16)	1972–1975	Northern California	3 towns	12–15,000 per town	1 similar town	Prospective controlled	Mass media only vs. mass media plus individual attention to high-risk individuals.	Improved risk factor knowledge, saturated fat intake, cigarette consumption, plasma cholesterol and blood pressure control, and projected cardiovascular risk by 15% to 20%. Mass media more cost-effective.
Stanford 5-CP (17)	1980–1986	Northern California	2 cities	About 75,000 per city	3 similar cities	Prospective controlled	Mass media only. No individualized interventions.	Sustained improvements in blood pressure but not in physical activity. No reductions in cardiovascular morbidity or mortality.
Minnesota (18)	1981–1988	Minnesota, North and South Dakota	3 cities, small, large, metro	Small: 25–40,000 Medium: 75–80,000 Metro: 80–115,000	3 similar cities	Prospective controlled	Face-to-face communications, public events, TV	Higher education exposure scores and favorable risk factor changes. No reductions in cardiovascular morbidity or mortality.
Pawtucket (19)	1984–1991	Southern New England	1 city	70,000 in city	1 nearby similar city	Prospective controlled	Community organization, campaigns; screening, counseling and referral.	Transient improvements in risk factors and risk ratio for projected cardiovascular disease rates. No reductions in cardiovascular morbidity or mortality.
Franklin, Maine (26)	1974–Present	Rural Maine	Franklin County	40,000 in county	Adjacent, similar counties and state	Retrospective ecologic observation	Integration of public health, medical care and community resources. Risk factor counseling, tracking and follow-up over time by 1-on-1 nurse encounters.	Reduced: total, cardiovascular and cancer mortality; cardiovascular and "preventable" hospitalizations and hospital charges; and smoking rates. Dose-dependent impact of nurse encounters on death rates.

CVD = cardiovascular disease.

Table 2. Intervention Strategies of Six Major Community CVD Prevention Trials

Strategies	North Karelia	Stanford 3-Community	Stanford 5-Cities	Minnesota	Pawtucket	Franklin Maine
Community organization	+	+	+	+	+	+
Mass media	+	+	+	+	Print only	+
Environmental modifications	+	0	+	0	+	+
Community groups	+	0	+	+	+	+
Schools	+	+	+	+	+	+
Worksites	+	0	+	+	+	+
Groceries and restaurants	+	+	+	+	+	+
Medical settings	+	0	+	+	+	+
Professional education	+	0	+	+	+	+
Health agencies collaboration	+	0	+	+	+	+
Train local personnel	+	0	+	+	+	+
Lay volunteer emphasis	+	0	0	0	+	0
Self-management focus	0	+	+	+	+	+
Group education	+	+	+	+	+	+
Risk factor screening	+	+	0	+	+	+
Individual counseling	+	+	0	+	+	+
Referral for medical care	+	0	0	+	+	+
Client risk factor tracking	+	0	0	+	0	+
Active client follow-up	+	0	0	+	0	+
Professional nursing staff	+	0	0	0	0	+
Primary medical care integration	+	0	0	0	0	+

CVD = cardiovascular disease. "+" indicates characteristic present, but does not imply equivalent intensity of intervention components.

media and personal contact, and community organization to foster institutional and environmental support. Theoretical underpinnings included varying degrees of social learning theory, social network diffusion theory, and social marketing. Each program had unique characteristics. Stanford excluded individualized interventions and used mass media to target behavior change. Minnesota emphasized face-to-face communications, public events, and television. Pawtucket focused on community organization, campaigns and screening, counseling, and referral activities. A number of surveys and interviews were conducted to evaluate the effects of the interventions.

Individually, the three projects produced modest but significant improvements in knowledge and risk factors within intervention communities compared with controls. Stanford documented significantly greater reductions in several risk factors, 15% lower composite risk scores, and sustained improvements for BP (21) but not for physical activity (22,23). Minnesota observed higher education exposure scores and favorable changes in blood cholesterol, physical activity, and smoking in the intervention communities. Pawtucket produced transient improvements in smoking, BP, lipids, physical activity, and projected CV risk (24). In all three, the greatest effects were seen among lower socioeconomic groups.

None of the three was able to demonstrate significant differences in CV morbidity and mortality compared with the control communities over the time period studied. Both intervention and control communities demonstrated improved disease outcomes, obscuring any differences. Data from the Stanford Five-Cities, Minnesota, and Pawtucket programs have been pooled and analyzed jointly (20). Time trends were estimated for cigarette smoking, BP, total cholesterol, body mass index, and CHD mortality risk in men and women age 25 to 64. The joint estimates of the effects of interventions were in the expected direction in nine of 12 gender-specific comparisons but were not statistically significant. Smaller-than-expected net differences, due to secular trend and less-than-expected impacts, appeared to explain the few statistically significant effects in these three U.S. prevention trials. Lessons learned from the Stanford (http://scrdp.stanford.edu/), Minnesota (http://www.epi.umn.edu/), and Pawtucket (http://www.cvhpinstitute.org/) projects have contributed substantially to subsequent community health concepts and models.

