



**National Heart Attack Alert Program
Coordinating Committee
and Subcommittees**

**MEETING
SUMMARY
REPORTS**

**June 25–26, 2001
Alexandria, Virginia**



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**NATIONAL HEART ATTACK ALERT PROGRAM (NHAAP)
COORDINATING COMMITTEE
10-YEAR ANNIVERSARY MEETING**

**June 25–26, 2001
Alexandria, Virginia**

HIGHLIGHTS

- The NHAAP Coordinating Committee celebrated the 10-year anniversary of the NHAAP at this meeting.
- Four new representatives were welcomed to the Coordinating Committee: Dr. Arthur Dresdale of the American Association of Health Plans, Dr. George Anderson of the American College of Preventive Medicine, Mr. John McGinnity of the American Academy of Physician Assistants, and Dr. Charles Eaton of the American Academy of Family Physicians.
- Ms. Mary Hand gave an update on work that is going on at the Institute including a strategy development workshop to plan an educational agenda on women and heart disease, the recently funded community-based Cardiovascular Enhanced Dissemination and Utilization Centers, and the new cholesterol guidelines issued by the National Heart, Lung, and Blood Institute's (NHLBI) National Cholesterol Education Program.
- Mr. Keith Hewitt updated the Coordinating Committee on the Cardiovascular Health (CVH) 2002 conference in Washington, D.C.
- Dr. Myron Weisfeldt presented the Post Resuscitative and Initial Utility in Life Saving Efforts (PULSE) research and asked the NHAAP to adopt the agenda as a new direction for improving CVH.
- Ms. Hand provided a presentation on the progress and accomplishments of the NHAAP over its 10-year history.
- The Education, Health Systems, and Science Base subcommittees went through the nominal group process in order to begin setting the Program's agenda for the next five years.
- Dr. Charles Curry discussed under recognition and treatment of heart attacks in Blacks.
- Dr. Patrice Devigne-Nickens presented information on ethnic and gender symptom presentations for acute myocardial infarction (AMI).
- Dr. M. Janice Gilliland reported findings on the heart attack symptom experience based on retrospective data collection from hospital records on 1,500 patients from the Rapid Early Action for Coronary Treatment (REACT) study.
- Dr. Lawton Cooper summarized REACT findings on coronary heart disease [CHD] symptom knowledge and attribution.

- Dr. Robert Christenson reviewed the consensus document of the Joint European Society of Cardiology/American College of Cardiology Committee for the Redefinition of Myocardial Infarction, and its implications.
- Dr. Jean McSweeney provided an overview of her qualitative research on women from rural Arkansas and Texas with prodromal and acute symptoms of AMI.
- Dr. Raymond Bahr reported on recognition of prodromal symptoms of a heart attack.
- Ms. Paula Upshaw told her story as a young Black woman who was misdiagnosed when she had her heart attack.
- Chairs of the Science Base Subcommittee, the Health Systems Subcommittee and the Education Subcommittee presented the subcommittee recommendations for work over the next 5 years.
- Dr. Myron Weisfeldt addressed the Committee on a broad research agenda for cardiac and traumatic resuscitation and the need for a permanent clinical trials “network.”



National Heart Attack Alert Program

10-Year Anniversary Meeting

**June 25–26, 2000
Alexandria, Virginia**

**NATIONAL HEART, LUNG, AND BLOOD INSTITUTE (NHLBI)
NATIONAL HEART ATTACK ALERT PROGRAM (NHAAP)
COORDINATING COMMITTEE
10-YEAR ANNIVERSARY MEETING**

**Meeting Summary
June 25, 2001**

GENERAL SESSION AND BUSINESS MEETING

Introduction [Ms. Mary Hand]

Ms. Hand welcomed four new members: Dr. Arthur Dresdale of the American Association of Health Plans (assigned to the Health Systems Subcommittee); Dr. George Anderson of the American College of Preventive Medicine assigned to the Health Systems Subcommittee; Mr. John McGinnity of the American Academy of Physician Assistants (assigned to the Education Subcommittee); and Dr. Charles Eaton of the American Academy of Family Physicians (assigned to the Education Subcommittee). She then introduced several participants who were standing in for designated representatives of their organizations: Ms. Susan Thurner of the American Red Cross, Mr. John Moore of the International Association of Fire Fighters, and Dr. Denise Hirsch of the American College of Chest Physicians.

Report From the Institute [Ms. Hand]

Ms. Hand referred participants to materials in their meeting packets for information about relevant Institute activities since the last NHAAP meeting. The packets include memos, press releases, and articles describing:

- A strategy development workshop, sponsored by the NHLBI Office of Prevention, Education, and Control, to plan an educational agenda on women and heart disease.
- Collaborative work with six community-based organizations, called “Enhanced Dissemination and Utilization Centers,” to address high mortality rates from cardiovascular disease, using existing guidelines and materials.
- New cholesterol guidelines issued by NHLBI’s National Cholesterol Education Program.

In addition, NHAAP members will receive a copy of the Fourth National Congress on Chest Pain Centers, provided by Dr. Ray Bahr.

Cardiovascular Health for All: Meeting the Challenge of Healthy People 2010—A National Conference [Mr. Keith Hewitt]

Ms. Hand introduced Mr. Hewitt, Coordinator of National and Regional Conferences in the Office of Prevention, Education, and Control to discuss the next national cardiovascular health conference.

The Cardiovascular Health (CVH) 2002 meeting will be held April 11–13, 2002, in Washington, D.C., at the Marriott-Wardman Park Hotel. It will focus on achievement of the Healthy People 2010 goals related to cardiovascular health and the overarching goals of reducing health disparities and improving quality of life for all Americans. The cosponsors are the NHLBI; the Office of Disease Prevention and Health Promotion; the American Heart Association; the Centers for Disease Control and Prevention; the recently renamed Health Care Financing Administration, now known as the Centers for Medicare and Medicaid Services, or CMS; and the Health Resources and Services Administration.

He mentioned several earlier conferences in the history of the Institute's cardiovascular health conferences, including hypertension national conferences beginning in the 1970's, and a combined conference on high blood pressure and cholesterol. The previous CVH conference was held February 1998 in San Francisco. Mr. Schneiderman represented the NHAAP in planning activities for that conference; Dr. DeVaughn has performed this role for the 2002 conference. Unlike many national meetings, the CVH meetings bring together representatives of disciplines and groups that do not normally meet in professional gatherings, Mr. Hewitt noted.

Abstracts for CVH 2002 are being solicited, with a request for online submission (www.cvh2002.net) by September 14, 2001; notifications will be made in October. Abstracts should be categorized according to the 2010 heart disease and stroke objectives. Additional information about the conference is available on the Web site.

The conference will have one plenary session on each of the following four broad topics: prevention of risk factors; detection and treatment of risk factors; early recognition and treatment of acute coronary syndromes and stroke; and prevention of recurrent complications of cardiovascular disease. Drs. Atkins and Ornato will be the plenary speakers for the third session. Mr. Hewitt anticipates that this conference will have a greater impact than any previous such meeting, which he characterized as a tribute to the NHAAP's accomplishments of the past 10 years.

Noting that the NHAAP must submit three additional ideas for breakout sessions at the CVH 2002 conference, Ms. Hand requested suggestions.

A BROAD RESEARCH AGENDA FOR CARDIAC AND TRAUMATIC RESUSCITATION [Dr. Myron Weisfeldt]

The NHAAP has had a significant impact on mortality from major acute cardiac ischemic events; unfortunately, the same cannot be said for survival after sudden cardiac arrest and severe cardiovascular trauma, Dr. Weisfeldt said. He expressed the hope that the NHAAP would adopt

the research agenda he was about to present, as a new direction for improving cardiovascular health.

The agenda began under the leadership of Dr. Claude Lenfant, NHLBI director, on June 29–30, 2000, with a conference guided by Dr. Sopko and entitled, “Post-Resuscitative and Initial Utility in Life Saving Efforts (PULSE).” The Department of Defense had a prominent role, and the conference attracted corporate sponsors as well. Some 200 physicians and scientists attended the 1.5-day event, which was developed by seven subcommittees. For approximately 6 months after the conference, the Executive Committee deliberated to develop a consensus, published in March 2001 and included in the meeting packet, about what was needed to improve this field of medicine.

If traumatic and cardiac deaths are included, some 1,000 Americans die each day from cardiovascular events or about 360,000 per year, Dr. Weisfeldt said. The survival rate for traumatic and sudden cardiac arrest is only 5 to 7 percent. A 10 percent improvement in that figure, to 17 percent, could save 36,000 lives per year. For perspective, he noted that automobile-related deaths in the United States total 50,000 per year.

The PULSE conference participants were optimistic about the possibility of achieving a ten percent improvement in survival, with appropriate basic research, translational engineering, and clinical trial research. Dr. Weisfeldt described some reasons for that optimism.

Long ventricular fibrillation (VF). Several years ago, Dr. Gerald Buckberg reported on 14 patients who were treated with long VF for cardiac arrest at UCLA Medical Center. The patients received at least 20 minutes of VF, cardiac resuscitation, blood exchange, and heart decompression; 11 survived and had little or no neurological injury. With such measures, very significant improvement of results with long-term VF is possible.

Defibrillation technology. In some settings, it is clear that early defibrillation with automatic external defibrillators has made a significant improvement in survival. Ideally, early defibrillation by various means would be combined with better resuscitation and better understanding and use of drugs to improve survival.

Insight Into Prolonged Ischemic Survival. From basic research on strokes and heart attacks, it is clear that individual tissues are injured during resuscitation and reperfusion, providing an opportunity to intervene with drugs or other agents after the arrest occurs to try to preserve the most important and vulnerable tissues.

Dr. Weisfeldt presented the post-PULSE agenda for research.

Basic Research Agenda

1. Toxic mediators: In the setting of global total-body ischemia, what leads to irreversibility? Is it injury to the liver, gut, or circulating neurohumors rather than brain and cardiac injury that prevents survival? If so, what are the opportunities for pharmacological interventions to address other factors that are important in global ischemia.

2. Vascular control mechanisms: Which ones are important in providing perfusion to critical organs?
3. Molecular mechanisms of ischemic tolerance: Some models are of interest. For example, hibernating animals may have genetic switches to lower their metabolic and suddenly revive it. If we understood those molecular genetic mechanisms, could we turn them off at the onset of a cardiac arrest or traumatic injury and turn them on again afterward? Similarly, considerable evidence suggests that hypothermia is important in preservation.
4. Traumatic injury: Hemostatic and blood-clotting systems need to be understood better. A vasoconstrictive drug that acted only in the target limb or artery would be a beneficial clinical tool, but it can be developed only with more basic research. Cardiovascular response to traumatic injury and fluid changes also merit additional basic research.

Engineering

1. Monitors: Better ways to monitor physiological function and severity of injury during cardiac arrest are needed.
2. Hypothermia: Better ways of inducing hypothermia quickly if it is beneficial.
3. Access: Better and more rapid vascular access to administer drugs and fluids faster.
4. Defibrillator technology: Better and simpler technology; better communication systems (e.g., cell phones) to improve the effectiveness of defibrillation. A “smoke detector” for people at risk—a monitoring device worn by persons at risk for sudden cardiac arrest—could alert those nearby to an event, eliminating time-consuming diagnosis.
5. Blood flow: Better ways of improving blood flow during cardiac arrest.

Translational Research and a Sustained Clinical Trials Network

Dr. Weisfeldt mentioned the contributions made by clinical trials networks to the understanding of what does and does not work in acute myocardial infarction, unstable coronary syndrome, and heart failure—conditions with a mortality and morbidity similar to those of sudden cardiac arrest.

1. Drugs: No drug (including bicarbonate, epinephrine, vasopressin, and amnioderone) has ever been shown in humans to result in long-term improvement in survival, which is the standard endpoint.
2. Tests: Tests are needed for drugs and for implementation techniques.

3. Clinical trials: Clinical trials in cardiopulmonary resuscitation pose a special problem for informed consent, which the patient is not in a position to give. The PULSE conference participants recommended that a sustained clinical trials network—involving investigators, the emergency medical services system, individual hospitals, and institutional review boards—was essential and that a community understanding of the rules governing informing next of kin was critical to the success of such a network. A standard waiver of consent for participation of patients who are not able to provide consent is needed.

