Introduction

Adult cardiovascular diseases constitute a frequent indication for both inpatient and outpatient medical care and are a major component in the practice of a family practitioner or general internist. Although many conditions are recognized to be within the scope of the generalist, other conditions, such as severe and life-threatening manifestations of both common and rare cardiovascular diseases and cases refractory to usual management, may benefit from the diagnostic techniques, therapeutic interventions and judgment based on experience provided only by the cardiovascular specialist. The point at which the generalist should consult the specialist is often indistinct and has profound implications for the quality and cost of health care, and hence the work force needs.

This issue demands examination from two perspectives to define the interactions between the generalist and the cardiovascular specialist. The knowledge and skills in the care of cardiovascular diseases that the generalist possesses should allow definitions of the threshold for referral to the specialist. Conversely, the knowledge and skills that the adult cardiologist should have in general medicine should define the threshold for referral from the cardiologist to the generalist. A two-way interchange is ideal, in which patients receive care from the physician who can provide the most favorable outcome at the lowest cost.

Definition of the Generalist and the Cardiovascular Specialist

The Generalist

In an era of increasing specialization, the role of the generalist who provides first-contact, broadly based, continuous and coordinated care for nonreferred and undifferentiated patients has become increasingly recognized as an important issue in health care delivery. Concern about the boundaries between specialization and generalism within medicine has been prevalent throughout the 20th century. The following editorial comments appeared in JAMA in 1900 (1):

In these days of specialization, the field of the general practitioner has become greatly restricted . . . at the same time as the value and the need of genuine specialists in medicine is fully recognized and established, there cannot be too strong a warning uttered against a tendency noticeable in some quarters to carry specialization to the degree of refinement beyond all reason.
The terms "primary care," "primary care physician," and "generalist physician" require definition. The use of the term "primary care" became common in the 1960s and early 1970s. Alpert and Charney (2) stated that physicians providing primary care should provide first contact, longitudinal and integrative care utilizing the overall resources of the health care system to address the problems presented by undifferentiated patients (2). In 1966, the Millis Commission called for the education of a new type of physician, a "primary physician," who could provide primary care and appropriate hospital-based services for patients (3). At the same time, the Willard Committee recommended the development of a new specialty of family practice to replace the disappearing general practitioner (4). These proposals led to the development of residency training in family practice and primary care tracks in internal medicine and pediatriciens.

Over the past 20 years, physicians trained to provide primary care services have often been called primary care physicians. Much of primary care is ambulatory, but primary care physicians often provide hospital care. Consequently, the term "generalist" physician is now being more commonly used. The term "generalist" implies initial contact with the undifferentiated patient, an integrative function, an orientation to addressing problems in breadth and longitudinal care, including preventive care. General internal medicine, general pediatric and family medicine are most often referred to as the "generalist" specialties. The gynecologist-obstetrician is sometimes added to this group of "generalists" because they provide primary care in a significant number of women. It seems likely that health care reform will bring an increasing emphasis on primary care provided through managed care organizations. In these systems, generalist physicians also have a "gatekeeper" role in providing access to the rest of the health care system. Self-referral to subspecialists by patients will be markedly reduced if this plan plays out to its ultimate conclusion.

The proportion of generalist physicians has been decreasing throughout the past 50 years. Today, less than one-third of active physicians (~75/100,000 population) are self-described generalists (5), and <20% of physicians in internal medicine training choose generalist fields. If major changes do not occur in graduate medical education, the proportion of generalists will continue to decrease to <20% (Fig. 1).

Health planners suggest that to achieve adequate access to managed health care, focused on the primary care physician, a 50:50 generalists/specialist ratio will be required. Various proposals have been made to increase the number of generalists to achieve that ratio (5,6). The proportion of generalists choosing careers in general fields must be increased. Present estimates indicate a sufficiency, if not an excess, in the number of physicians in the United States. Planning models suggest that if the number of generalists in training is increased to 50%, only a moderate improvement in the balance can be achieved in the next two decades because of the large pool of practicing physicians and the long educational pipeline (7) (Fig. 2). To reach an equilibrium between generalists and subspecialists by the year 2010, 100% of residency graduates would have to be trained as generalists—a clearly impossible task. A number of plans are being proposed to decrease the number of specialists and to increase the number of generalists trained, including retraining of adult subspecialists as generalists. These initiatives, however, will not achieve balance within the foreseeable future.