The *Franklin Cardiovascular Health Program* (1974 to the present) has served 23 communities scattered over 1,800 square miles in rural Franklin County, Maine. The Franklin Program's major objective has been to reduce CVD through a comprehensive community program that integrates public health and health care, and it focuses public, individual, and heath professional attention on the importance of long-term risk-factor detection and control. The program has been eclectic, drawing inspiration and ideas from contemporaneous national initiatives and demonstration projects (including Stanford, Minnesota and Pawtucket) and empirical, with ongoing quality improvement. Key strategies have included screening; counseling; referral; follow-up; continuity (including mailed follow-up reminders); physician involvement (including reciprocal referrals between physicians and the program); community activation; and community, patient, and professional education. Over time, the program's focus has expanded from hypertension to cholesterol, smoking, and physical inactivity; and strategies have been

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broadened to include environmental and policy initiatives, integration of cardiac rehabilitation with primarily-telephonic CV nurse care support, and guideline-based, software-enhanced, nurse-mediated risk-factor modification at work-sites and physician practices (25).

Franklin Program outcomes have been assessed by means of retrospective ecologic observational analysis with external comparisons. During the 20-year period from 1974 to 1994, the Franklin Program encountered more than half of the adult population on at least two occasions, broadly distributed by site, gender, and age, in all towns and most worksites. The program documented substantial risk-factor improvement (increased detection, medical treatment and control of hypertension and high cholesterol and reduced smoking) among participants with and without known CVD. Compared with the state of Maine and two demographically similar, adjoining counties, the Franklin Program was associated with significant dose- and time-dependent reductions in CV mortality (26). In addition, Franklin County's average total death rate fell from fifth highest among Maine's 16 counties in the 1960s to the absolute lowest during the following 25 years (1970 to 1994). Franklin County now compares very favorably with Maine's other counties with respect to excess deaths from chronic diseases (27), life expectancy (28), CV hospitalizations and hospital charges, smoking rates (14%, compared with an average of 25%) (27), self-perceived health status, and preventable hospital stays among Medicare and Medicaid enrollees (nearly 40% lower) (29). The Franklin Program spawned Maine's first Healthy Community Coalition, has evolved into the Western Maine Center for Heart Health at Franklin Memorial Hospital, and continues to serve as a model for communities in New England and beyond (http://www.fchn.org/fmh/wmchh/wmhhhome.htm).

Other community intervention programs. Rural populations have been characterized as "late adopters" of preventive health behaviors and, thus, may be both at greater risk for preventable CV and other chronic diseases and an ideal laboratory for testing community interventions (30). For example, both the *Bootheel Heart Health Project* in rural Missouri (31) and the *Heart to Heart Project* in South Carolina (32) have demonstrated that community interventions can improve diet, physical activity, and cholesterol awareness and screening. In rural Sweden, systematic risk factor screening and counseling done by family physicians and family nurses within the larger framework of a community intervention program for the prevention of CVD was associated with improved risk factors and a 19% reduction in CVD risk (33).

Innovative community interventions have also focused on non-rural, multi-ethnic, socioeconomically disadvantaged, and worksite populations. The *Healthy Heart Community Prevention Project* targeted low-socioeconomic-status urban African American populations with innovative approaches (including barbershops, beauty salons, churches, and sporting events) for screening and education (34). Immigrant populations pose unique language and cultural challenges (35). Worksite programs (at Coors Brewing, Travelers Insurance, Providence Health System, Pacific Railroad, Dupont, and Superior Coffee and Foods, among others) have improved behavioral risk factors (36,37) and reduced direct and/or indirect health care costs (38).

Community programs for youth. Childhood behaviors lead to adult habits and disease. The severity of asymptomatic atherosclerosis in young people is proportional to the cumulative presence of traditional CV risk factors (39), including diet, physical activity, and obesity (40). Distressingly, American children, especially African-American, Hispanic, and Native-American children, are becoming heavier and fatter (25).

Community efforts to improve childhood health behaviors have focused on schools. Sponsored by the NIH, the *Child and Adolescent Trial for Cardiovascular Health (CATCH)* was a randomized, controlled field trial involving students from ethnically diverse backgrounds in public elementary schools in California, Louisiana, Minnesota, and Texas. The third- through fifth-grade intervention, which included school food service modifications, enhanced physical education (PE), and classroom health curricula, was able to modify the fat content of school lunches, increase moderate-to-vigorous physical activity in PE, and improve eating and physical activity behaviors in children during three school years (41). Concurrent family involvement enhanced knowledge and attitudes toward changes in health habits (42). Tobacco experimentation, BP, body size, and cholesterol levels were not affected (43). Some behavioral changes initiated during the elementary school years persisted to early adolescence (44). The CATCH study (http://www.sdhealth.org/catch/catch.html) may be a feasible model for multi-level health promotion programs to improve eating and exercise behaviors in elementary schools in the U.S. (45,46). The Planet Health intervention in middle schools included an interdisciplinary curriculum that was taught within existing math, science, language arts, social studies, and PE classes. To improve energy balance, the curriculum emphasized a healthy diet and reduced television viewing time, replacing this inactive time with physical activities chosen by students. Reductions in obesity prevalence were documented for girls, and these reductions were directly related to reductions in time spent watching television (47,48) (sgortmak@hsph.harvard.edu). Finally, drug abuse prevention programs (such as *Life Skills Training*) conducted during junior high school can produce meaningful and durable reductions in tobacco, alcohol, and marijuana use among multicultural youth (49) (http://www.lifeskillstraining.com). Achieving greater parental involvement and understanding of adolescent developmental issues remain major challenges for school-based programs (50,51).