Dr. Weisfeldt referred participants to the meeting packets for information about progress in these areas since the PULSE conference, and he summarized this information. Substantial progress has been made in engineering advances, he reported. The Department of Defense and NHLBI (through a small business initiative) have both solicited applications to address engineering issues. Additionally, Dr. Thomas F. Budinger, a member of the PULSE Executive Committee, may receive funding through a California research initiative in biomedical engineering.

In the area of training and translational research, the Public Access to Defibrillation (PAD) I study group, which is conducting a trial of automatic external defibrillators in 26 communities nationwide, has met its goal of enlisting 1,000 sites with 250 or more adults randomly assigned to either training in cardiopulmonary resuscitation (CPR) or training in CPR plus automatic defibrillators. This study group has met the criteria for waiver of informed consent at all participating sites. Dr. Weisfeldt observed that the PAD1 structure will be available to address other issues, such as vasopressin versus epinephrine, when the study ends in 2 years.

Although the NHLBI has not issued Requests for Applications or Proposals to address basic science issues, the conference group is hopeful that progress in this area will be made in the near future.

Several activities have been undertaken in followup to the PULSE conference:

- The full proceedings of the conference and rationale for the executive summary have been submitted for publication in a peer-reviewed journal.
- The group is soliciting formal written endorsements of the executive summary from professional societies, especially those with at least 2 million members.
- A Web site is available at <http://www.nhlbi.nih.gov/meetings/pulse/index.htm>.
- The executive committee is in the early stages of forming a coalition for resuscitation research, both within and outside Government, to assist in public and professional education about the importance of research in this arena.

Dr. Weisfeldt asked that the NHAAP accept the need to address sudden cardiac death and traumatic injury as part of its program, so that at the next 10-year meeting, progress in these areas will be evident in decreased morbidity and mortality.

In response to a question about progress in prevention of sudden cardiac death, Dr. Weisfeldt noted an increased sophistication in identifying persons at risk. However, he said,

only two procedures seem to work in the small groups of persons identified with serious heart disease: implantation of an automatic defibrillator and cardiac transplantation, and both consume tremendous resources. Among pharmacological agents, beta-blockers have shown only a modest effect in prevention for persons at risk. Otherwise, there is little promise of a breakthrough, he said.

Dr. Ornato thanked Drs. Weisfeldt and Sopko for their leadership in this field and provided an analogy to demonstrate the scope of the problem from a public health perspective. In the United States, the mortality from sudden cardiac death and traumatic injury (approximately 1,000 persons per day) is equal to the loss of life from two jumbo 747 jets crashing per day. He commented that a multicenter effort is needed for clinical trials, to enroll the numbers of patients required to yield meaningful data with statistical power. Although sudden cardiac death is finally getting the attention it deserves as a public health problem, only one randomized clinical trial (PAD1) has been funded, representing roughly .05 percent of the National Institutes of Health budget.

Dr. Weisfeldt described the actions that are needed for a waiver of consent that is needed for participation in a resuscitation clinical trial:

- Inform the public of what will be done.
- Arrange for formal public notification and meetings about the process.
- Respond to the advice received and deal with a 2-year institutional review board.
- Have provisions for informed consent should someone survive, before any action related to a clinical trial protocol is taken.
- If the person does not survive, immediately and formally inform the next of kin that the loved one, in undergoing cardiac arrest and resuscitation, participated in a research study.

Although the NHLBI does not have long-term study groups, the AIDS Clinical Trial Groups, the Southwest Oncology Group, and other cooperative research consortia have an approach to long-term clinical trials that involves periodic peer review, continuing entities, and a consistent and long-term agenda for pursuing specific research. Dr. Weisfeldt suggested this as an appropriate model for NHLBI to use in considering long-term research.

Dr. Zalenski proposed that the NHAAP Coordinating Committee support the PULSE research agenda by reviewing the executive summary and voting to endorse it. Ms. Hand said that supporting the PULSE research agenda would be appropriate and could be discussed the next day during a meeting with the Executive Committee.

PROGRESS REVIEW: NATIONAL HEART ATTACK ALERT PROGRAM

Overview of 10-Year Meeting Planning and Agenda [Ms. Hand]

The 5-year anniversary of the NHAAP was marked by a retreat conducted with a facilitator, Ms. Hand said. At this 10-year meeting, the goals were to review progress since 1996

and to look ahead at some important issues facing the program now, such as sudden cardiac arrest and resuscitation research involving human subjects.

In planning the agenda for the 10-year meeting, staff presented several issues for the Executive Committee consideration for a special meeting focus that they deemed important for the next 5 years of the Program's work, including racial and gender disparities, prodromal symptoms, and information technology. In addition, the Executive Committee suggested the topics of sudden cardiac death, barriers to research in impaired subjects, and public education interventions beyond the Rapid Early Action for Coronary Treatment (REACT) research programs. Ultimately, however, it had to select only two. Given the program's movement into public education and the broad implications of recognition of heart attack, it was decided that the June 26th agenda would focus on gender and racial disparities and issues related to early recognition of heart attacks.

Ms. Hand listed the overall objectives of the meeting:

- To review progress in the areas of focus identified at the 5-year review meeting.
- To examine relevant data trends.
- Through the subcommittees, to look at existing areas of focus and consider new areas of focus for the next 5 years.
- To consider the available science related to early recognition of patients with symptoms of acute coronary syndromes (acute myocardial infarction and unstable angina), with a special emphasis on presentation profiles by race and gender.

Data Trends of Interest to the NHAAP at 10 Years: Report From the NHAAP's Data Advisory Group [Dr. Bruce MacLeod]

The NHAAP Data Advisory Group was begun in 1992 to create an evaluation plan and periodically update the program's objectives and data sources, according to Ms. Hand. The Data Advisory Group has met twice since the 5-year meeting: in April 1997 and in April 2001. She acknowledged data support the Program received from coronary heart disease surveillance project investigators, Dr. Robert Goldberg (Worcester Heart Attack Study), Dr. Wayne Rosamond (Atherosclerosis Risk in Communities [ARIC] Study), Dr. Russell Luepker (Minnesota Heart Survey), Dr. Dale Burwen (CMS; formerly HCFA, National Acute Myocardial Infarction Project), Dr. Kathee Littrell (National Registry of Myocardial Infarction [NRMI] Project Manager), and Dr. Paul Sorlie and Mr. Thomas Thom (Division of Epidemiology, NHLBI).

Ms. Hand referred participants to a written report on the data in their meeting packets, thanked Mr. Alex Kuhn, in her office, for preparing the data progress report, and introduced Dr. MacLeod as spokesman for the Data Advisory Group (see slides in Attachment C). Dr. MacLeod commented on the significant areas of data deficiency, particularly about treatment-seeking behavior and prehospital times—the time from onset of initial symptoms to time of presentation or reperfusion. Now, unlike the 5-year meeting, some such data are

available. The principal sources of data used in his presentation are NRMI, the ARIC study, and the Worcester Heart Attack Study.

According to data from the National Center for Health Statistics on actual and expected age-adjusted death rates for coronary heart disease (CHD), actual deaths in 1998 were 460,000—a decrease from the expected number. Death rates for acute myocardial infarction (MI) per 100,000 population, United States, 1968–1998, show a decrease in most categories (age 35–64, older than 64, men, women, Black, White). The rate for White men decreased steadily; around 1990, the graph shows a crossover for White men and Black men, and the highest rate for acute MI is now among Black men. Data on the average annual percentage decline in acute MI mortality, 1990–98, show the greatest drop for young White men and the least reduction for elderly Black women.

ARIC data on CHD mortality show the greatest decrease among elderly men (approximately 4 percent), with a decrease of only 1 percent for younger men. For women, the decrease was about 4.5 percent for the older group, with a slight upward trend for younger women. Out-of-hospital mortality from CHD is much lower for women than for men. From the Minnesota Heart Survey, data on mortality from CHD per 100,000 population, 1985–97, confirm trends from other sources. Out-of-hospital mortality rates are decreasing, and in-hospital rates are decreasing even faster.

Data from the National Hospital Discharge Survey on hospital case fatality for MI, 1970–98, show a decrease that has been leveling off in recent years. Age-specific trends in hospital case fatality rates, taken from the Worcester Heart Attack Study, show a decrease in each age group from the 1975–1978 to the 1997–1999 time periods, especially among those in the 75–84 and 85 years and older age groups.

In the ARIC study, 1987–97, the 28-day case fatality after hospitalization for MI was 3.1 percent for women (both Black and White) and 2.7 percent for men (both Black and White). Dr. MacLeod issued a caution about case identification bias in studies of MI and CHD in 1970 versus 1995 and 2000, because of changing definitions at those time points. In 1970, serum markers identified some 5 percent of emergency department cases as MI. In more recent years, however, the World Health Organization definition of MI has a high likelihood of identifying many more patients with MI who survive a heart attack. Some of the decrease in mortality shown therefore may be the result of diagnostic criteria that identify more people who are likely to survive rather than to actual progress.

Data from the NMRI on trends in management of MI (1990–99) show that reperfusion strategies led to shorter hospital lengths of stay. In the Worcester study, the decline in average hospital stay confirms a significant decrease for MI.

The NRMI also examined use of medication. Aspirin use increased from approximately 60 percent in 1990 to 83 percent, and use of beta-blockers increased from a percentage in the high 20s to over 50 percent. Heparin use, however, has decreased somewhat. Noting the relatively new use of IIb/IIIa inhibitors, Dr. MacLeod said that he expected use of these agents to increase. CMS (HCFA) data on use of medication for patients with acute MI (1994–1995 to

1998–1999) show that use of aspirin increased 7 percent, use of beta-blockers increased 18 percent, but use of reperfusion increased only 2 percent.

The Worcester Heart Attack Study data on use of different interventions and medications, from the 1986/88 to 1997/99 time periods, show that use of antiplatelet agents, including aspirin, climbed to more than 80 percent and use of beta-blockers increased significantly (to around 80 percent), but use of calcium channel blockers decreased significantly, and thrombolytic therapy (reperfusion) has leveled off.

In presenting data on door to drug time for thrombolysis, Dr. MacLeod said that he believes the NHAAP deserves all the credit for the improvements shown since the program began in 1991. In the period 1990–94, 23 percent of patients in NRMI presented in less than 30 minutes. In 1998, that figure had risen to 37 percent. The average time is now 34 minutes. Door to balloon time for primary PTCA (percutaneous transluminal coronary angioplasty), also from NRMI, has dropped from 116 minutes in 1994 to 108 minutes in 1999 and continues to decline gradually. CMS (HFCA) data on time to reperfusion treatment, 1994–98, show a 7 percent reduction in time to lytics (40 minutes) and a 12 percent reduction in time to PTCA.

Data on prehospital delay were difficult to obtain for the 5-year NHAAP meeting, Dr. MacLeod said. Since then, however, several data sources have been identified. The Worcester Heart Attack Study found no significant change in median or mean delay times from onset of cardiac symptoms to hospital care (1988–99): the mean delay was 4.1 hours in 1988 and 4.6 hours in 1999; median delay increased from 2 to more than 2.2 hours. These statistics show a continuing opportunity for improvement, Dr. MacLeod commented.

ARIC data on the percentage of patients with MI who arrive at a hospital within 4 hours of the onset of cardiac symptoms show a modest increase 1987–98 from 42 percent to 47 percent. Also from ARIC (1987–97 data), more Black than White patients with MI are using emergency medical services (EMS) to reach the hospital. Another study found that only 40 percent of patients with MI arrive at the hospital via EMS.

Dr. MacLeod presented data on 9-1-1 coverage as an indicator of access to care. At the end of 1976, the 9-1-1 emergency system served approximately 17 percent of the U.S. population. At the end of the 20th century, coverage had expanded to reach some 93 percent of the country, and 95 percent of that is enhanced 9-1-1 service. A recent study by the National Emergency Number Association found that 98 percent of the population is covered by 9-1-1. This success will eliminate the need to continue to monitor 9-1-1 as an evaluation factor, Dr. MacLeod said.

Dr. McNutt asked about controlling for changes in diagnostic criteria to acquire better data. Dr. MacLeod concurred but pointed out that the Data Advisory Committee merely borrows the data; it does not generate them. He suggested that Dr. McNutt be on the Data Advisory Committee.