The Cardiovascular Specialist

Cardiovascular specialists are physicians who have completed training and certification in cardiovascular medicine after the completion of training in internal medicine. They therefore have competency in general internal medicine in addition to being capable of performing and interpreting diagnostic procedures in adult cardiovascular disease. Within the broad definition of cardiovascular specialist are those who may also have expertise in special diagnostic and therapeutic procedures, including, but not limited to, echo-
cardiography, nuclear cardiology, electrophysiology, angiography and intracardiac invasive therapeutic technology. In some areas of expertise (e.g., electrophysiology and nuclear cardiology), additional certification is required. Although this is the broad definition of a cardiovascular specialist, in many cases the cardiologist may in fact provide care in general internal medicine and primary care.

How many are there? According to the American Medical Association (AMA) profile, there were 15,862 adult cardiologists in 1990. There has been a 700% growth in cardiologists from 1965 to 1989. Each year ~1,000 physicians complete cardiology training. The increase in number of cardiologists can be seen in Figure 3. At present there are ~6.4 cardiologists/100,000 population in the United States. It is estimated that in managed care settings, the need for cardiologists is 3.4/100,000 (8). If the present rate of physicians completing training continues, there will be as many as 8/100,000 by the year 2000. This relative increase raises concern about further imbalance between generalists and specialists. Because of the rapid growth in the recent decade, 67% of the cardiologists are <54 years of age, and 41% are <44 years old. They are predominantly men (95%), and ~53% of self-identified cardiologists are board certified.

What do cardiologists do? According to a survey of the membership of the American College of Cardiology (ACC), it is clear that cardiologists spend a significant amount of time in technical pursuits. Eighty-eight percent of adult cardiologists perform cardiac catheterizations, and >62% provide some type of interventional cardiovascular procedure, whereas only 16% do electrophysiologic studies and 33% implant permanent pacemakers. In terms of noninvasive studies, 88% read echocardiograms, and 89% do exercise stress testing.

In the year 1989 to 1990, it is estimated that adult cardiologists had an average of 4.5 office visits for 100 patient visits/year. In general, the cardiology patient was old, with 88.7% >44 years old and 55% >65 years old (9) (Fig. 4). Cardiovascular specialists provided an average of 1.6% of all office visits, and 4% of patient visits were for those ≥65 years old. Approximately 10% of their patients were referred from other physicians, twice that of all other specialists. The chronicity of cardiovascular disease, and their role in longitudinal care, are underscored by the fact...
that almost 80% of visits made to cardiologists were return visits for a previously treated condition.

Nearly half of all visits to adult cardiologists (47.7%) were for symptomatic problems or complaints. Although most patients visiting a cardiovascular specialist were seeking care for a specific symptom relative to the vascular system, most visits for cardiovascular symptoms were made to primary care physicians. Cardiologists provided 35.3% of all physician office visits for angina, whereas the majority of patients with this complaint were seen by internal medicine or general and family practice physicians, 26.0% and 25.3%, respectively. The distribution of visits by Internal Classification of Disease (ICD)-9 code is shown in Figure 5. The cardiologist's visit comprised about one-third of the primary cardiac diagnoses. Preventive health care is more often provided by noncardiologists; for example, 51.2% of hypertensive patients were seen by a family practitioner, and 32% were seen by internists; only 5.2% were seen by cardiovascular specialists.

Cardiovascular specialists often provide primary care to patients with cardiovascular problems. In doing so, they assume the responsibilities of generalists, providing primary access, comprehensive and continuing care and referrals to other specialists, within both the fields of cardiology and cardiac surgery. In a recent survey of the ACC membership, ~40% of the work week is occupied by the performance of consultative cardiology, and <20% is involved with invasive or noninvasive procedures. Cardiologists provide primary care for 31% of their patients with cardiovascular disease and for 14% of patients without cardiovascular disease (Fig. 6). There has been little change in this distribution since 1985.

From these data it can be seen that the cardiovascular specialists fulfill the major role in providing diagnostic,
therapeutic and counseling advice for a wide spectrum of cardiovascular disease, including ischemic heart disease and hypertension. The generalist, however, also provides a significant amount of services with respect to adult cardiovascular disease.

**Knowledge and Skills of the Internist and Generalist in the Field of Cardiology**

It is in society's best interest to have generalists give as much cardiologic care as they can give safely and effectively (10). Generalists, although outnumbered by all specialists, outnumber adult cardiologists by >10:1. Care by generalists is by definition more easily directed as the health care needs of patients change.