"Putting it together"—some keys to successful community interventions. Why have some community programs succeeded and others had difficulty demonstrating success?

Table 3. Strategies That May Contribute to Successful Implementation of Community CVD Prevention Programs

Community Strategies	Program Strategies

• Promote community ownership and openness to change.
• Mobilize, collaborate, network, and integrate with key stakeholders and community resources.
• Employ multiple interventions through multiple channels: school, worksite, health care, community.
• Develop and participate with coalitions: local, regional, state, and national.
• Identify and nurture local health professional and community champions.
• Nurture local medial advocacy.
• Know your community, and modify general principles to deal with local realities, including cultural and resource issues. One size does not fit all.
• Seek reliable, long-term funding, immune from legislative and economic vagaries.
• Try to make financial and behavioral vectors point in the same direction.
• Enable and reward health-promoting behaviors by individuals and organizations.
• Seek win-win solutions:
  • Promote concept that community hospital has service-area responsibility for health promotion and disease prevention and management, in addition to acute treatment.
  • Promote development of functionally integrated medical care networks.
	• Have an enduring, consistent vision and mission.
	• Be flexible in goals and objectives.
	• Enjoy eclectic empiricism. ("What works works.")
	• Integrate three health models: medical, public health, and health promotion.
	• Strive to make enduring changes in systems, policies, and environment. To have a lasting impact, education is necessary but insufficient.
	• Continually improve quality: Design → Implement → Measure → Redesign.
	• Obey Suttons's Law: Go where the people are.
	• Focus on continuous tracking, follow-up, and improvement of modifiable risk factors among individuals and populations at risk for preventable adverse outcomes.
	• Adhere to national guidelines; synchronize with national movements and topics (Healthy People 2010; new AHA guidelines and initiatives; obesity, diabetes, tobacco use, physical inactivity). This gives credibility and momentum.
	• Facilitate supportive, strong 3-person teams: patient, physician, professional nurse or other counselor.
	• Produce best results by deploying teams of physicians and non-physicians using multiple intervention modalities to deliver individualized advice on multiple occasions.
	• Promote integration of the community program with primary medical care and community resources.

CVD = cardiovascular disease.

Of the major community interventions reviewed here, only North Karelia and Franklin, Maine, were associated with demonstrable improvements in CV health outcomes. These interventions, unlike Stanford, Minnesota, and Pawtucket, served primarily rural populations, employed professional nurses, tracked individual clients' risk factors for more than two decades, and intentionally integrated community programs with primary health care.

Is success a function of the community? The program? The environment? The times? Are rural areas different from urban settings? Are rural communities inherently more coherent and self-reliant? Are rural populations at higher risk to begin with? Is the success of an early adopter rural community more readily apparent because it may be more isolated, more easily assessed, and then compared with more typical, late-adopter surrounding communities? Have prominent institutions foiled their own efforts to demonstrate a difference in their intervention communities by simultaneously being opinion leaders for the rest of the region (often "control" communities) or country? Have some community interventions intentionally devised non-medical interventions and thus failed to build potentially potent alliances between public health and health care? A particularly important challenge will be to extend demonstrated successes in rural communities to urban settings, with programs adapted to cultural and linguistic variations.

A *comprehensive community program* integrates *three models*: *clinical* (health care professionals and institutions), *public health* (interdependent systems connecting local, state, and federal public health agencies), and *health promotion* (multi-sector collaboration, including economic, education, health, environment, employment, social services, government, and multiple organizations). The comprehensive program uses many channels of prevention (health care, community, work sites, and schools) to prevent CVD in populations and individuals. Key strategies, based on the experience and understanding of the authors, are listed in Table 3.

Community programs may promote policy and environmental changes that help prevent the development of risk factors (primordial prevention) or make it easier for those with risk factors (primary prevention) or disease (secondary prevention) to modify their risks. Examples include the identification and promotion of sites for safe indoor and outdoor walking, and legislation to provide for smoke-free school campuses, restaurants, and work places.

Community CVD prevention programs may *focus* on factors both physiologic (e.g., weight, BP, lipids) and behavioral (eating, activity, tobacco use, medication adherence, psychosocial well-being, and early symptom recognition and response); they may *provide* opportunities for screening, confirmation, referral, follow-up, monitoring, education, and psychosocial support for behavior change; they may *serve* individuals, families, groups, employers, employees, hospitals, physicians, schools, community health centers, food service providers (restaurants, groceries), and government (state and local); and they may *reach* their clients in public places and at special community meetings, worksites, schools, and health care settings.