Dr. Smith commented on two points in Dr. MacLeod's presentation: (1) that some of the steep declines in key areas before the NHAAP began may, in part, be the result of changes in data criteria and (2) that since approximately 1995–96, there appears to have been a leveling off

in major parameters of progress. Dr. MacLeod responded that some areas, such as prehospital delay times and use of EMS, showed little movement and are appropriate targets for more attention. Databases are now available to help evaluators gauge progress in these areas at NHAAP's 15-year mark, he said. He also expressed the opinion that little additional progress can be made in door to needle and door to balloon times.

Dr. Selker said that many apparent improvements may indeed be the result of changing diagnostic criteria. It is important to be able to monitor what is happening doctors' offices, the community, and hospitals, he said. To do that, we need to "get around" the changing definitions of acute coronary syndromes, the changing sensitivities of tests, and the changing use of DRG (CMS Diagnosis-Related Groups) and ICD-10 (*International Classification of Diseases*, 10th edition) codes. A solid, stable way to monitor outcomes is needed, he said.

Review of Progress With Areas of Focus Identified at the 5-Year Meeting [Ms. Hand]

At the 5-year NHAAP meeting, held in June 1996 at Ellicott City, Maryland, as a formal retreat process, the NHAAP considered its Coordinating Committee structure and process, the roles and responsibilities of participating organizations, and special areas of focus (Ms. Hand's presentation appears as Attachment D). Ms. Hand listed the seven areas of focus identified at that meeting:

- Evidence-based evaluation of diagnostic technologies, strategies, and protocols.
- Health care systems and community planning.
- New information technologies.
- Professional education.
- Education of high-risk patients.
- Patients discharged from emergency departments ruled out for acute MI.
- Public and bystander education.

Since the 5-year meeting up to this 10-year meeting, the NHAAP Coordinating Committee has met seven times. During that period, the NHAAP broadened its initial charge of expediting the rapid identification of patients with acute MI to include patients with unstable angina, and non-Q wave MI, thus encompassing all patients with acute coronary syndromes.

Ms. Hand reminded participants that, within the subcommittee breakout sessions, they would be asked to determine how well the program has addressed these areas and which remain important to the NHAAP at its 10-year mark. She then summarized key activities in each area of focus and referred participants to a spiral-bound report in their meeting materials that included much of the same information.

Diagnostic Technologies. A report was prepared prior to the 5-year meeting to review technologies used in emergency departments for diagnosing patients with acute cardiac ischemia and evaluate their diagnostic performance and clinical impact. That report was published in the

January 1997 issue of *Annals of Emergency Medicine*, sent to 41 editors of journals and newsletters, and prepared as a slide program that now appears on the NHAAP Web page. Since then, NHLBI and the Agency for Healthcare Research and Quality (AHRQ) have supported an update of the evidence done by one of the AHRQ's Evidence-Based Practice Centers (EPC) [New England Medical Center's EPC], and recently published the findings. An executive summary appears on the AHRQ Web site. The full report is available through the AHRQ information center.

Health Care System Community Planning. At the 5-year meeting, the Coordinating Committee recognized the pivotal role of health care systems in identifying and treating patients with acute coronary syndromes and the role of the community in ensuring access to timely care. In December 1995, before the retreat, the Coordinating Committee held a special meeting, chaired by Dr. Jones, to examine whether managed care posed a barrier to access and early treatment. After the retreat, proceedings and an executive summary of that meeting were published, and a Health Systems Subcommittee, chaired by Dr. MacLeod, was created.

That subcommittee formed an Outcome Measures Working Group to address issues of quality improvement. In the spring of 1998, it submitted a proposal to the Cardiovascular Measurement Advisory Panel of the National Committee for Quality Assurance (NCQA) to consider several emergent cardiovascular measures for managed care organizations. Unfortunately, Ms. Hand reported, NCQA did not adopt those measures, some of which were hospital based. However, representatives from NCQA, the Joint Committee on Accreditation of Health Organizations, HCFA's National Acute MI Project, and the National Quality Forum have addressed the subcommittee about their quality improvement programs.

In the area of community planning, the NHAAP published a paper on *Access to Timely and Optimal Care of Patients with Acute Coronary Syndromes—Community Planning Considerations*, which was featured at the last national CVH conference in February 1998. The paper was intended to be a blueprint for all community settings, to help them identify the training, education, equipment, and protocols they needed to respond appropriately and rapidly to heart attack patients. A slide program and action alert summary have been developed and appear on the Web site; copies were mailed to more than 3,000 EMS and public health providers.

New Information Technologies. This category includes the management, organization, entry, retrieval, display, interpretation, and understanding of information. In April 1998, NHLBI, the National Library of Medicine (NLM), and the Agency for Health Care Policy and Research (now AHRQ) cosponsored a symposium, chaired by Dr. Smith, with experts in informatics and in NHAAP issues as part of the planning process as well as the program. The event included informatics sessions with speakers on telehealth, diagnosis and treatment, decision support, large-scale databases, medical records, access, and the application of information technology to the education of the public, patients, and health care providers. NLM later awarded contracts to examine informatics approaches to heart attack issues. A proceedings of the symposium was prepared and published by the Government Printing Office in September 1999.

Professional Education. At the 5-year meeting, a recommendation was made to target primary care physicians, moonlighting physicians, and medical, nursing, and prehospital providers in the Program's educational efforts. Ms. Hand mentioned a number of NHAAP

publications that had been produced since the 5-year meeting, such as recommendations on educational strategies for reducing delay in high-risk patients, a report evaluating the evidence for use of emergency department technologies for patients with acute cardiac ischemia and the update of the evidence produced by one of AHRQ's Evidence-Based Practice Centers, a report on community planning, a report on chest pain centers and programs, proceedings from the April 1998 information technology symposium, and a forthcoming journal article describing the symposium and the informatics tutorials.

Ms. Hand mentioned ways in which committee members have adapted these materials for their own constituents. For example, Dr. Crumlish and other nurses on the committee worked on two articles: "When Time Is Muscle," published in the January 2000 issue of the *American Journal of Nursing*, and "MEDSURG Nursing: Reducing Patient Delay in Seeking Treatment for Acute MI," published in April 1999. Dr. Ray Holt published an article on the pharmacist's role in reducing delay, published in a 1999 issue of the *Journal of the American Pharmaceutical Association*. An issue of *Family Practice Recertification*, a peer-reviewed clinical journal for primary care physicians, was devoted to management of acute MI. Dr. Atkins is one of the editors, and he and Dr. Roger Rodrigue, former representative of the American Academy of Family Physicians, published an article on "Reducing Treatment Delay in MI: The Physician's Role," and Drs. Selker and Zalenski coauthored an article on emergency department technologies that was published in 1997.

Information has appeared in exhibits of NHAAP member organizations and other professional groups as well. Before each Coordinating Committee meeting, members are asked about relevant activities within their organizations, and the information will be circulated.

Education of High-Risk Patients. At the 5-year meeting, this was identified as a critical focus while the program awaited results of the Rapid Early Action for Coronary Treatment (REACT) study, with providers of patients with pre-existing heart disease identified as primary targets. The program published a paper on educational strategies to prevent prehospital delay in patients at high risk for acute MI, which included an algorithm for telephone triage and a patient advisory form. To reach the primary care and internal medicine communities, the NHAAP published a short version in *Annals of Internal Medicine*, in addition to a full Government Printing Office version and slides and an action alert, with posting on the NHAAP Web site. The full version was published in the *Journal of Thrombosis and Thrombolysis*. It was also marketed to editors of 80 journals and newsletters and mailed to 125,000 primary care physicians. Additionally, the Society of General Internal Medicine published the action alert in *SGIM Forum*.

Patients Ruled-Out for MI in Emergency Departments. Ms. Hand explained that the Program has not had any specific activities aimed at reaching patients ruled out for an acute coronary event, through their primary care physicians. However, the Program has prepared two papers that address patient stratification issues related to acute coronary syndromes. The program published a position paper on chest pain centers and programs offering recommendations to assist emergency physicians and departments in providing comprehensive care for patients with acute cardiac ischemia: heart attack treatment programs, diagnostic and observational programs to rule out patients, and outreach and education programs. In May 2000, the position paper was published in *Annals of Emergency Medicine*. In June 1997, the Science Base Subcommittee

identified a need to develop recommendations for all emergency departments to adopt a critical pathway approach to the management of patients with acute coronary syndromes. Dr. Christopher Cannon, an advisor to the Science Base Subcommittee, has been the lead in that effort. The paper is under review at the *American Heart Journal*.

Public and Bystander Education. Through the Rapid Early Action for Coronary Treatment (REACT) study (1994–98), NHLBI funded 10 communities for intensive intervention, and they were matched with 10 control communities. The program tested the hypothesis that a multistrategy community intervention can reduce patient delay in seeking care for heart attack symptoms. At the end of the study, there was no statistically significant difference in the primary outcome measure, delay time. However, the study results pertaining to use of 9-1-1 in the intervention communities were significant. The use of EMS in all 20 communities was initially very low (33 percent), but at the end of the study, the intervention communities showed a 20 percent increase, and calling 9-1-1 was a major message of the REACT campaign. Since the REACT data were presented at an American Heart Association meeting in November 1998, the NHAAP has been considering the implications of the findings for its own approach to public education. The REACT investigators made a presentation to the Coordinating Committee in spring 1999 and met with each of the subcommittees. The Executive Committee then formulated recommendations, in light of the REACT results. A decision was made to broaden the program scope, building on lessons learned from REACT. The NHAAP has been modifying some of the REACT materials for a national audience, targeting those with longer delay times. One campaign message will try to clarify the misperception that a heart attack is a cardiac arrest, identified through REACT focus groups.

Ms. Hand then presented information on behalf of her colleague, Ms. Terry Long, who was unable to attend the meeting and has been working with Ms. Hand to adapt REACT materials for NHAAP use.

Considerable progress has been made in creating the next generation of REACT materials for dissemination, according to Ms. Hand, and in implementing a strategic marketing campaign. The priority audiences are older people and minority groups, especially African Americans. The program will be working to develop partnerships that can reach these audiences with educational materials. The campaign theme is “Act in Time to Heart Attack Signs.”

An important part of the effort is working with the American Heart Association (AHA) to refine the message about heart attack symptoms, based on the REACT findings. NHLBI and AHA have agreed on a consistent core message about heart attacks, which will be used by both organizations in their joint communication efforts.

Revised REACT materials that are in the final stage of development include a brochure on symptoms and appropriate action steps; a discussion guide for small groups, for use with an updated video for 1-hour sessions at senior centers, hospitals, and other community settings, which is undergoing field testing now; and a wallet card. A coordinated set of materials is planned for use by health professionals, including a wall chart listing the warning signs of a heart attack, for use in physicians’ offices; an information sheet/prescription tear-off pad, for the patient and physician to fill in; and a laminated card containing key counseling points. A new heart attack Web site will incorporate some content from the REACT Web site.

Additionally, the Red Cross will work with the NHLBI to offer the discussion guide to its chapters nationwide, and a Washington, DC-area chapter is pilot-testing the course. The National Council on Aging, another partner, will pilot-test the small group session in several senior centers, including one in a largely African-American neighborhood.

The NHLBI hopes to launch a heart attack awareness campaign formally in the fall; the timing and nature of the launch are under discussion, and final details will be conveyed to the NHAAP Coordinating Committee. The Institute's media staff will promote the campaign and key messages. NHLBI will also work with its partners to ensure that the materials are integrated into their communication channels and networks and continue to seek new partners, such as chest pain centers, managed care organizations, and physician professional associations.

The three subcommittees then met in separate breakout sessions and reconvened to share their conclusions with the entire Coordinating Committee.

SUBCOMMITTEE REPORTS AND RECOMMENDATIONS

Dr. Atkins, chairman of the Executive Committee, introduced the chairs and vice chairs of the three subcommittees, who presented the results of their deliberations in response to two questions (for complete raw data see Attachment E):

Question 1. From the existing areas of focus you think are still relevant at the 10-year point at the NHAAP, what specific issue or subset of issues deserves attention in a more focused way in the next 5 years, or for which there may be deficiencies or gaps that have not been addressed.

Question 2. From the standpoint of the subcommittee, are there any new areas of focus that should be added as a priority to the subcommittee's agenda for the next 5 years?