The division of labor between cardiology subspecialists and generalists, and other subspecialists functioning in a general capacity for a given patient, has been decided more by social issues than by a dispassionate assessment of what generalists can do, or learn to do, well. Among the forces that have created the present division of labor are patients' belief in specialization, marketing by organizations representing specialists, hospital privileges based on training and not necessarily competency and the greater risk of malpractice actions if care is given by physicians other than the most specialized available.

An estimate of what generalists are expected to do can be obtained from the content of review courses and by certifying examinations (for internists, Medical Knowledge Self-Assessment Program (MKSAP) and the American Board of Internal Medicine, respectively). Both suggest that internists are expected to be competent in the majority of cardiovascular conditions, such as congestive heart failure, and coronary artery, valvular and pericardial disease. These written approaches test only cognitive knowledge, not judgment, problem solving or physical skills, which are also central to patient care.

What generalists can do in practice is another matter. Studies of residents in internal medicine show that their ability to recognize common heart murmurs falls far short of expectations for cardiac diagnosis (11,12). Less is known about the competence of generalists in practice, but there is every reason to believe they can do no better. This might be expected, given the breadth of generalism and the complexity of cardiovascular medicine. However, general internists trained in 3-year categoric programs should be well equipped to take care of a broad range of hospitalized patients, including those with cardiovascular disease.

What is not known, is how cardiovascular care is now divided between generalists and cardiologists. It is also not known whether the additional cognitive knowledge and experience of cardiologists results in better outcomes of care compared with that provided by generalists for comparable kinds of cardiovascular problems—and if so, in which kinds of patients.

Therefore, establishing the dividing line between what generalists can do and what subspecialists in cardiology should do cannot presently be data based. Managed care organizations, using trial and error at the local level, will probably have to determine this, proceeding on the assumption that generalists can do more. Generalists will, however, need extra training, and their performance relative to cardiologists should be monitored.

**Referral and cardiovascular care.** The goal that appropriate cardiovascular care be provided by the professional with adequate knowledge and skill at the lowest cost implies that patients will frequently be referred from the cardiovascular specialist back to the generalist, who can then integrate the total care of the patient. This referral can occur when the condition of a patient with acute or chronic disease has stabilized, allowing the generalist to resume care, or when the diagnostic or therapeutic maneuvers are completed.

The decision by the generalist physician to seek consultation or to refer a patient has enormous impact on the cost and quality of care. In the fee-for-service sector, studies at the Universities of Missouri and Washington suggest that for each $1.00 charged by a family physician, $2.00 are charged by consultant physicians and $4.00 by the associated hospi-
tal (13,14). Despite the obvious importance of consultation and referral both for the quality and cost of care, we know relatively little of the process or the results of the process. Consultation and referral, although frequently discussed interchangeably, actually represent two distinct processes. When seeking consultation, a generalist physician seeks advice on the diagnosis or management, or both, of the patient’s problem so that care can be continued. This consultation may be formal or informal and may be instigated at the request of the patient to provide a “second opinion.” In referring a patient, the physician typically sends the patient to the specialist to provide a specific therapy or to manage a specific problem while the generalist continues to provide general care. Frequently, in the process of consultation and referral, there is inadequate communication between patient, primary physician and consultant to define the exact role of primary and consulting physicians.

Wide variations in consultation and referral rates exist. In the family practice setting, studies have documented referral rates varying from 1.5% to 11% of patient visits (15-17). Similar variations occur in general pediatrics and internal medicine (18). Although differences in patient populations obviously are present, the decision for referral is highly discretionary. Even in managed care systems where the incentives are to control costs through efficient utilization of consultative services, large variations occur in use of specialists (19-21). Referral rates in the United Kingdom have been documented to be associated with the availability of specialists and only weakly associated with measures of illness (22).

Relatively little information has been collected about referral rates from primary care to specific specialties. Rates appear to be highest from the primary care setting to otorhinolaryngology—head and neck surgery, ophthalmology, orthopedics, obstetrics/gynecology, general surgery and gastroenterology. In the University of Missouri-Columbia Department of Family and Community Medicine, of 55,139 office visits, the overall consultation and referral rate was 5%. One referral in 10 was directed to cardiology. Thus, using total office visits as the denominator, that practice had one cardiology referral for each 200 office visits. Managed care will probably reduce the utilization of cardiology services. Referrals from primary physicians, however, may not drop and actually could increase as patients who previously sought direct care from a cardiologist seek care through a primary physician. In one study, primary physicians retrospectively perceived that their referrals to cardiology and to ophthalmology had been least discretionary and those to dermatology most discretionary (23). Nevertheless, net reductions in cardiology services are supported by the fact that the ratio of cardiologists to population in health maintenance organizations (HMOs) is approximately half that of the nation as a whole.