Momentum and sustained intervention may be crucial to the success of community CV health programs. In years of

Franklin Program growth, absolute death rates declined faster in Franklin than in Maine and adjoining counties. In years of program decline, absolute death rates in Franklin County plateaued or rose slightly. In Pawtucket, the risk ratio for projected CVD rates was 0.84 ($p = 0.02$) during peak intervention but dropped to 0.97 post intervention (19). In California, initial benefits from comprehensive community-wide tobacco control programs did not persist (52) once funding was reduced, and associated reductions in CV death rates have proved transitory (53). Sustaining program momentum, particularly in the face of economic decline, remains a major challenge.

CLINICAL INTERVENTIONS

Medical practice settings are presently underutilized as a venue for providing prevention services to the public. This reflects a health care system that focuses primarily on acute care to the detriment of chronic care and prevention. However, observational studies, randomized controlled trials, and experience gained in the dissemination of models into clinical practice suggest that CV risk-factor interventions can be effectively implemented in medical practice settings (54–56). Keys to success include systematic screening of individuals for coronary risk factors, utilization of non-physician personnel to assist with behavioral change, and the application of practice algorithms to guide pharmacologic therapy. Barriers to the implementation of preventive cardiology care in medical settings include economic barriers, a lack of motivation or interest on the part of patients and a lack of skill or motivation on the part of health care providers. An additional challenge to the effectiveness of these systems is the gap that presently exists between in-patient and out-patient services, highlighted by the authors of the 11th Bethesda Conference Report in 1981 (57). The provision of funding through the Medicare Program for prevention-related office visits and pharmacologic therapy is currently being re-examined and may expand the availability of preventive services for the Medicare population. The effects of health care economics and reimbursement on the delivery of preventive cardiology health care are addressed in Task Force #2 of this Bethesda Conference. Success in CV risk reduction requires that patients be educated and provided not only the appropriate skills to help them adopt and maintain health behavior changes but, in many cases, physiologic feedback as well. Standard medical care often lacks the systems needed to achieve these goals. For example, a lack of time often prevents physicians from offering prevention services in office practice settings. Yet even brief office-based educational interventions (3 to 8 min) provided by medical professionals may produce beneficial outcomes in diet (54), weight (54), blood lipids (54), smoking (58), alcohol consumption (59), and physical activity (60,61). The success of these interventions involves a systematic approach that includes the training of physicians and other health care providers by academic detailing, role-playing, and case-study presentation, in addition to didactic presentation, standardized patient education materials, the use of office support staff to offer reminders and cues, and participation in supporting educational interventions (62). Without all of these elements, the implementation of educational interventions that incorporate practice guidelines is generally unsuccessful.

Although clinical practice guidelines offer the mandate for practice based on randomized controlled trials and expert opinion, they seldom offer a road map to ensure the broad application of them (63). Systems with outcome assessment and quality improvement that ensure the broad application of the guidelines in clinical practice settings need to be developed (64–66). Moreover, it is the thoughtful systematic application of interventions that has proven to be successful in improving patient outcomes in CV risk reduction. Finally, one must determine who has the time and skills to offer the services to help individuals during their follow-up as they embark on lifestyle changes, receive medical therapies, and monitor their symptoms: physicians, nurses, and allied health professionals such as dieticians, exercise physiologists, psychologists, and others may all play a role.

Various clinic-based systems have been developed to provide CV risk reduction services in both primary and secondary prevention (Table 4) (67–71). Many of these models relied on nurses and nurse practitioners to coordinate the services of a multidisciplinary team, including dietitians, pharmacists, social workers, exercise physiologists, and psychologists. The success of these models is largely due to the availability of defined protocols for management of medications, the development of comprehensive well-defined treatment plans, weekly team meetings, individualized education of patients, and coordinated care (e.g. pre-appointment reminders, use of home health agencies, and so forth). Patients often present with several medical and psychosocial problems. Many of these programs are associated with improved patient outcomes, but little work has been conducted in evaluating their cost-effectiveness.

In addition to clinic-based models, nursing case management has proven to be effective in CV risk reduction in both primary and secondary prevention (Table 4) (55,68,72–77). Case management involves having a single individual, usually a nurse, coordinate both the determination of overall cardiac risk and the delineation of a therapeutic plan based on established guidelines to reduce cardiac risk. Case management has been applied to screen and educate large populations (74) and to intervene in single risk factors such as dyslipidemia (73), diabetes (72), or smoking (75,76) and/or in multiple risk factors (55,77,78). Case management systems have also been applied to older, sicker patients with heart failure (70,79) and multiple CV or other comorbidities (80). The interventions have taken place in differing health care settings, including academic medical