Health Systems Subcommittee [Dr. MacLeod]

Question 1: Existing Areas of Focus That Are Still Relevant at the 10-Year Point of the NHAAP:

1. Access and planning for timely and appropriate care and removal of barriers (e.g., reimbursement barriers, barriers for the uninsured and underinsured).
2. Development of new information systems to support quality measures and feedback; development of systems to monitor patient safety and reduce medical errors.
3. Identification and support for improvements in use of prehospital utilization, in a broad sense that is not limited to what currently exists (e.g., use of EMS, bringing interventions such as ECGs to the patient's bedside).

Responding to Dr. Smith's questions about the strength of evidence that more prehospital use would improve outcomes, Dr. MacLeod said that would have to be taken on faith, because no good data are available yet.

Question 2: New Areas of Focus That Should Be Added to the Subcommittee's Agenda for the Next 5 Years:

1. Leverage emerging technologies, specifically tools that support medical decision-making; enhance transfer of information between hospitals and prehospital settings.
2. Focus on disparities between vulnerable populations (e.g., handicapped persons, gender and ethnic differences, rural populations).
3. The following areas were tied for third place:
 - a. Focus on behavior change rather than information and education.
 - b. Adopt and implement the Institute of Medicine's *Principles for Performance by Physicians in Hospitals*.
 - c. Explore alliances with nontraditional partners, for example, with businesses and chambers of commerce.

Science Base Subcommittee [Dr. Joseph Ornato, Dr. Robert Zalenski]

Question 1: Existing Areas of Focus That Are Still Relevant at the 10-Year Point of the NHAAP:

1. Promote development of information systems that will support improvement in diagnosis and treatment of acute MI, at both the patient and network system levels.
2. Review the literature about troponins, which are becoming the cornerstone of diagnosis of MI, and perhaps standardize them.
3. Examine the causes of delay in seeking treatment among high-risk patients.

It was suggested that number 3 include an examination of the reverse—what succeeds in getting people to the hospital in 30 minutes.

Question 2: New Areas of Focus That Should Be Added to the Subcommittee's Agenda for the Next 5 Years:

1. Put more emphasis on sudden cardiac death; develop new monitoring systems to detect it.

2. Broaden educational efforts, especially for emergency department physicians.
3. Support tediagnosis targeted to the home setting, to empower patients to obtain as much information as possible before they leave home and help them make correct decisions in a timely manner.

Education Subcommittee [Dr. Christine Crumlish]

Question 1: Existing Areas of Focus That Are Still Relevant at the 10-Year Point of the NHAAP:

1. Public and professional education:
 - a. Focus on new populations: Hispanics, youth groups, the community as a patient.
 - b. Explore new alliances to reach the African-American community and with obstetrician/gynecologists, who function as portals to reaching many women.
 - c. Examine new materials for the heart attack alert campaign and consider dissemination mechanisms.
 - d. Focus on the changing nature of high-risk patients as technologies change.
2. Information technologies—Develop a Palm Pilot-type of technology to help emergency department physicians and high-risk patients in making medical decisions.
3. Health system partnerships—Develop more partnerships, for example:
 - a. With corporate CEOs, to disseminate information to their employees.
 - b. With third-party payers, to educate patients who are discharged with a rule-out MI diagnosis.
 - c. With health care systems, to explain to patients more clearly and succinctly what is and is not covered under their plan, for example, in emergency department use.

Dr. Curry asked about partnering with NHLBI's other outreach efforts, such as the National Cholesterol Education Program and the National High Blood Pressure Education Program, to work toward elimination of heart disease. That idea had been discussed, particularly the link between the NHAAP and smoking, said Dr. Crumlish, but had not been among the top three priorities. The Education Subcommittee also thought it would helpful to require physicians and other health care providers to make patients rehearse what they would do in case of an ischemic episode.

Question 2: New Areas of Focus That Should Be Added to the Subcommittee's Agenda for the Next 5 Years:

1. Conduct ongoing research, specifically about patients' decision-making during an ischemic episode.
2. Encourage legislation at the state level requiring registries, CPR training in schools, and enhanced 9-1-1 service.
3. Target employers in the workplace to assist with dissemination of information to employees.

Dr. Ornato pointed out that enhanced 9-1-1 is a wonderful success story but will be a short-lived one because of cell phones. Cell phone technology is rapidly complicating the 9-1-1 system, because it is impossible to locate the source of a cell phone call. Cell phones are already used to make 10 percent of all calls and 40 percent of EMS calls; it is estimated that by 2006, 40 percent–60 percent of 9-1-1 calls will be placed via cell phone. The Department of Transportation is the lead agency in seeking a solution to this problem, and New York State has pilot projects under way.

Noting similar themes across recommendations from all three subcommittees, Dr. Zalenski suggested that the chairs of the three subcommittees work together to identify the high-priority areas within their common recommendations. Dr. McNutt commented that every recommendation has been addressed in some form outside the NHAAP. For example, the technologies needed to implement some of the recommendations exist but have not been brought to fruition for these purposes. He suggested that Ms. Hand and Dr. Sopko might be able to identify a role for the NHAAP in this regard. Additionally, dissemination of existing materials was identified as a problem and a job for the NHAAP.

Dr. Smith noted that the data trends reported were not overwhelming, and had flattened out over 10 years. Dr. Atkins and Ms. Hand responded that not all curves in key areas discussed by Dr. MacLeod were flat. For example, door-to-needle time and in-hospital fatality rates have dropped dramatically, and the benefits of calling 9-1-1 have been demonstrated in getting cardiac patients to emergency departments quickly and in getting reperfusion treatment earlier.

Meeting Summary
June 26, 2001

WELCOME AND INTRODUCTION [Ms. Hand]

Ms. Hand welcomed the participants to the second day of this anniversary meeting. She mentioned that in her Progress Report yesterday, she forgot another accomplishment of this committee in the past 5 years: the addition of NHAAP objectives to those of Healthy People 2010. Some of these objectives are as follows: increase the proportion of adults age 20 years and older who are aware of the early warning symptoms and signs of a heart attack and the importance of accessing rapid emergency care by calling 9-1-1; increase the number of adults aged 20 years and older who call 9-1-1 when they witness an out-of-hospital cardiac arrest and administer cardiopulmonary resuscitation (CPR); increase the proportion of persons with witnessed out-of-hospital cardiac arrest who are eligible and receive their first therapeutic electrical shock within 6 minutes after collapse recognition; increase the proportion of eligible patients with heart attacks who receive artery-opening therapy within an hour of symptom onset. Ms. Hand then told participants that in planning for the 10-year meeting the Executive Committee was asked to look at areas which the program had not addressed, and today's topics of racial/ethnic and gender recognition issues, as well as early, prodromal recognition of patients with acute coronary syndromes, emerged as important areas for the program's consideration for the next 5 years. She explained that the experts today will address the state of the issues and their associated challenges, opportunities, and the science base.

PANEL #1: RACIAL/ETHNIC AND GENDER ISSUES IN ACUTE MYOCARDIAL INFARCTION (AMI) RECOGNITION

African American Issues in Heart Attack Recognition: Introductory Comments [Dr. Charles Curry]

Dr. Curry said that after 10 years on this Committee he is now taking time to describe an issue which is of passionate importance to him: the issue of racial differences in recognition and treatment of cardiovascular disease. Historically, it has been thought that Blacks did not have heart attacks. There are cultural and educational factors for doctors and patients, which present barriers to treatment for Blacks. The Black population is generally less educated and does not report symptoms in a manner that doctors recognize as heart disease. The Black population has a high incidence of risk factors for heart disease such as hyperlipidemia, high blood pressure, smoking, and obesity. Yet Blacks reportedly are less aware than Whites that these are risk factors. The diagnosis of heart disease in Blacks, especially Black women, is often missed. Blacks have a higher mortality rate from AMI; even with chest pain they do not have the prevalence of coronary artery disease, a phenomenon that is not understood. Blacks with heart disease are also less likely to get treatment of any kind. A combination of factors, therefore, leads to undertreatment of this minority group.

Clinical Manifestations of CHD in Women and Blacks [Dr. Patrice Desvigne-Nickens]

Dr. Desvigne-Nickens, Leader of Cardiovascular Medicine at the National Heart, Lung and Blood Institute, focused on gender and racial/ethnic presentations for AMI. There is a national mandate to eliminate health disparities among minorities and these two groups suffer from a lack of recognition of the existence of heart disease. They represent high-risk groups for mortality from heart disease. Women and Blacks have less classical myocardial ischemic symptoms. They are not diagnosed properly. There is a need to improve patient awareness and education in these groups as well as among physicians. There has been a decline in coronary death rates since the 1960s, but not all groups have benefited equally. Focusing on these high-risk groups is the appropriate thing to do now. It is also efficient and will save dollars and lives. The public needs to understand the full benefit of modern cardiovascular medicine in order to help themselves. Gains will occur from successful applications of what we already know. Dr. Desvigne-Nickens charged the committee with ensuring that available health care is applied to all groups. Large segments of the population do not benefit at present. The committee can help to alleviate disparities among underserved populations.

Women have higher morbidity and mortality due to CHD and they receive less aggressive treatment and are frequently unaware of the symptoms (see slides in Attachment F). Women have a twofold increase in 30-day mortality. CHD in women is under-recognized by the physician and by the patient. It is an important health issue and a primary cause of death among women, yet only 7 percent of women identify CHD as a health risk. There is a common myth that CHD is a man's disease. Women experience the same five common symptoms as men: chest pain, fatigue, pain at rest, shortness of breath and weakness. Women, however, have more frequent noncardiac chest pain, back and neck pain, nausea and shortness of breath. There are other differences between men and women with regard to CHD such as symptom progression, in-hospital differences, prodromal symptoms and level of ST elevation. With women the symptoms seem to progress more slowly than with men. This slower progression appears to be a factor that masks the underlying condition and doctors do not diagnose coronary insufficiency as readily in women. Women also seek treatment in a different manner than do men. Women ask several sources for answers in seeking treatment from their husband to their doctor—all prior to actually seeing their doctor. Women then need more urgent care, rather than palliative therapy, by the time they reach the doctor.

Women experienced the following prodromal symptoms in order of frequency: (1) fatigue, 67.5 percent; (2) shoulder blade discomfort, 52.5 percent; (3) chest discomfort, 50 percent; (4) shortness of breath, 37.5 percent; (5) top shoulder pain; indigestion, 27.5 percent; (6) neck/throat discomfort, 27.5 percent; (7) dizziness; change in headache, 27.5 percent; (8) did not feel well, 20 percent. This data is from McSweeney and Crane. In looking at men and women who present without chest pain, the gender difference for nausea/vomiting was significant (41 percent for women versus 14 percent for men). The MONICA Project found that women were less likely to receive direct Cardiac Care Unit (CCU) admission, thrombolytic therapy, aspirin, and beta-blocker use. Both sexes had similar angina, smoking and chest pain, but fewer women had a previous MI. Women had more shock, syncope and shortness of breath. They also had smaller ECG changes. The level of ST segment elevation is generally less than that in men and may lead to misdiagnoses.

Dr. Desvigne-Nickens echoed Dr. Curry's presentation in delineating data about Blacks and CHD. CHD in Blacks is an important, yet under diagnosed and less aggressively treated problem. They have higher morbidity and mortality due to this problem and although CHD is a primary cause of death among Blacks, it is not considered by them to be a threat to health. Blacks are more likely to have atypical cardiac symptoms, present later to the hospital, more likely to have nondiagnostic ECGs, less likely to receive intravenous thrombolytic therapy, invasive diagnostic or therapeutic procedures or coronary artery bypass grafting (CABG) (see Attachment F). They have chest pain associated with hypertension and since they have relatively normal coronary arteries misdiagnosis can occur. Low access to care impairs prevention, recognition and treatment of CHD among Blacks. Lack of access to care is a factor in poor outcomes in this group. They tend to be of lower socioeconomic status and are underinsured. Bias can erode the communication between the doctor and the patient.

In looking at cardiac arrest, Becker et al. found that survival rates were 2.6 percent for Blacks versus 0.8 percent for Whites. However, it has been shown that the incidence of cardiac arrest is higher for Blacks. Blacks were less likely to be witnessed during cardiac arrest, less likely to have bystander CPR, have a favorable rhythm, be admitted to the hospital or survive when admitted to the hospital. There is also a higher prevalence of risk factors in healthy siblings of Black patients. Blacks have a greater number of modifiable risk factors than do Whites, so there is a good opportunity for intervention and education.