Other factors in addition to the availability of consultants may relate to the referral process. Intuitively, it is presumed that referral rates would be based on the levels of diagnostic and therapeutic uncertainty. Consequently, those with the least amount of knowledge in an area might be expected to have the highest referral rates. Studies of internal medicine house staff indicate that they have higher referral rates than family practice house staff. Much of this difference can be explained by increased referrals to obstetrics/gynecology, general surgery and dermatology (24). These findings should not be unexpected inasmuch as family physicians receive training in these areas, whereas general internists often do not. However, it could be explained by an increased recognition of serious disease. A study of referral rates by eight family physicians and two nurse practitioners in New York City found that rates seem to be higher by referring physicians who had a high level of diagnostic certainty. For example, the highest referral rate from this group to orthopedics came from the physician who had the greatest knowledge of orthopedics (25). Therefore, an argument might be made that extensive education of generalists in the field of cardiology could result in an increased referral to cardiologists.

**Knowledge and Skills of the Cardiologist**

The growth in the demand for cardiology services is multifactorial, but one important contributing factor is the aging of the U.S. population. Currently, >54% of visits to cardiovascular specialists are from patients >65 years old, in contrast to 21% for other specialists. The public demand for specialty care, particularly in cardiology, is due in part to the perception that a higher quality of care can be obtained from specialists than generalists.

The growth of cardiology has also resulted, in part, from the increase in the knowledge base of cardiology coupled with a tremendous growth of new technology. The development of coronary care units and the use of thrombolytic agents has revolutionized the treatment of acute myocardial infarction. In addition, development of new diagnostic techniques has required the expansion of cardiology training programs from a 2-year training program in the 1970s to a 3- or 4-year training program.

The adult cardiologist is a subspecialist within internal medicine and has been trained to be a general internist. Many cardiologists in fact do function as internists with specialization in cardiology. As the population ages, this clearly will increase. One might argue that a well trained internist or general practitioner can manage most of these cardiology problems without the need for a cardiologist. This may be true for certain disorders such as hypertension, but with an ever-increasing number of sophisticated tests and newer therapies, it is unlikely that the generalist can maintain adequate proficiency in these areas. Lack of knowledge and optimal use of tests has the potential to increase delays in therapy, which subsequently can result in increased costs, morbidity and mortality.

One criticism of the current health care system is that the high number of cardiovascular specialists results in
increased medical expenditures, mainly because of their utilization of tests, some of which may be inappropriate (23). The Medical Outcomes Study (26–28) examined 20,000 patients who visited providers’ offices during a 9-day period in 1986 in three large metropolitan areas in the United States. Resource utilization was greater for specialists, even after adjustment for patient mix (Table 1). However, there were no data on outcomes of care. A recent report using data derived from the Medicare data base suggested that outcome for angioplasty in the elderly is related to angioplasty volume of the operator (29). In addition, low volume operators perform angioplasty in less severe coronary disease. Likewise, hospitals with a low number of interventional procedures have a less favorable outcome (30).

The overutilization of cardiac resources has been addressed in a study in which a sample of hospital charts from 15 New York State hospitals was reviewed, using criteria developed by an expert panel for appropriateness of performance of bypass surgery, angioplasty and cardiac catheterization (31–33). Overall, there was an extremely low incidence (2% to 4%) of inappropriate use of these procedures using the criteria established by this group. The majority of the inappropriate cases occurred in patients who were asymptomatic. The results of these studies suggest that cardiologists do use testing and treatment modalities more frequently than generalists, but it is not clear whether this increased utilization of resources results in better long-term outcome.

A trend toward a further subspecialization has occurred within cardiology, driven by the explosion of technology. Despite this emphasis on advanced subspecialty skills, an adequate volume of cases to maintain proficiency may not exist. Some cardiologists perform procedures without adequate training or an ongoing experience with a sufficient volume of cases. Recent studies indicate that 54% of 15,862 adult cardiologists performed the 286,000 interventional procedures in 1990. The average number of procedures per operator is 33. Of the 7,762 ACC members who completed the 1992 membership survey, the average number of angioplasty procedures was 67. The ACC/AHA guidelines suggest that a minimal number of percutaneous transluminal coronary angioplasty procedures is ≥75/year (34,35). It is clear that many operators are performing below this standard. This lack of an adequate number of cases to maintain proficiency can result in lower quality and has the potential to increase overutilization through the process of self-referral.