Table 4. Primary/Secondary Medical Models for CVD Prevention

Reference	Population and Study Design	Intervention	Components of Intervention	Outcomes
Shaffer and Wexler, 1995 (67)	• Convenience sample • High-risk dyslipidemic patients comparison of lipid team versus general internal medicine • n = 120 • Mean age–61 yrs F/U 18 months.	Lipid intervention team led by RN (Pharmacist, NP, dietician, clinical psychologist) (Lipid management)	• Clinic visit by RN including health and physical exam, review of lipid profile and secondary causes. Referral to endocrinologist as needed • Dietary counseling by dietician (all pts) • Screening by health psychologist for behavioral barriers to lifestyles change • Printed health education materials and individualized treatment plan • Follow up visits every 3 months (RN and dietician)	• At 18 months, reduction in total cholesterol (19% int. vs. 10% u.c. $p = 0.02$) and LDL cholesterol (26% int. vs. 8% u.c., $p < 0.01$). • No significant change in TGs or HDL between groups
Aubert et al., 1998 (72)	• RCT 138 type 1 (n = 17) and type 2 (n = 121) patients • Mean age–54 yrs F/U 12 months	Nurse case management (patients recruited from 2 large primary care clinics) (Diabetes management)	• Care provided by nurse case manager • Treatment algorithms developed by multidisciplinary team • Baseline visit with RN (45 min) and 2 week F/U (glucose mon., med adj. meal planning) • Referral to 5 weeks, 12 diabetes education program (dietician, exercise psychologist) • Quarterly F/U visits (RN) • Biweekly telephone contacts for review of glucose logs and medications adjustment	• At 12 months, change in HbAlc - 1.7 (9.0 → 7.3) (int.) compared to 0.6 (8.9 → 8.3) (uc) $p < 0.01$ • Change in fasting glucose: −48.3 (194–146 mg/dl int.) vs. −14.5 (191–176 mg/dl u.c.) ($p = 0.003$) • Improved perception of health status at 12 months in int. patients ($p = 0.02$)
Taylor et al., 1990 (75)	RCT 173 Post-MI males • Mean age–54 years F/U 12 months	Nurse case management (patients recruited from large staff model HMO) (smoking cessation)	• Behavioral counseling for smoking cessation at bedside by RN (30 min) • Health education pamphlet/audiotape • Nicotine replacement therapy as needed • Follow-up telephone contacts (10 min) at 48 h, 21 days, and monthly through 6 months	• At 12 months, biochemically documented smoking cessation 71% (int.) vs. 45% (u.c.), $p = 0.003$
DeBusk et al., 1994 (55)	RCT 585 Post-MI patients • Mean age–57 yrs F/U 12 months	Nurse case management/liaison cardiologist (patients recruited from large staff model HMO) (Multiple risk factor interventions)	• In-hospital baseline/education visit by RN • Behavioral education/counseling for diet, exercise and smoking primarily by telephone (11 telephone contacts over 12 months) • Protocol-driven medical algorithms for lipid management • Referral to other health disciplines as needed (dietitian, psychologist)	• At 12 months, mean exercise capacity (METS) 8.6 → 10.3 (int.) vs. 9.1 → 9.9 (u.c.), $p = 0.01$ LDL cholesterol 107 mg/dl (int.) vs. 132 mg/dl (u.c.), $p = 0.001$ smoking rate 70% (int.) vs. 53% (u.c.), $p = 0.03$
Haskell et al., 1994 (78)	RCT 300 patients with documented CAD • Mean age–57 yrs F/U 4 years	Clinic-based intervention team (RN, MD, psychologist, dietitian) and nurse case management (Multiple risk factor interventions)	• Baseline visit by nurse and dietitian • Risk reduction goals including written health educations materials • Individual follow-up via phone/mail by nurses re: patient progress • Lipid-lowering medications provided under protocol • Clinical visits every 2–3 months with project staff (5–7 visits/yr)	• Significant 4-year improvements in risk factors LDL (22%) ↓ HDL (12%) ↑ TGs (20%) ↓ Exercise capacity (20%) ↑ Diet Fat (24%) ↓ Diet cholesterol (40%) ↓ Body weight (4%) ↓ • Significant (47%) ↓ in narrowing of diseased coronary artery segments vs. u.c. • Reduction in clinical cardiac events (25 int. vs. 44 u.c., $p = 0.05$)

Table 4. Continued.

Reference	Population and Study Design	Intervention	Components of Intervention	Outcomes
Rich et al., 1995 (70)	RCT 282 CHF patients • Mean age–79 yrs F/U 3 months	Nurse-directed multi-disciplinary team (Heart failure)	In-hospital: • Education using teaching booklet by RN • Dietary assessment int. by dietitian • Social service consultation re: discharge planning • Analysis of medications by geriatric cardiologist Posthospital: • Individualized use of home health/telephone contact by RN for education, compliance, surveillance	• Survival without readmission at 90 days 91/142 (intervention) compared to 75/140 (controls), $p = 0.09$. • Heart failure readmissions ↓ 56% (54 intervention vs. 24 controls, $p = 0.04$) • Multiple readmissions (23% intervention vs. 9% controls, $p = 0.01$) • Improvement in quality of life (baseline → 90 days) intervention group, $p = 0.001$
Naylor et al., 1999 (80)	RCT 363 elderly chronically ill (79% cardiovascular) • Mean age–75 years F/U 6 months	APNs (Elderly chronically ill individuals)	• Hospital visits every 48 h by APN • Discharge planning by APN-individualized comprehensive home follow up protocol for patient/caregiver • Written discharge summaries provided to all health care providers/patients/caregivers • Home visits by APN at 48 h, 7–10 days, and individualized per patient thereafter • Weekly telephone contact with patient/caregivers–6 months	• Readmission rate 37.1% (usual care) vs. 20.3 (intervention), $p < 0.001$ • Multiple readmission rate 14.5% (usual care) vs. 6.2 (intervention), $p = 0.01$ • Total Medicare reimbursements significantly reduced ($1.2 million (usual care) vs. $0.6 million (intervention) $p < 0.001$) • No significant difference in acute care visits, functional status, depression or patient satisfaction
Fonarow et al., 2001 (126)	Comparison sample Consecutive Post-MI patients (n = 558) • Mean age–70 yrs F/U 12 months	Team of physicians and nurses (Secondary prevention treatments)	• Development & dissemination of focused treatment algorithm for all secondary prevention treatments • Standardized admission orders (pre-printed) • Patient education/counseling by cardiac nurses re: risk factors/tests • Patient education materials on risk of atherosclerosis/benefits of compliance	• Comparison (1992–1933) prior to implementation and two-year period after implementation (1994–1995): Significant improvements in aspirin, beta-blockers, ACE inhibitors and statins pre vs. post int. ($p < 0.01$) • Reduction in recurrent MI, hospitalization, cardiac mortality and total mortality ($p < 0.05$)