In summary, there are some similar signs and symptoms of acute CHD among women and Blacks. It is important that patients and doctors learn these less common as well as the common symptoms of CHD. Missed diagnoses disproportionately affect women and Blacks and cardiac arrest is higher among Blacks than Whites. Barriers to treatment include the nonrecognition of the signs and symptoms as do access problems for poor minorities. Dr. Desvigne-Nickens' message is primarily educational: educate women and minorities about CHD. She further recommended family interventions, attempting to improve adherence to the guidelines for evaluation of chest pain and expanding those guidelines to include women and minorities. There is also a need to teach primary prevention among those who come for treatment but are told that they have not had a heart attack. Another area for study and education is the pathophysiology of CHD in women and minorities—a factor that is not completely understood.

Prevalence, Clinical Characteristics, and Mortality Among Patients With AMI Presenting Without Chest Pain: Data From the National Registry of Myocardial Infarction (NRMI) [Dr. Ornato]

Dr. Ornato presented findings from the National Registry of Myocardial Infarction 2 (NRMI-2), and credited the work of Dr. Canto (see slides in Attachment G). NRMI-2 is a national registry of 772,586 patients who were admitted to 1674 hospitals with confirmed MI from June 1994 to March 1998. The investigators wanted to look at the phenomenon of the occurrence of MI without chest pain in some patients and clinical factors associated with this type of presentation. Chest pain itself is generally considered to be a diagnostic cornerstone in MI as evidenced in the WHO criteria for MI. In NRMI-2 a patient was diagnosed with MI if he/she had a clinical presentation consistent with MI and at least one of the following: (1) total CK or CK-MB equal to or greater than two times the upper limit of normal; (2) ECG evidence of

acute MI; (3) alternative myocardial marker, scintigraphic or autopsy evidence of MI; and (4) ICD diagnosis code of 410.11. Although it is known that not all MI patients have typical symptoms, the extent to which atypical presentations occur is not well characterized. Interestingly, chest pain was not the most typical symptom in older individuals in NRMI-2. Patients who presented in an atypical fashion (i.e., without chest pain), experienced more hospital delay; more process variables leading to delayed or missed diagnoses; and ultimately worse outcomes. Patients without chest pain had significantly longer delay to hospital arrival, underwent one third the number of acute interventions and were less likely to receive other therapeutic treatments. MI patients who lacked chest pain also had an adjusted odds of death, which was 2.2 fold higher after adjusting for differences in age, gender, race, past medical history and clinical presentation. These patients were more likely to die in the hospital compared to patients with chest pain. They also had a lower mean ejection fraction when measured. The phenomenon of MI patients who present without chest pain is baffling and allows less timely opportunities for therapy.

Chest pain is often the last marker in a cascade of symptoms of ischemia. Bean described the ten “masquerades of MI” in the likely rank order of frequency as follows: (1) congestive heart failure; (2) classic angina pectoris without a particularly severe or prolonged attack; (3) cardiac arrhythmia; (4) atypical location of pain; (5) central nervous-system manifestations resembling those of stroke; (6) apprehension and nervousness; (7) sudden mania or psychosis; (8) syncope; (9) overwhelming weakness; (10) acute indigestion. Even with better detection methods now, the prevalence of atypical presentations of MI still remains unknown. The top risk factors for an atypical MI presentation were found to be prior heart failure, prior stroke, age greater than 75 years, diabetes mellitus, female gender and non-White ethnic background.

There were several limitations in the study. Among some of the limitations were the following: The hospitals were more urban than rural; the additional details of the presenting complaints were not collected in the absence of chest pain; this study was not a random sample of all U.S. hospitals. However, the NRMI-2 data were externally validated and were found to be comparable with the Cooperative Cardiovascular Project in major process and outcome measures in retrospective chart review.

In summary, the study is thought provoking. There is an absence of real details to fully understand this patient group. It is fair and reasonable to conclude that a substantial number of patients present without chest pain on arrival at the hospital. These patients are more likely to be older, female, Black, and Asian and they delay getting care. Dr. Ornato stated that the National Heart Attack Alert Program needs to think about these groups in its attempts to educate the public and health care professionals. Understanding factors in presentation such as the absence of chest pain may help in the earlier identification and proper treatment of these patients with MI.

What the Rapid Early Action for Coronary Treatment (REACT) Research Program Tells Us About the Heart Attack Symptom Experience [Dr. M. Janice Gilliland]

Dr. Gilliland was an investigator in REACT at the University of Alabama at Birmingham. She conducted a retrospective data collection from hospital records on 1,527

patients who presented with chest pain or an equivalent chest symptom and had a confirmed diagnosis of MI from December 1, 1995 to March 31, 1996 (see slides in Attachment H).

The research shows that men report more chest pain than women. Women present with other symptoms such as back pain, jaw pain, nausea, and weakness more than men. The data revealed the following ethnic differences: Whites with AMI/unstable angina (UA) symptoms report the symptoms more frequently than Blacks with the exception of cough and weakness. Whites differ significantly from Hispanics in reporting chest pressure that is reported more by Whites. Whites report more typical symptoms while Hispanics report more atypical symptoms. The data also showed no significant symptom differences between Blacks and Hispanics, but Blacks reported more chest pain. Logistic regression analyses were done on AMI/UA symptoms for Whites versus Hispanics and Blacks versus Hispanics. The odds ratios were adjusted for community, sex and 10-year age groups. Blacks report other typical symptoms less frequently than do Whites. Blacks were less likely than Whites to present with some chest pain or radiating symptoms. Blacks were more likely than Whites to present with some atypical symptoms such as abdominal pain and cough. Blacks were 60 percent less likely than Hispanics to report dyspnea. Hispanics were less likely than Whites to present with chest pressure and diaphoresis. Hispanics were more than five times as likely as Whites to report cough or dizziness. Hispanics were similar to Blacks in presentation for AMI with the exception of dyspnea.

Some of the study limitations include the small number of patients, the selection criteria, data quality/collection methods, self-report data and low frequencies for some of these symptoms. The researchers conclude from the data that there are differences in symptom presentation by sex, ethnicity and age. Previous research by Goldberg and Canto showed similar findings. The REACT results are consistent with earlier research in showing differences with women, minorities and age.

REACT—Acute CHD Symptom Knowledge and Attribution [Dr. Lawton Cooper]

Dr. Cooper is a Medical Officer in the Division of Epidemiology and Clinical Applications at the National Heart, Lung and Blood Institute. He outlined the REACT trial and described its database as a rich source of information for addressing the major public health problem of excessive delay time in assessing acute CHD. The study was a randomized community intervention trial with ten matched communities. The study looked at the effects of a community education intervention on patient delay time from heart attack symptoms to hospital arrival. One thousand two hundred ninety-four (1,294) subjects were asked two open-ended questions regarding their knowledge of heart attack symptoms (see Attachment I). Participation rates were lower in communities with a higher proportion of minorities. The overall response rate was 65 percent. Telephone availability exceeded 80 percent in all communities and 90 percent in 18 out of 20 communities. The main finding was striking: although there are some differences ethnically in knowledge, the overall knowledge of heart attack symptoms is very poor. Blacks had a lower absolute number of knowledge of symptoms. There was a difference in knowledge when comparing Hispanics to non-Hispanic Whites. There were no gender differences in symptom knowledge. Another key finding in REACT was the importance of attribution. If people could understand that their symptoms were those of a heart attack, the delay time to getting to the hospital or calling 9-1-1 might be lessened. Even those in REACT who

thought they were having a heart attack had a 2-hour delay in getting treatment. It is baffling to understand what people thought was the problem causing them to go to the emergency department.

In summary, the study had several findings about heart attack symptom knowledge: (1) gender differences appear to be minimal; (2) minorities appear to be less aware than Whites of certain common symptoms of heart attack; (3) persons in all gender and ethnic groups can name only three or fewer symptoms of heart attack; (4) minorities are less likely than Whites to attribute symptoms to heart attack; (5) if the patient knows he/she is having a heart attack there is less delay in seeking treatment. The conclusion from REACT for the NHAAP is that there is a need to work on attitudes and beliefs which lead to denial of heart attack symptoms or temporizing which can lead to morbidity and mortality.

Discussion

Dr. Wayne Giles, Associate Director for Science at the Centers for Disease Control and Prevention, moderated the discussion. The group first discussed the fact that the findings on Hispanics differed in REACT and NRMI-2. NRMI-2 found that Hispanics were more likely to report with chest pain, while REACT found that they were not. Dr. Ornato responded that the group had hit the Achilles heel of NRMI-2 and the data with which they had to work (see Canto JG, et al. Presenting Characteristics, Treatment Patterns, and Clinical Outcomes of Non-Black Minorities in the National Registry of Myocardial Infarction 2. *Am J Cardiol* 1998;82:1013–18) He did not have an answer to the contradiction, but suggested that the difference may be due to the group studied. Dr. Gilliland suggested that they may have gotten different answers in REACT by asking direct questions and by analyzing all radiating symptoms separately.

Pain and how it is defined was discussed. Different people describe pain differently. The question becomes: Is there a duality in the message to send to the public? Do we attribute pain by race and gender or by medical condition? Are there corresponding conditions of age, diabetes, etc. which factor into the description of pain? Are we missing symptoms of acute ischemia in women and minorities or in the population with coexistent diseases? Do we focus on getting the message out by group (i.e., racial/ethnic/gender groups) or by symptoms? The participants had some general agreement that they should focus on medical conditions having nothing to do with race or gender, and to focus on the risk factors for a heart attack. The major obstacle in identifying women and minorities is the lack of appreciation of their own risk. The educational message to patients will empower them to get better, faster care for themselves.

There is also a need for gender cultural competence as well as ethnic cultural competence. There are some communication issues between the doctor and the patient in correctly reporting heart disease. The patients may be telling the correct symptoms, but sometimes the doctors can't understand them if they are in different ethnic groups. There is also a need for doctors to know the differences in pain (expression) among groups. The group also discussed whether some ethnic differences in outcome could be attributable to hospital differences. When the patient speaks English as a second language or there is a need to use a translator, a lot of information is lost in the communication. Doctors who speak Spanish have had a higher incidence of correctly reporting heart disease. This is a complex issue. In some

cases communication does make the difference, but there are some wider system issues. Some research has found that racial concordance between the doctor and the patient showed similar disparities in health care when the patient and doctor were concordant and discordant.

The group next talked about the older patient. Dr. Ornato was asked if the older patient with symptoms of heart disease may also have differences in pathophysiology. There is support for that hypothesis. These patients differ in both the disease process and in the severity of the disease process. Among the factors that correlate with a bad outcome, nonchest pain was the highest and many older patients seem to report without chest pain. These patients may also be different physically. They are more likely to arrive by ambulance, but they have more delays and worse outcomes. If the bias of the NRMI hospitals is not overwhelming, this merits further study. The message is that doctors need to be more humble in knowing how easily they can miss the boat in this category of patients and the consequences of doing that are more catastrophic.

Blacks often have normal coronary arteries and do not as frequently report with acute coronary symptoms. Blacks, however, have more hypertension and left ventricular hypertrophy, which may account for differences in symptom presentation.

Another issue the committee considered is that patients call 9-1-1 and 9 out of 10 are told they have risk factors but no disease. The patients get frustrated when they go to the emergency department and are sent home. This may be an issue to explore in terms of its impact on future behavior. The emergency department is a difficult place to educate people. The patients need to have follow-up with a primary care physician where they can learn that they are still at high risk. The committee talked about ways to make the experience of going to the emergency department and being told you have no disease, a positive experience, not one which binds further action. Perhaps the committee should try to educate people that any discomfort should be assumed to be a heart attack. However, there are also issues of expense, so the message may need to be specific rather than one of increasing sensitivity to the issue. REACT investigators did some follow-up surveys of patients in the emergency department and found that there was not much talk between the doctor and the patient about what to do in the future if they experience symptoms.

The committee asked if the REACT data pointed to some indications of better understanding or awareness in some communities, which could lead to areas of study to learn why those communities were more aware. The REACT data presented by Dr. Cooper were adjusted for community, not by community. The attribution data were also not looked at by community. They will be correlated by percent of minorities in the community. Dr. Gilliland added that there will be differences, especially in areas where people have had more exposure to these issues, which are usually in the White population. The REACT database has information on where people obtain their knowledge, but it has not been analyzed along those lines.