A survey of adult cardiology training program directors emphasized the need for reassessment of the current ratio of invasive to noninvasive physicians (36). Three-fourths of the respondents did not believe that there was a need for more invasive cardiologists, whereas 57% believed there was a need for more noninvasive cardiologists. A survey of the membership of the ACC and a sample of generalists throughout the United States revealed that there was little perceived need for additional cardiologists by either group (Table 2). This was particularly true for invasive cardiologists. Approximately two-thirds of the generalists felt that there were sufficient cardiologists, and ≤15% perceived a need for additional cardiologists.

These factors strongly favor the restriction of the number of invasive subspecialists within cardiology, as well as the development of guidelines for the performance of specialized tests and treatments. The development of credentialing and recredentialing criteria that require adequate volume of cases and favorable outcome seems desirable. Alteration of the financial incentives that drive many physicians to perform these procedures may also alleviate the maldistribution of invasive versus noninvasive cardiologists. In addition, alteration of the training program to emphasize the importance of the general cardiologist’s role in the care of patients is an important strategy in adjusting our cardiology workforce needs for the future.


### Table 1. Adjusted Utilization Rates

<table>
<thead>
<tr>
<th></th>
<th>Family Physicians</th>
<th>General Internists</th>
<th>Endocrinologists</th>
<th>Cardiologists</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pts admitted to hospital</td>
<td>4.77 (117)</td>
<td>5.99 (117)</td>
<td>7.15 (150)</td>
<td>10.53 (221)*</td>
<td>≤ 0.001</td>
</tr>
<tr>
<td>Office visits/pt per yr</td>
<td>4.64 (95)</td>
<td>4.42 (95)</td>
<td>5.22 (113)*</td>
<td>4.53 (98)</td>
<td>≤ 0.001</td>
</tr>
<tr>
<td>Prescription drug/pt</td>
<td>1.49 (104)</td>
<td>1.46 (104)</td>
<td>1.54 (110)†</td>
<td>1.74 (124)*</td>
<td>≤ 0.001</td>
</tr>
<tr>
<td>% Pts with tests/pt</td>
<td>40.0 (111)*</td>
<td>44.2 (111)*</td>
<td>55.9 (148)*</td>
<td>47.7 (119)*</td>
<td>≤ 0.001</td>
</tr>
<tr>
<td>Mean value of tests/pt</td>
<td>23.10 (114)*</td>
<td>26.40 (114)*</td>
<td>24.00 (104)</td>
<td>34.10 (148)*</td>
<td>≤ 0.001</td>
</tr>
<tr>
<td>Mean value of tests/visit</td>
<td>104.30 (106)</td>
<td>110.10 (106)</td>
<td>132.10 (127)*</td>
<td>150.50 (144)*</td>
<td>≤ 0.001</td>
</tr>
</tbody>
</table>

*p ≤ 0.01. †p ≤ 0.05. *Mean value of tests or procedures. pt (Pts) = patient(s). Reprinted, with permission, from Greenfield et al. (27). Copyright 1992, American Medical Association.

### Table 2. Perceived Needs for Additional Cardiology Subspecialists by Cardiologists and Generalists

<table>
<thead>
<tr>
<th>Subspecialists</th>
<th>More</th>
<th>Too Many</th>
<th>Enough</th>
</tr>
</thead>
<tbody>
<tr>
<td>Card Gen</td>
<td>Card Gen</td>
<td>Card Gen</td>
<td></td>
</tr>
<tr>
<td>Noninvasive</td>
<td>22</td>
<td>15</td>
<td>36</td>
</tr>
<tr>
<td>Invasive</td>
<td>4</td>
<td>11</td>
<td>59</td>
</tr>
<tr>
<td>Electrophysiologist</td>
<td>25</td>
<td>15</td>
<td>19</td>
</tr>
</tbody>
</table>

Data presented are percent of respondents. Card = cardiologists; Gen = generalists.
Role of the Cardiologist and the Generalist in Cardiovascular Preventive Care

The manifestations of atherosclerotic disease are often sudden, without previous symptoms. Thus, the cardiologist is often the sole care provider immediately after the diagnosis of coronary disease. The goals of therapy in that setting are to prevent acute catastrophic complications of the disease and to initiate secondary prevention programs to reduce the occurrence of future cardiac events and death.