ACE = angiotensin-converting enzyme; APN = advanced practice nurses; CAD = coronary artery disease; CHF = congestive heart failure; CVD = cardiovascular disease; F/U = follow-up; HDL = high-density lipoprotein; HMO = health maintenance organization; LDL = low-density lipoprotein; MD = medical doctor; METS = metabolic equivalents; MI = myocardial infarction; RCT = randomized controlled trial; RN = registered nurse; TG = triglycerides.

care centers, primary care clinics of large HMOs, and homes (55,80). Many have relied on the telephone as the primary mode of communication with patients (55,72,78). These programs have used specially trained nurses and nurse practitioners to provide multifactorial interventions in lieu of a team of health care professionals. For moderate-to-high-risk patients with diabetes, established CVD, and heart failure, case management systems have proven responsive to the basic needs of patients. Such programs enable an access to broader resources and expertise and greater opportunities for close follow-up. They also foster closer adherence to evidence-based guidelines and facilitate communication with clinical experts. Finally, they incorporate databases to collect and organize data for individual patients and populations (81). The majority of case management programs have been shown to be effective in improving overall patient care (55,68,72,75,78,80). Effectiveness is measured by: 1) a greater achievement of goals such as BP, smoking cessation, and hemoglobin A1c (HbA1c) levels; 2) improvement in the quality of life; 3) an increase in short-term compliance; and 4) reductions in medical resource utilization, including fewer emergency room visits and hospitalizations. The cost-effectiveness of this type of care, the appropriate length of intervention time, the appropriate caseload, and the capability of such systems to improve long-term compliance have not been studied extensively (81,82). Moreover, how these programs link to other large population-based approaches and to standard clinical care requires further study. Models combining case management and the application of less intensive interventions for low-risk populations are currently being tested (83). To the contrary, the combination of the markedly increased risk for future coronary events in patients with established coronary disease (84) and the availability of various effective pharmacologic agents for the prevention of second coronary events (2) largely relegates the medical management of patients with CHD to physicians and nurses in their office practices. Newer models that rely on nurses and physicians to bridge the gap between hospitalization and out-patient care such as the AHA's "Get With the Guidelines" program may also enable a larger number of patients to be more effectively managed.

Cardiac rehabilitation programs are evolving from being primarily a site for highly monitored exercise programs for recently hospitalized cardiac patients to "secondary prevention centers" that provide a collection of preventive services for patients with established heart disease (85–88). These services include screening and treatment of hyperlipidemia, hypertension, diabetes mellitus, and obesity (86). Treatment programs consist both of counseling related to nutritional and psychological issues and the provision and adjustment of pharmacologic therapy for risk factors such as hyperlipidemia and hypertension (86,88,89). Exercise conditioning remains a central focus both for its preventive effects (90,91) and for the prevention of work-related and age-related disability (92). The case-management approach to cardiac prevention in cardiac rehabilitation has been widely adopted (55,78,93), with case managers focusing on individualized programs to reach short- and long-term risk-factor goals (78). A limitation of the delivery of secondary preventive services at cardiac rehabilitation programs is that, at present, only roughly 15% to 20% of patients attend cardiac rehabilitation after an acute coronary event, due in part to a geographic maldistribution of available programs (85).

The success of the systems noted above depends on the individualization of interventions and the availability of more time that can be offered by a single health care professional such as a registered nurse or exercise physiologist. Innovations in technology are certain to influence the dissemination of these systems in the future. For example, the use of computers and telephones to link patients and health care professionals increases knowledge, medication compliance, satisfaction with care, and quality of life, while it reduces utilization of medical care resources (94). Electronic medication sensors such as BP monitors, blood glucose meters, and interactive voice-recognition technology will facilitate the gathering of data that are currently difficult to retrieve. Real-time, online analysis of data, linked to patient reminders will enable more highly individualized management. Finally, technology will continue to simplify some of the most time-consuming tasks of data management and patient counseling that are faced by health care professionals attempting to manage CV risk reduction. Educational systems that incorporate the process of health behavior change and provide individualized tailored messages, such as the "My Heart Watch" program offered by the AHA, allow users to work at their own pace as they continue to attempt difficult changes. These systems have the potential to complement the office visit and promote effective health behavior changes in large populations of individuals at risk for CVD and its complications.