The committee asked Dr. Ornato to look at his NRMI-2 data and highlight differences in the criteria for MI, which might be helpful to the committee in formulating a definition of MI. He was also asked to look at that data by race and gender. The committee's criteria for diagnoses have changed and time is an additional criterion that should be examined.

There was some discussion that we may need better tools to diagnose women with heart disease. Women may not present with radiation of pain or palpitations, but it has been found in

NHLBI research at the microvascular level that one-third of women had epicardial disease and 40 percent had ischemia, when sophisticated technology was used. These women would normally be labeled as false positive. The definition of ischemia may also still be evolving. Nonobstructive versus obstructive epicardial disease is also a challenging issue. In donor hearts, 85 percent of those over age 55 had heart disease with plaques that were not obstructive.

Gender, race, and ethnic disparities are clearly issues to be addressed and are part of the mandate of Healthy People 2010.

PANEL #2: EARLY RECOGNITION OF PATIENTS WITH ACUTE CORONARY SYNDROMES

Introduction [Ms. Hand]

Ms. Hand told the committee that the issues to be discussed were chosen by the Executive Committee as areas that need to be examined as the Committee looks ahead for the next 5 years. Early prodromal symptom recognition needs to be studied and the committee needs to consider their impact in its work. One of the important questions is: Is it possible to capture people even earlier and get them into the care system? The committee will hear presentations on early recognition of patients with acute coronary syndromes, both from the standpoint of a new definition of (what is considered to be) a heart attack, based on biochemical measures, and from the standpoint of very early or prodromal manifestations.

New Definition of a Heart Attack and Prodromal Recognition [Dr. Robert Christenson]

Dr. Christenson discussed the new definition of a heart attack. AMI has been diagnosed by signs and symptoms of ischemia, ECG readings, and biochemical markers for the past 25 years. Dr. Christenson posed a relationship between the new definition of AMI and early prodromal symptom recognition. The European Society of Cardiology and the American College of Cardiology have published new recommendations that put biochemical markers, especially troponins, at the forefront for diagnosis of AMI. The new definition considers even the smallest amount of damage, i.e., necrosis, as AMI. (see Attachment J). The consensus document of the Joint European Society of Cardiology/American College of Cardiology Committee for the Redefinition of Myocardial Infarction states: “Any amount of myocardial necrosis caused by ischemia should be labeled as myocardial infarction.”

The traditional focus of MI treatment has been on improvement of diagnosis. The patient breakdown is as follows: about 59 percent have unstable angina; 19 percent have ST segment elevation MI; 22 percent have non-ST segment elevation MI. The ST segment elevation group shrinks annually. The WHO criteria developed in the late seventies came to a diagnosis of MI from patient history, ECG changes and serum markers. ECG is a significant indicator, but not a sensitive indicator so it may not show changes. Serum markers, especially CK-MB, were the gold standard for diagnostic markers. Since the new definition considers even the smallest amount of damage to the heart to be an MI, many more individuals may be labeled as having MI.

At a biochemical level the root cause of acute coronary symptoms is due to plaques. Plaques form due to social habits, genetics, and diet. Unstable plaque can expose the lipid core and form a clot, which can cause death due to thrombus. Inflammation is also involved in the process and there is a question about the contribution of infectious disease to the process. The inflammatory component may be due to infectious disease, which leads to instability of the plaque. Acute coronary syndromes are a spectrum of disease going from asymptomatic to plaque rupture to thrombosis to necrosis. We need to find biochemical markers to better assess patient risk. We can then better risk stratify these patients.

In clinically classifying acute coronary syndromes, there is no need for biochemical markers with acute ST elevation. These patients are treated with artery-opening therapy. Necrosis can be prevented in these patients if the ST segment elevation is treated early. There are three members in the troponin complex: C, T and I, which is an enzyme. This is essential for contraction of heart muscle. When patients are troponin positive versus troponin negative, there is a threefold increase in risk for cardiac death and myocardial infarction. There have been guidance, chemical treatments and intervention in the group of patients with ST segment elevation. However, troponin T or I are best for indicating who will benefit from these therapies. In the new definition of MI with any amount of myocardial ischemia being labeled as MI when caused by necrosis, troponin is a surrogate for necrosis in ischemia. If troponin becomes positive in the setting of ischemia, it is a positive marker for MI. The cornerstone of this new definition is troponin or CK-MB being elevated in the setting of ischemic symptoms.

The troponin assays vary and are not standardized. The recommended precision of the troponin assays is at the 99th percentile as the cutoff point. Troponin T will decrease ten fold and its functional sensitivity is not good. Troponin I also has functional sensitivity of about 20 percent with lots of random noise in both of these assays. Troponin I results are difficult to assay and vary widely. If troponin is used as a marker, one third more patients will be redefined as having MI. Two researchers recently reported that these will be more defined as having had an infarction. Epidemiologically, the denominator will increase for those with MI. There are negative consequences of being so labeled such as pilot licenses, insurance, etc. but the hope is that more will receive treatment. The new cholesterol guidelines will also increase those treated. However, there is systematic variation between troponin assays at present and they must be standardized. There is also random variation since troponin is released as a complex and degrades. A single patient may have serial samples with antibody against troponin I, but does the assay recognize all the forms of troponin? Do we need a panel of samples to test against all the antibodies out there? Is troponin-reporting time sensitive? It seems that if the markers are going to be useful for patient treatment, the test results need to be done immediately. Then there will be a flow to early invasive strategy so some strict criteria in troponin turnaround time are needed. This issue leads to the “vein to brain” paradigm. The vein to brain reporting time is about 15 minutes to the point of care. A lab measures turnaround time when the sample is clocked into the lab. Clinicians say they need cardiac markers in a quick turnaround time and labs are not doing well with this.

In summary, Dr. Christenson said there are four Ds for acute coronary syndromes: (1) Door; (2) Data; (3) Decision; (4) Drug. The challenge will be to consider that troponin and cardiac data and GP IIIa inhibitors ought to be important markers. The following will be needed: harmony between the lab and the point of care and serial samples on presentation and serial

markers. These tests are not particularly sensitive initially. Marker turnaround time will need to be improved because of its use.

Women's Prodromal and Acute Symptoms of Acute Myocardial Infarction [Dr. Jean McSweeney]

Dr. McSweeney is an Associate Professor at the University of Arkansas for Medical Sciences. She conducted a qualitative, retrospective, self-report study of women with prodromal and acute symptoms of MI. She cited a letter to Ann Landers written on January 6, 2000 in which a woman said that she complained for 3 weeks of backache, chest pain, etc. She was prescribed a nasal spray instead of being treated for cardiac disease. Women have difficulty being adequately diagnosed. Younger women, too, may have heart disease and their symptoms are often misdiagnosed. A 35-year-old woman from rural Arkansas had tightness in her chest, a serum total cholesterol of 202, jaw tightness for 1 year, and headaches. She was given a diagnosis of temporal mandibular joint disorder (TMJ) and had her teeth pulled. She then had an acute MI while driving her children home from school, pulled over to the side of the road, and called 9-1-1. Her symptoms of CHD were missed.

Dr. McSweeney's research explored the risk factors for MI, comorbid conditions, prodromal and acute symptoms in women ages 27–79 (see Attachment K for slides). Most of the women were Caucasian from Texas or Arkansas. The risk factors included high cholesterol and hypertension identified prior to the MI. Thirty-seven of 40 women had prodromal symptoms prior to the MI. The women were interviewed for two and a half hours each and they filled out a Health Status Survey. The research questions concerned what early warning symptoms do women identify as precursors to their AMI and what acute symptoms do women identify with their MI? Prodromal symptoms were defined as those that come and go prior to the MI and change after the AMI. Acute symptoms were defined as those, which persist or intensify, leading to a diagnosis of AMI. The study sample was 40 women who were English speaking and had been diagnosed with their first MI. The study used descriptive statistics for the survey data and content analysis and content comparison for the interview data.

The location of sensations was mainly across the shoulder blades in 53 percent of the women and 50 percent had chest pain. Women do not call what they experience pain; they call it a sensation. Most of them reported no pain. They also reported more than one sensation such as tightness or heavy feeling prior to the MI. Indigestion was the most frequent gastrointestinal symptom. They also report a loss of taste or a change in taste for a period of time prior to the MI. Most of their symptoms disappeared after the MI. Shortness of breath was also a top prodromal indicator in the study with some coughing and swelling in the arms and legs. One woman had a primary symptom of swollen upper arms and her astute doctor gave her a treadmill test and sent her to the hospital. Many of the women attributed their symptoms such as shortness of breath to age, even though they were relatively young, such as age 45. They also reported unusual fatigue or lethargy and were exhausted just trying to make a bed. This is an important symptom for doctors to realize. Health care professionals need to ask these women to further describe their fatigue rather than simply checking off a box labeled, "Fatigue." One woman could not eat dinner once she had prepared it. There were also some reports of neurological and vision changes and migraine headaches prior to the MI.

The women with prodromal symptoms sought care more slowly than those with acute symptoms. The symptoms did not go away and they evolved over time, so the women then went for care. The most frequent prodromal symptoms were: unusual fatigue; shoulder pain; shortness of breath; and pain expressed as mild or tightness or heaviness.

Dr. McSweeney is developing a survey instrument and establishing the reliability of the tool in order to address the stability of the respondents' answers. Ninety-four percent of the women in another survey of 191 women experienced prodromal symptoms. She found no significant difference in prodromal symptom scores between women experiencing their first versus recurrent MI. More research is needed to develop a list of prodromal symptoms to assist doctors in diagnosing CHD and to help women themselves recognize their symptoms earlier.

Recognizing Prodromal Symptoms: An Overlooked Phenomenon [Dr. Raymond Bahr]

Dr. Bahr is Medical Director of the Coronary Care System of St. Agnes HealthCare in Baltimore, Maryland. He has devoted his career to the issue of prodromal symptoms. The goal in analyzing prodromal symptoms is to reduce morbidity and mortality from acute MI including sudden cardiac death, through rapid identification and treatment of individuals.

Dr. Bahr first discussed the issue of how better to reduce the time to treatment and to detection. Are there symptoms other than MI symptoms? Can we define prodromal symptoms and look at outcomes and devise the essence of prodromal symptom recognition? He also discussed the need to recognize early ischemia. Early detection and awareness for these prodromal symptoms are needed. Early identification has been shown to improve outcome. Prodromal symptoms have been known for almost 100 years. They were called premonitory symptoms in 1916. Treatment has not taken advantage, however, of prodromal symptom recognition. Half of the myocardial infarctions are heralded by angina and the other half are abrupt. The prodromal symptoms in the 50 percent of patients who have them, occur prior to arrest, MI, and unstable angina. Prodromal symptoms differ from the classical Mack truck on the chest, pain that spreads, etc. Prodromal symptoms are not recognized as ischemic heart disease or unstable angina. They are not described as pain, but rather they come and go. The classical symptoms can be associated with lesions. Cardiac catheterization usually reveals blockages in these cases.

There have been studies that show a good outcome in those with prodromal symptoms. There was also a study in Japan which found that those with prodromal symptoms had better outcomes than those with abrupt onset of symptoms, when less than 24 hours from onset of symptoms to treatment is used as a measure of the benefit of prodromal presentation.

The Global Use of Strategies to Open Occluded Coronary Arteries (GUSTO) II b showed that symptom onset was divided between continuous and intermittent. Four thousand patients had AMI and eight thousand had unstable angina. In many thrombolytic trials they quite often do not collect information on intermittent symptoms. The most common reported interval for intermittent symptoms was found to be within 2 weeks. With AMI the patients had symptoms for 2 days before coming in and 3 days before coming in with unstable angina. Prodromal symptoms

were found to benefit patients in many cases by having an MI aborted and by reduction of infarct size. Prodromal symptoms also appeared to be a predictor of mortality.

Another area of study is the issue of why some patients benefit from prodromal symptoms while others do not. Those with prodromal symptoms reperfused faster. Pathophysiologically there is intermittent reperfusion and occlusion. It happens over a period of hours and perhaps days. For some reason, this process does not produce damage. Those with prodromal symptoms seem to have them over a period of time, but there is a phase in which they seem to have prolonged chest pain and the question arises, are they occluding at that time? One study in the literature review done by Dr. Bahr found that 19 of 32 patients with prodromal symptoms had an MI aborted. The time to treatment was 2.72 hours in these cases. Those with prodromal symptoms can benefit from aggressive therapy even though their time to treatment is prolonged. These patients are ideal candidates for thrombolytic therapy. If they have prodromal symptoms as seen in GUSTO II b they may not go on to an acute MI and potentially can be converted.