Less well accepted is the concept of primary prevention aimed at the evaluation and modification of factors that are etiologically associated with the development of cardiovascular disease. These include cigarette smoking, hypertension, elevated low density lipoprotein cholesterol, low levels of high density lipoprotein, diabetes, obesity and sedentary life-style. The major role of the modification of these risk factors in the secondary prevention of coronary disease is beyond question (37). Despite the scientific evidence in favor of aggressive efforts to prevent cardiovascular disease, considerable evidence confirms the infrequent provision of such services. Fewer than 5% of patients were referred for cardiac rehabilitation programs after cardiac surgery (38). Serum lipid levels are often overlooked in patients referred for coronary arteriography or cardiac surgery (39).

Referral of patients back to the generalist without attention to these risk factors adds to the problem. The cardiovascular specialist may fail to incorporate life-style modifications as part of the overall follow-up plan. The primary care physician is no more trained to be effective in these life-style assessments or interventions than the cardiologist. The cardiologist has a responsibility to establish treatment goals, perform the appropriate diagnostic tests that focus preventive interventions, call in the appropriate and available ancillary services to help initiate life-style modifications, educate and counsel the patient and send a cogent summary of these recommendations to the generalist to facilitate follow-up with the patient. The occurrence of a cardiovascular event in a first-degree relative should elicit a search for and modification of risk factors, both inherited and behavioral, in that person's relatives, both adults and children. Often, siblings and children have infrequent visits for medical care so that the incidence of coronary disease in a close relative may not be communicated to the primary care provider. The referral of family members to the generalist is feasible and the best channel to communicate specific recommendations for risk factor assessment and goals for modification of those risk factors identified.

Summary

1. An imbalance between generalists and cardiovascular subspecialists exists: that will require decades to correct. We question the validity of the 50:50 generalist/specialist ratio in view of current practice patterns for cardiology.
2. There has been a large increase in the number of cardiovascular specialists in the past 30 years that will continue if training programs remain at their current size.
3. Cardiovascular specialists provide a substantial amount of inpatient care, care to older patients and care to those with cardiovascular symptoms, although generalists actually provide the majority of office-based cardiovascular care.
4. A significant portion of cardiovascular specialist care can be classified as comprehensive care to patients with and without cardiovascular disease.
5. Most generalists and cardiovascular specialists do not perceive a need for additional cardiovascular specialists.
6. Many providers perform cardiovascular procedures at levels below the recommended threshold for maintenance of clinical competence.
7. Managed care may result in a reduced demand for cardiovascular specialists.
8. If cardiovascular specialists provide general care, it may not be assumed that previous training prepares them for generalist practice.
9. The appropriate boundaries of cardiovascular care between generalists and cardiovascular specialists are indistinct. They are defined somewhat by the training programs from which the generalists graduate.
10. Many generalists have deficiencies in basic skills in clinical cardiology.
11. Desirable interactions between generalists and cardiovascular specialists involve referral of patients in both directions to the provider who can give care to a given patient, at a given time, with the best outcome and lowest cost.
12. It should be noted that the balance between generalists and subspecialists for the delivery of pediatric cardiovascular care is substantially different from that for the adult population and that the previous conclusions do not apply to pediatric work force characteristics (see Task Force 6).

Recommendations

1. To achieve good outcomes at the lowest cost, cardiovascular care must be shared by generalists and cardiovascular specialists.
2. Current trends in health care suggest that the cardiovascular community should anticipate and plan for a potential reduction in the numbers of cardiologists.
3. As the health care system is restructured, high quality educational programs must be maintained to prepare future leaders, researchers and practitioners of cardiovascular medicine.
4. Cardiovascular specialists and others should develop criteria for high quality cardiovascular training programs, taking into account the career choices of their graduates and the needs of society.
5. Cardiovascular specialists should work collaboratively with other disciplines to develop appropriate training pro-
programs for noncardiovascular specialists in the provision of cardiovascular care.

6. Cardiovascular specialists should work collaboratively with generalists to develop appropriate retraining programs for cardiovascular specialists who provide comprehensive care.

7. Guidelines for maintenance of competence in cardiovascular procedures should be utilized in the credentialing of personnel and institutions.

Areas in Need of Further Definition Through Research

The information base for these recommendations is weak and should be strengthened by studies of care by cardiovascular specialists and generalists, specifically with regard to the following:

1. Studies comparing the outcomes and costs of care by generalists and cardiovascular specialists for specific cardiovascular conditions, adjusting for other differences in patient mix.

2. Description of the current referral patterns between cardiovascular specialists and generalist physicians and the effects on outcomes and cost of care.

3. On the basis of these studies, challenge or affirm the 50/50 generalist/specialist goal.

References