MEDIA AND COMMUNICATIONS

Whether a program message is delivered to a single individual or to an entire community, effective communication is necessary if behavior is to change. The role of media in implementing health interventions includes media as educator, media as supporter, media as promoter, and media as supplement (95). The goal of media targeted at the individual level is to change awareness, knowledge, attitudes, self-efficacy, skills, and behavior. Health-promotion organizations and health educators can reach defined target audiences, tailor interventions to specific contexts, and multiply their efforts by using existing organizational resources. At the societal level, mass media can be used in an attempt to affect normative behavior, laws and policies, and physical and information environments.

Commercial news services. The commercial media are powerful in their ability to expose vast numbers of people to stories, messages, and information about health and to build the public agenda for health-promoting policies. As noted

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by Finnegan (96), however, because their primary purpose is not improvement of public health per se, the relationship of health-oriented organizations and the media is dynamic and not easily controlled.

Schooler et al. (97) have demonstrated that news can be generated by an intervention program at the local level, and under the right conditions, newspapers will cover health promotion efforts. Finnegan et al. (96) documented that national coverage of heart disease issues was highest in the years 1983, 1984, and 1985, with a decline after that time to basal levels.

Paid advertising. Paid advertising has the advantage of being controllable by the program that sponsors it. The major disadvantage relates to expense. However, Reger et al. (98–100) have shown that, with a relatively inexpensive campaign of paid advertising, they were able to shift consumer demand from whole and 2% milk to 1% and skim milk. Total milk sales also increased.

Health communication campaigns. Mass media can play an important role in reducing CV risk. A creative way to bring these media forces together is through a CVD health communication campaign. Communication campaigns have been described as a purposive set of communication activities aimed at a large audience within a defined period of time (101).

Over the last 25 years, health communication campaigns have played a prominent role in national efforts to reduce heart disease, cancer, stroke, and accidents, the four leading causes of death and disability in the U.S. (102–104). The goal of most health communication campaigns has been to bring about some change in the knowledge, attitudes, or behavior of individuals clustered into a demographic or sometimes psychographic target audience.

The effects of health communication campaigns can have several dimensions. Effects can be short-term or long-term, immediate or cumulative, planned or unplanned. Effects can occur at the individual level, the group level, the organizational level, the societal level, or the cultural level (105). An effect of a health communication campaign can be an increase in cognitive complexity (106) or a gap in cognitive complexity (107). A communication campaign may also have the effect of setting a news agenda or a personal agenda (108) that may create a knowledge gap between the higher socioeconomic groups in a social system (who tend to assimilate the information) and lower socioeconomic groups (who tend not to assimilate the information) (109).

Communication researchers have differed on the significance of the change brought about by communication campaigns. Early reviews of health communication campaigns (107,110–113) concluded that health communication campaigns did little to alter negative health practices. More recently, researchers have cited the Stanford Three Community Study, the Stanford Five City Project, and the North Karelia project to point out that health communication campaigns can have positive effects, including changes in the health status of the target audience (114). However, rather than anticipating large behavior changes, many researchers now believe that small but overt behavior changes can be an outcome of communication campaigns (114).

In an exhaustive review of dozens of health communication campaigns conducted after 1980, Freimuth (115) identified the size of the effect generated by campaigns. Freimuth distinguished six types of effects, in a hierarchy of persuasion, that campaigns typically seek to bring about: awareness, information seeking, knowledge gain, attitude formation, behavioral intention, or behavior change. Freimuth found larger effects in the earlier stages of the hierarchy (i.e., awareness, information seeking, knowledge gain) and more modest effects in the later stages (i.e., attitude change, behavior intentions, behavior change).

SOCIAL MARKETING PRINCIPLES. Social marketing is a well-tested strategy that weaves theory and the lessons from previous campaigns into a structured process of campaign development. Social marketing uses the concepts of market segmentation, consumer research, concept development, communication, facilitation, incentives, and exchange theory to maximize target-group response (116). According to exchange theory, people exchange a resource (time, money, behavior) for a benefit (a product or a positive attribute such as health). Exchange theory is based on the idea that people will make rational decisions in their own best interest (i.e., satisfy a need or want by obtaining the most benefit for the least price). Social marketing seeks to facilitate that exchange by reducing the psychological, social, economic, and practical distance between consumer and behavior.

Researchers have developed a variety of schema to depict the social marketing process. One schema used by several health communication campaigns is described in detail in *Making Health Communications Work* published by the Department of Health and Human Services (117). In this schema, the social marketing process is segmented into six distinct but sometimes overlapping stages.