The mortality rate in GUSTO II b with acute MI was 6.2 percent and with unstable angina it was 3.2 percent. There is prodromal MI and there is prodromal unstable angina. It is important to give consideration in planning to capture these prodromal patients and get them into the hospital before it becomes painful enough for them to go to the hospital on their own. One patient drove around in the emergency department parking lot for 2 hours before going in, waiting for the pain to get severe enough to be seen by the doctors. The point is to get these patients who have intermittent symptoms and need to be seen. This is the concept of infarctus interruptus. Why do patients need to occlude before we start to monitor for heart attack? Is there a way we can get them to come in early to get the symptoms treated? When treated early the clot may not have formed enough so it behaves as if it were not there. There is a need for a system of care that moves in the direction of making people aware of early symptoms and getting them examined. In acute MI, there is a need to reduce the time to treatment. In prodromal MI with intermittent reperfusion, the MI can possibly be aborted. In unstable angina, all problems can possibly be aborted. There is a need to educate the public on intermittent symptoms so they can take care of the problem early and avoid more serious consequences.

Dr. Bahr next discussed the NHAAP program with respect to the 1,200 chest pain centers in the United States. Patients with atypical symptoms can be seen in these centers and there will be a reduction in the number of missed MIs and the number of inappropriate admissions to the hospital. Hospitals need to be prepared to sort out those with a low probability of MI. As part of Healthy People 2010, these centers will become cost effective. There is a need, however, to increase public awareness of symptoms and of chest pain programs and to make them more knowledgeable about coming into the chest pain centers and hospitals for treatment. The message needs to go out about the importance of time dependent treatment for myocardial muscle preservation. This is the concept of acute prevention.

The Patient Perspective [Ms. Paula M. Upshaw]

Ms. Upshaw is a member of the group, WomenHeart. She is a former respiratory therapist from Maryland who worked at the Washington Hospital Center in medical, surgical,

and cardiac care units. She is a 10-year survivor of a massive heart attack and bypass surgery in 1991 when she was 31 years old.

She was watching her son's baseball game when she experienced bad chest pain and could not walk. She thought it was a heart attack. At the hospital, the chest pain protocol of tests was done, but the doctors did not look at the results and discharged her with a diagnosis of hiatal hernia. She saw a gastroenterologist after that weekend and he prescribed an antacid. He read the electrocardiograms from the hospital and said they were normal. She went back in 2 days rather than 5 when the pain did not subside and she was told at that time that the pain was psychological. Her pain continued to be excruciating for several days. When it worsened her husband took her back to the emergency department and she refused to go home. She requested nitroglycerin and a nurse gave her some, and she found that her pain diminished. The doctors repeated the tests and told her everything was normal. When she still refused to go home, the gastroenterologist admitted her to the hospital. In the middle of the night, a cardiologist came in to see her saying, "Where's the 31-year-old with the massive heart attack?" Whereas, doctors had been treating her with pain medicine, at that point the cardiologist began proper treatment. She had a cardiac catheterization and the doctors dissected one vessel during the procedure. The other vessel was 100 percent occluded. Then her whole body shut down, and she went into adult respiratory distress syndrome (ARDS). She underwent a double bypass and was on the heart transplant list, at one point at the top of the list. Finally, after two and a half months in the hospital, she was discharged. She is now permanently disabled due to the misdiagnosis. Her husband lost his job due to needing to spend so much time taking her to the hospital. She has guilt now since she feels she was not forceful enough initially. She knew she was having a heart attack, but she wanted to hear the diagnosis of hiatal hernia, more than that of heart attack.

Discussion [Moderated By Ms. Mary Beth Michos]

Ms. Michos opened the discussion by thanking the presenters and asking if there were any questions. She asked Dr. McSweeney if patients who had recurrent myocardial infarctions sought treatment more quickly with the second MI based on prodromal symptoms? Dr. McSweeney responded that if the symptoms were similar to those experienced previously, then patients did seek help sooner. However, if the prodromal symptoms differed the second time, they waited during the prodromal period. There was no statistical difference between the first and second MI, she found. Her follow-up survey was done only on patients who had had an MI. She also responded to a question about her instrument stating that she is planning further tests of the instrument and will consider using matched controls looking at time of admission, place, emergency department visits, etc. She may use her instrument also for other diagnoses and by ICD-9 group, comorbidities, age, etc. These are the areas she will next pursue.

Dr. McSweeney was asked a follow-up question regarding her finding of fatigue among women with prodromal symptoms prior to MI. Dr. McSweeney found fatigue to be among the most prevalent prodromal symptom in the women she surveyed. It was mentioned that a study in England 20 years ago among those who had died a cardiac death found many similar symptoms such as those found by Dr. McSweeney, especially depression and fatigue. The families of those who had died were interviewed. How can fatigue be evaluated in these studies? Is it possible to match patients who have fatigue and depression and experience a heart attack with those who

have the same symptoms, but do not experience a heart attack and find other things that may help filter out those with a real MI? There are many things which contribute to the problem of heart disease. Dr. McSweeney added that in her study many of the women came from very low-income families, i.e., less than \$20,000 per year income. They debate whether or not to go to the emergency department and they are often told that their symptoms indicate a gastrointestinal problem or depression and they cannot afford the medicine, so they think the emergency department visit was a waste of money and do not go back. Dr. Atkins said that in the Framingham study, those with silent myocardial infarctions had fatigue for 2 to 6 weeks prior to the MI. About one quarter of the women had fatigue as their only symptom and about 15 percent of the men had fatigue. Better ways to measure fatigue are needed.

The issue of troponin was next discussed. Renal failure patients have positive troponin values. Forty percent of dialysis patients are positive for troponin T, but only 5 percent are positive for troponin I. But there are also studies that show that these patients are at a higher risk for 1-year mortality in the high rate event group. The physiological difference mentioned previously may also be present in these patients. It seems, however, that renal values for troponin are usually flat in these patients whereas ischemic troponin values rise and fall. Serial measures, therefore, must be taken. There may be silent ischemia in renal failure patients, but it does not appear to be manifested clinically. Dr. Christenson added that the definition states that in the setting of ischemia, once you have a positive troponin diagnosis, you have a MI. With CK-MB two measurements beyond the 99th percentile cutoff are required to make a firm diagnosis. If troponin is used as a screening tool, we will get 1 percent positive and the rate in Chest Pain Centers now is 3 percent. This measure, therefore, should not be used indiscriminately. Another question was raised about what to do with patients who are troponin negative, but have clinical manifestations of CHD. Hamm's studies show that if the troponin is negative, the patient is at less risk, but not zero risk. Dr. Stryer commented that the diagnosis of MI has been useful in deciding who should be admitted to the hospital and in management of patients. The new definition makes MI almost meaningless. He thinks that perhaps instead of defining AMI we should call these patients at high 1-year risk of mortality. The only defense is to propose a clinical trial to see if it is safe to use troponin as a screening measure. Dr. Christenson agreed with Dr. Stryer and said that CK-MB has good precision. The issue seems to be that physicians will be forced by the new definition to "put people in buckets like ICD-9 codes." A better use of troponin screening may be to use those values to indicate risk stratification or percent at risk of mortality based on 30-day studies. Dr. Atkins challenged the committee to think about what physicians should do with those individuals who test troponin positive. He received a response that the Science Base Committee has looked at two cutoffs, one determined by the 99th percentile and the other that has evidence of benefit from GP IIIa inhibitors. The hazard ratio was flat until it got to about ten times higher than .01, then it dropped and after that level those patients were at greater risk. Up to that level, there was no evidence that they were at a greater risk when using the endpoint of 30-day mortality. However, more recently in Europe, Lindl has pushed that level of risk lower showing that patients with a lower troponin level do benefit from therapy. This brings up questions about how many cutoffs are needed and why actually these should be used. What is the evidence for this 99th percentile?

Ms. Michos stated that unanswerable questions kept coming up in this discussion and said that the subcommittees will discuss the implications of these issues, especially racial, gender

and early recognition factors in their meetings later. The issues will be examined for their impact on this committee's work for the next 5 years.

Ms. Hand then thanked the presenters and Ms. Michos and adjourned to a working lunch for the subcommittees.

SUBCOMMITTEE REPORTS ON RECOGNITION ISSUES: IMPLICATIONS FOR THE NHAAP COORDINATING COMMITTEE/SUBCOMMITTEE WORK FOR THE NEXT 5 YEARS

Science Base Subcommittee [Dr. Joseph Ornato]

Dr. Ornato presented the top three recommendations from the subcommittee. They were as follows (see Attachment L for raw data from all subcommittees Day 2):

1. Develop a vein-to-brain time recommendation. This is Dr. Christenson's idea and it is patterned on the four Ds ("Door; Data; Decision; Drug"—from the NHAAP's 60 Minutes to Treatment Working Group Report, 1994). It basically involves developing a quick turnaround time from the moment of venipuncture for troponin markers in the blood, to the time the blood is processed by the lab and the results are back in the hands of the physician. A quality timeline is needed here.
2. Support or encourage a clinical trial or trials for ED/EMS acute cardiac ischemia (ACI) diagnostic strategies.
3. Support the development of a national database for AMI or acute coronary syndromes which will expand the ability to look at gender and ethnic/racial issues and help to standardize terminology, definitions and means to diagnose acute coronary ischemia.

This database could also provide secular trends to track what is happening with regard to items number 1 and 2 above. These recommendations are all actionable items. A comment was made that developing a database is a wonderful idea, but if it has more than the normal characteristics needed for clinical care, it will be too costly and will not be successful. The items entered into the database must be outgrowths of the normal process of care for the database to be useful.

Health Systems Subcommittee [Dr. MacLeod]

The Health Systems Subcommittee recommended:

1. First that the NHAAP focus on behavioral change strategies in using evidence based medicine. They suggested focusing on what we actually know, especially in terms of reducing errors, and apply it across the country. Some chest pain centers and certainly all those participating in this meeting apply what we know now, but there is a need to apply it more universally.
2. The second recommendation was to study the efficacy and cost effectiveness of the evaluation, treatment, diagnosis and management of ACS and AMI. There was a call in this meeting to see what we can do about prodromal symptoms in a cost effective manner that will not overwhelm the country's resources. There need to be some collaborative, cross-committee ways of looking at this issue.
3. And, finally, the subcommittee recommended looking at the impact of linguistics and culture and gender differences in the patient/provider relationship. They suggested looking at the underlying reasons why there are differences in care among different genders and ethnic groups. Are the gender differences pathophysiological or due to linguistics? The cultural difference may be the reason why there are differences in treatment. The subcommittee was not sure about how to implement this last point, but felt it was important to explore.

Education Subcommittee [Dr. Christine Crumlish]

The education subcommittee recommended:

1. First, testing current models of interventions to effect behavior change, specifically looking at the psychosocial and cultural elements to learn what forms of education are effective with different patient groups. One focus could be on the low literacy group, to find the best ways to reach this group in order to effect behavior change.
2. Second, the subcommittee recommended that research be done on the combinations of prodromal symptoms and the different symptom markers such as troponin, C reactive protein, etc. and how the symptoms and markers may fit together. Is it possible to ascertain what symptom goes with what marker and what it all means?
3. The final recommendation was to track the implementation of the heart attack alert materials to see if what is being produced is effective. Use the CQI type of format. How can the materials be changed based on answers to point number one above. It was also suggested with regard to this last point that the NHAAP materials on the Web site be linked to sites of other professional organizations. This may help to stratify communications between patients and providers.

Dr. James Atkins moderated the subcommittee presentations. He stated that conference calls with the subcommittees will be organized to see what measurable goals they want to accomplish in the next 5 years. The public education campaign will begin either September 11, 2001 or in November depending upon whether or not it is decided to coordinate with the American Heart Association (AHA) Scientific Sessions.