1. *Planning and strategy selection* to identify a primary audience, establish the goals for the campaign, analyze existing information about a health issue, and quantify the type or extent of change the campaign will seek to achieve;
2. *Selecting channels* such as print, television, Web, or radio and planning materials such as public service announcements, brochures, video, interactive media, easy-to-read material, and so forth;
3. *Developing and pre-testing materials* to ensure that they are appropriate for and understood by the primary audience;
4. *Implementing the campaign*, which involves "shepherding" the campaign materials through the selected channels to ensure that the messages reach the intended audiences;
5. *Assessing effectiveness* by measuring how well the campaign is achieving the objectives established in stage one; and

6. *Refining the campaign through feedback*, which allows campaign planners to adjust campaign strategy, resources, and messages based on feedback received through the campaign.

In the health arena, some practitioners and researchers have criticized social marketing for promoting a single solution to what is usually a complex problem (118). The critics have argued that social marketing tends to reduce serious health problems to individual risk factors and ignores the importance of the social and economic environment as major determinants of health. The NCEP and the media campaign that supports the NCEP demonstrate that a well-conceived program can address both individual and societal issues simultaneously.

Summary: media and communications effectiveness. The most fundamental requirements for media and communications effectiveness are that the messages' content and context be designed to flow through an individual's social network, be appropriate to the needs of the individual, and follow empirically devised theories of human learning (119).

The strength of mass media is that they reach large to very large audiences, but their weakness is that the audiences reached are diverse and undifferentiated. Audience diversity is a problem in that, to be effective, media messages should be designed specifically for particular target audiences. The weakness of targeted media (newsletters, booklets, self-help kits, videos, and computerized information systems) is their inability to reach large numbers of people.

Several investigators have shown that media is particularly effective when used in conjunction with face-to-face encounters (119). For example, Flay (120) reviewed the literature on media and smoking cessation and found that mass-media campaigns were reasonably successful in changing knowledge, attitudes, and in some instances, smoking behavior. Mass-mediated smoking cessation clinics that provided written materials were more successful than those that did not, and mass-mediated clinics with social support were more effective than either of the other methods.

Puska et al. (121,122) produced a nationally televised, 15-segment multi-risk television series over six months. The show featured health experts and eight participants who were attempting changes in behavior. The results were positive and showed a graded effect between contact with the program and behavior change.

The Stanford Three Community Study provides an example of a long-term (three years), comprehensive media program to achieve CV risk reduction (123). This study compared the effects of mass media alone and mass media supplemented with intensive face-to-face counseling. The study showed that media alone can change behavior over the short-term but that the addition of face-to-face interaction enhances long-term change (16).

The value of face-to-face interaction to promote behavior change is a recurring theme throughout diverse behavior change literature. For example, in reviewing the process of technological innovation, Tornatzky et al. (124) concluded that face-to-face communication has a strong and positive effect on the dissemination of innovations (page 159), while "passive access [to information] does not lead to a high volume of activity" (page 167). It is important to stimulate demand for new technologies, and efforts to push new technologies via development and demonstration are ineffective unless they are coupled with demand-creating activities (page 184). Gerlach and Hine (125) studied movements of social change and concluded that mass media primarily provide information and reinforcement of behavior, whereas face-to-face recruitment is usually necessary for individuals to undertake fundamental behavior change.

SUMMARY—GETTING RESULTS: WHO, WHERE, AND HOW?

Despite the progress made in the past quarter century in decreasing the incidence of CHD, it remains the major cause of death for both men and women in the U.S. and in other industrialized societies. A nationally coordinated public policy effort that combines community programs, focusing on healthy lifestyles and screening for risk factors, with medical screening and treatment of patients at increased risk would expand current efforts. The power of major health promotion organizations and opinion leaders to foster population changes in CVD risk should not be underestimated.

In the absence of a nationally coordinated program, increased integration of local efforts that encourage and reward healthy behaviors, screen for CV risk factors, and refer individuals to medical practices or hospital clinics for treatment and surveillance will best advance the cause of CVD prevention. Consolidation of resources, integrating the support of government, health promotion organizations, and private industry to use the media effectively to educate and encourage lifestyle change will be a major challenge. The role of government may need to be better defined, both in terms of how it might coordinate and fund the overall prevention effort on a national scale and how it might expand its role in supporting healthy lifestyles at the local level.

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Task Force #4—Adherence Issues and Behavior Changes: Achieving a Long-Term Solution

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INTRODUCTION: THE CHALLENGE OF ADHERENCE

Adherence (equivalent to compliance) to lifestyle and medication recommendations for the prevention of cardiovascular disease (CVD) is a crucial element in the path from the science of risk-factor modification to the actual reduction of risk factors and consequent prevention of disease-related events. Lack of adherence to therapeutic regimens has been documented for decades, particularly for preventive interventions requiring changes in behavior such as smoking cessation, change in eating patterns, physical activity, and adherence to pharmacologic therapy (1,2). Pharmacologic industry data (IMS Health; NDC Health Information Services) document that by the end of one year, adherence to preventive pharmacologic therapy has dropped to less than 50% across several broad classes of drugs, including hydroxy-methyl-glutaryl–coenzyme-A (HMG-CoA) reductase inhibitors and angiotensin-converting enzyme inhibitors. Although non-adherence may consist of dropping therapy altogether, there is also, a significant problem with individuals who remain in treatment but fail to follow the treatment regimen in sufficient quantity or appropriate