SUMMARY AND ADJOURNMENT

[Ms. Mary Hand]

Ms. Hand thanked the committee members, the subcommittee Chairs and Vice Chairs, all the presenters and participants and Prospect Associates, for their work at this tenth annual meeting. The ideas that were not among the top three recommendations in the subcommittee presentations will not be lost. The next meeting will be held February 4 and 5, 2002. There may be a face-to-face meeting in the interim to go over the ideas from today. Racial and gender issues have been suggested as session topics for the National conference for next year. Ms. Hand said that she welcomes other suggestions for session topics.

Certificates of Recognition for 10 years of service on the committee were presented at the dinner the previous evening, but two awardees were not present. Dr. Pamela Steele of the Department of Veterans Affairs was recognized for her work during the past 10 years on the NHAAP and as a member of the Coordinating Committee and of the Science Base Subcommittee. Dr. Mark Smith who represents the American College of Emergency Physicians was honored for his 10 years of dedicated service, specifically as a member of the Executive Committee from 1991–1996, for his work on the April 1998 Symposium on New Information Technology and the Heart Attack Alert Program, and as Cochair of the 60 Minutes to Treatment Group. Dr. Smith thanked the committee and stated that he is leaving the committee to allow another member of the American College of Emergency Physicians (ACEP) to participate. He also thanked Dr. Atkins and in particular Ms. Mary Hand. Committee members were also given paperweights and dinner programs marking milestones for NHAAP over the past 10 years.

The meeting was adjourned.



National Heart Attack Alert Program

Attachments

**June 25–26, 2001
Alexandria, Virginia**

ATTACHMENT A
LIST OF ATTENDEES

**NATIONAL HEART ATTACK ALERT PROGRAM (NHAAP)
COORDINATING COMMITTEE
10-YEAR ANNIVERSARY MEETING**

Participants

June 25-26, 2001

Organization	Representative
Agency for Healthcare Research and Quality	Daniel Stryer, M.D.
American Academy of Family Physicians	Charles B. Eaton, M.D., M.S.
American Academy of Insurance Medicine	Lawrence D. Jones, M.D.
American Academy of Physician Assistants	John McGinnity, M.S., PA-C
American Association for Clinical Chemistry, Inc.	Robert H. Christenson, Ph.D.
American Association of Critical Care Nurses	Kathleen G. Keenan, R.N., M.S., C.C.R.N.
American Association of Health Plans	Arthur Dresdale, M.D.
American Association of Occupational Health Nurses	Carol Cunningham Base, M.S., COHN-S
American College of Cardiology	James M. Atkins, M.D., F.A.C.C.
American College of Chest Physicians	Denise Hirsch, M.D.
American College of Emergency Physicians	Mark S. Smith, M.D.
American College of Occupational and Environmental Medicine	Emmett B. Ferguson, M.D., M.P.H.
American College of Physicians	Robert A. McNutt, M.D., F.A.C.P.
American College of Preventive Medicine	George K. Anderson, M.D., M.P.H., F.A.C.P.M.
American Heart Association	Joseph P. Ornato, M.D., F.A.C.C., F.A.C.E.P.
American Nurses Association, Inc.	Christine M. Crumlish, Ph.D., R.N.
American Pharmaceutical Association	M. Ray Holt, Pharm.D.
American Public Health Association	William J. Schneiderman
American Red Cross	Susan Thurner
Association of Black Cardiologists	Gerald DeVaughn, M.D., F.A.C.C.
Centers for Disease Control and Prevention	Wayne H. Giles, M.D., M.S.
Centers for Medicare and Medicaid Services	Jay Merchant, M.H.A.
Department of Defense, Health Affairs	Thomas M. Wiley, M.D., LTC, MC, USA
Department of Veterans Affairs	Pamela Steele, M.D., M.P.H.
Emergency Nurses Association	Julie Bracken, R.N., M.S., C.E.N.
Food and Drug Administration	Arthur A. Ciarkowski, M.S.E., M.P.A., M.B.A.
Health Resources and Services Administration	David B. Snyder, R.Ph., D.D.S.
International Association of Fire Chiefs	Mary Beth Michos, R.N.
International Association of Fire Fighters	John Moore (substitute for Ms. Lori Moore)
National Association of EMS Physicians	Bruce A. MacLeod, M.D., F.A.C.E.P.
National Association of State Emergency Medical Services Directors	Jimm Murray
National Black Nurses Association	David E. Simmons, Jr., M.S.N., R.N.
National Heart, Lung, and Blood Institute	Claude Lenfant, M.D.

National Highway Traffic Safety Administration
National Medical Association
Society for Academic Emergency Medicine
Society of Chest Pain Centers and Providers
Society of General Internal Medicine

Jeffrey Michael, Ed.D.
Charles Curry, M.D.
Robert J. Zalenski, M.D., M.A.
J. Lee Garvey, M.D.
Harry P. Selker, M.D., M.S.P.H.

[Absent]

National Center for Health Statistics (CEC)
National Association of Emergency Medical
Technicians

Richard Gillum, M.D.
Christopher P. Cebollero, M.S., NREMT-P

[Vacant]

American Medical Association

NHAAP Advisors

Angelo Alonzo, Ph.D.
Allan Braslow, Ph.D.

The Ohio State University
Braslow and Associates

NHLBI Staff

Lawton Cooper, M.D., M.P.H.
Patrice Desvigne-Nickens, M.D.
Mary Hand, M.S.P.H., R.N.
Keith Hewitt
Gregory J. Morosco, Ph.D., M.P.H.
Denise Simons-Morton, M.D., Ph.D.
George Sopko, M.D.

Guests

Raymond Bahr, M.D., F.A.C.P.
Myron Weisfeldt, M.D.
M. Janice Gilliland, Ph.D.
Jean C. McSweeney, Ph.D., R.N.
Paula M. Upshaw

St. Agnes Hospital
Columbia University – New York, N.Y.
University of Alabama at Birmingham
University of Arkansas for Medical Sciences
WomenHeart

Prospect Associates, Contract Staff

Jill K. Gross, M.P.H., C.H.E.S.
Georgia Jeffs Kaplan
Susan A. Keller, B.S.N., M.S.
Matt Mangan
Barbara Shapiro

ATTACHMENT B
COORDINATING COMMITTEE AGENDA

**National Heart Attack Alert Program (NHAAP) Coordinating Committee
10-Year Anniversary Meeting**

**June 25–26, 2001
Radisson Hotel Old Town Alexandria
Alexandria, Virginia**

Agenda

Objectives of the 10-Year NHAAP Coordinating Committee meeting are to:

- ♥ Review progress with the focus areas/priorities identified at the five-year NHAAP Coordinating Committee meeting, and relevant data trends at the 10-year point of the Program
- ♥ Specify existing and new focus areas that should be on the NHAAP Coordinating Committee and its subcommittee agendas for the next five years
- ♥ Examine the available science related to early recognition of patients with symptoms of acute coronary syndromes—with a special emphasis on presentation issues for racial/ethnic and gender groups, from large patient series
- ♥ Identify the implications of the symptom recognition issues presented, for the NHAAP Coordinating Committee/subcommittee work for the next five years

Monday, June 25, 2001

1:00 PM–1:30 PM

General Session/Business Meeting

- | | | |
|------|---|---------------------|
| 1:00 | Welcome/New Member Introductions | Ms. Mary Hand |
| 1:05 | Report from the Institute | Ms. Hand |
| 1:10 | Cardiovascular Health for All: Meeting the Challenge of Healthy People 2010—A National Conference | Mr. Keith Hewitt |
| 1:15 | A Broad Research Agenda for Cardiac & Traumatic Resuscitation | Dr. Myron Weisfeldt |

1:30 PM–2:30 PM

Progress Review: National Heart Attack Alert Program

- | | | |
|------|--|----------------------------|
| 1:30 | Overview of 10-Year Meeting Planning/Agenda | Ms. Hand |
| 1:45 | Data Trends of Interest to the NHAAP at 10-Years:
Report from the NHAAP's Data Advisory Group | Dr. Bruce MacLeod |
| 2:00 | Review of Progress with Areas of Focus Identified at the Five-Year Meeting | Ms. Hand
Ms. Terry Long |
| 2:30 | Break | |

2:45 PM–5:45 PM

Recommendations for Existing and New Focus Areas for Subcommittee Work for the Next Five Years

2:45 Subcommittee Sessions:

♥ Science Base Subcommittee

Dr. Joseph Ornato, Chair
Dr. Robert Zalenski, Vice Chair
Dr. George Sopko, NHLBI staff
Ms. Susan Keller, Prospect

♥ Health Systems Subcommittee

Dr. Bruce MacLeod, Chair
Ms. Mary Beth Michos, Vice Chair
Mr. Alex Kuhn, NHLBI staff
Mr. Matthew Mangan, Prospect

♥ Education Subcommittee

Dr. Christine Crumlish, Chair
Mr. David Simmons, Vice Chair
Ms. Terry Long, NHLBI staff
Ms. Jill Gross, Prospect

4:45 **Break**

5:00 Subcommittee Reports/Recommendations

Dr. James Atkins, Chairman
NHAAP Executive Committee

Subcommittee Chairs/
Vice Chairs

6:30 PM

10-Year Anniversary Dinner

♥ Dinner

♥ Awards Presentations

♥ *Premier Showing of All-Star Video*
“Act In Time To Heart Attack Signs”

♥ Reflections

Tuesday, June 26, 2001

8:00 AM–10:30 AM

Panel #1

Racial/Ethnic and Gender Issues in Acute Myocardial Infarction (AMI) Recognition

- | | | |
|-------|--|--|
| 8:00 | Introduction | Ms. Mary Hand |
| 8:05 | African American Issues in Heart Attack Recognition:
Introductory Comments | Dr. Charles Curry |
| 8:20 | Ethnic/Gender Symptom Presentations for AMI:
What Science Do We Have In Hand | Dr. Patrice Desvigne-
Nickens |
| 8:45 | Prevalence, Clinical Characteristics, and Mortality
Among Patients with AMI Presenting Without Chest
Pain: Data from the National Registry of Acute Myocardial
Infarction (NRFMI) | Dr. Joseph Ornato |
| 9:05 | What the Rapid Early Action for Coronary Treatment (REACT)
Research Program Tells Us About The Heart Attack Symptom
Experience | Dr. Lawton Cooper
Dr. M. Janice Gilliland |
| 10:00 | Discussion—Large Group | Dr. Wayne Giles
Moderator |
| 10:30 | Break | |

10:45 AM–12:30 PM

Panel #2

Early Recognition of Patients with Acute Coronary Syndromes

- | | | |
|-------|--|------------------------|
| 10:45 | Introduction | Ms. Hand |
| 10:50 | New Definition of a Heart Attack
and Prodromal Recognition | Dr. Robert Christenson |
| 11:10 | Women's Prodromal and Acute Symptoms
of Acute Myocardial Infarction | Dr. Jean McSweeney |
| 11:30 | Recognizing Prodromal Symptoms:
An Overlooked Phenomenon | Dr. Raymond Bahr |
| 11:45 | The Patient Perspective | Ms. Paula Y. Upshaw |
| 12:00 | Discussion—Large Group
Moderator | Ms. Mary Beth Michos |
| 12:30 | Buffet/Working Lunch (break-out rooms by subcommittee) | |

1:00 PM–4:00 PM

**Implications of Recognition Issues for the NHAAP Coordinating Committee/
Subcommittee Activities for the Next Five Years**

1:00 Subcommittee Break Out Sessions:

- ♥ Science Base Subcommittee
Dr. Ornato, Chair
Dr. Robert Zalenski, Vice Chair
Dr. George Sopko, NHLBI staff
Ms. Susan Keller, Prospect
- ♥ Health Systems Subcommittee
Dr. Bruce MacLeod, Chair
Ms. Michos, Vice Chair
Mr. Alex Kuhn, NHLBI staff
Mr. Matthew Mangan, Prospect
- ♥ Education Subcommittee
Dr. Christine Crumlish, Chair
Mr. David Simmons, Jr., Vice Chair
Ms. Terry Long, NHLBI staff
Ms. Jill Gross, Prospect

2:30 **Break**

2:45 Subcommittee Reports on Recognition Issues: Implications for the NHAAP Coordinating Committee/Subcommittee Work For the Next Five Years
Subcommittee Chairs/Vice Chairs

3:45 Summary
Dr. James Atkins
Ms. Hand

4:00 Adjournment
Ms. Hand

Next Meeting: February 4–5, 2002