

Task Force III: Perspectives on the Allocation of Limited Resources in Cardiovascular Medicine

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The need to allocate scarce resources for health care or any other human purpose is an old one that arises because the number of legitimate claimants always exceeds available resources. Not everything that is technically feasible is financially possible. Choices must be made. Individuals and societies must confront the problem of living within their means.

The need to allocate scarce or limited health care resources to manage the care of the cardiovascular patient poses some of the most vexing problems in all of medical ethics. It is apparent that there is not a sufficient consensus to formulate detailed guidelines on the subject. Accordingly, Task Force III established as its goal the identification of issues it considered most in need of discussion, refinement and rethinking before sound guidelines can be promulgated to assure a just and equitable allocation of limited resources. Persuaded that this is a societal issue in a phase of evolution, the Task Force considered four areas most in need of development: 1) an understanding of the duality of the relation that exists between the physician and the patient and the physician and society, 2) an understanding of the limitation and maldistribution of health care resources, 3) an understanding of the physician's role and obligations in the care of the patient with end-stage disease, and 4) identification of programs that should be available to render appropriate cardiovascular care for all.

I. The Physician and the Patient

The physician has a dual relation—one to the patient and one to society. In the clinical practice of medicine, the physician's first obligation is to be the advocate of the patient. Until society justly directs otherwise, there should be nothing standing in the way of the physician caring for the health needs of his or her patient.

Given the finite aspect of health care resources today, it is evident that not every diagnostic test or therapeutic inter-

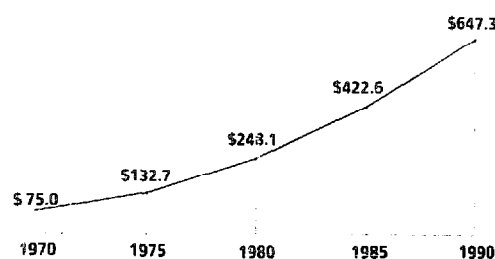


Figure 1. Projected U.S. health expenditures in billions of dollars.

vention can be available for every patient. Apart from absolute dollars there are recognized limits on other important resources such as beds available in specialized units, the amount of equipment and number of technical personnel available and the cardiovascular specialist's time and energies. Decisions regarding the allocation of medical services seem inevitable and the cardiovascular specialist has a societal obligation to enter debate, discussion and decision making related to this distribution.

II. Limitation and Maldistribution of Resources to Provide and Pay for Medical Care

For well over a decade federal health policy has focused on restraint of public funds to beneficiaries of Medicare and Medicaid programs. The elderly and the poor are "entitled" to benefits mandated by Titles XVIII and XIX of the Social Security Act. In the past few years major employers have joined government officials in protesting the rising costs of providing health care for their employees. The rate of increase in spending for health care has greatly exceeded expectations and far exceeded the rate of growth in many other sectors of our economy.

Figures 1 and 2 and Table 1 illustrate the magnitude of these costs and the marked rate of change (1). Perhaps the

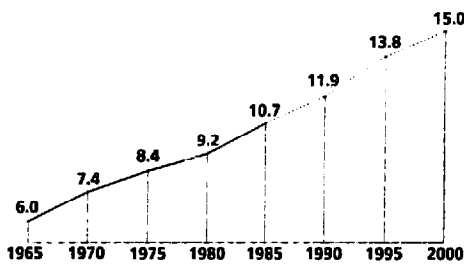


Figure 2. Projected U.S. health expenditures as a percent of gross national product.

most significant way to illustrate our spending for health care, however, is to compare it with that of other countries. Figure 3 compares our expenditures as a percent of gross national product and on a per capita basis with those of 23 other countries. We exceed them by far in per person and total spending (2).

Although the United States invests the most in health care, many traditional measures of health do not indicate that we are healthier than those who spend less. We rank approximately 19th in the world in infant mortality, and life expectancy in both Japan and Greece exceeds that in the United States. Furthermore, there are well documented differences in the health status of different socioeconomic and ethnic groups, with blacks ranking significantly behind the population in general. For example, it is estimated that in the U.S. there are 60,000 more premature deaths per year among blacks than among the population in general.

Despite our enormous expenditures for health care, many Americans have inadequate or no health insurance coverage (3). Approximately 37 million Americans have no insurance or other coverage for medical care expenses and perhaps another 30 million have inadequate coverage, meaning that 1 in 4 is either uninsured or underinsured. A third of the uninsured are children. There are people both in over-

Table 1. U.S. Federal Government Outlays for Health Care

Year	Billions of Dollars
1965	5.5
1986	134.7 (about)
1987	142.7 (about)
1988*	159.6 (about)
2000	498.6 (about)

*Increases between 1965 and 1988 and 1987 and 1988 were 2,902% and 11.8%, respectively.

crowded urban areas and in rural communities whose access to appropriate medical care is either extremely difficult or virtually nonexistent. Different ethnic or racial groups, illegal immigrants and the homeless frequently cannot obtain appropriate care because of a variety of economic problems as well as real or presumed unavailability of care. Our present health care system not only limits access to many in need, but also is viewed as "expensive, inefficient, and increasingly bureaucratic" (4).

A. Expansion of "Public" Federal Care

Medicare currently covers primarily those aged ≥ 65 years and those who are disabled. It is a Social Security insurance plan that is funded by the federal government. Medicaid is funded approximately equally by the states and the federal government. Together these programs pay for more than 40% of health care in the U.S.

Two major approaches for including the currently uninsured in an insurance program are to expand Medicaid or to expand Medicare, or both. One approach to Medicaid expansion would require states to decrease the qualifying income level to cover all unemployed persons, pregnant mothers, young children and those employed persons whose employers do not offer them health insurance. Medicare

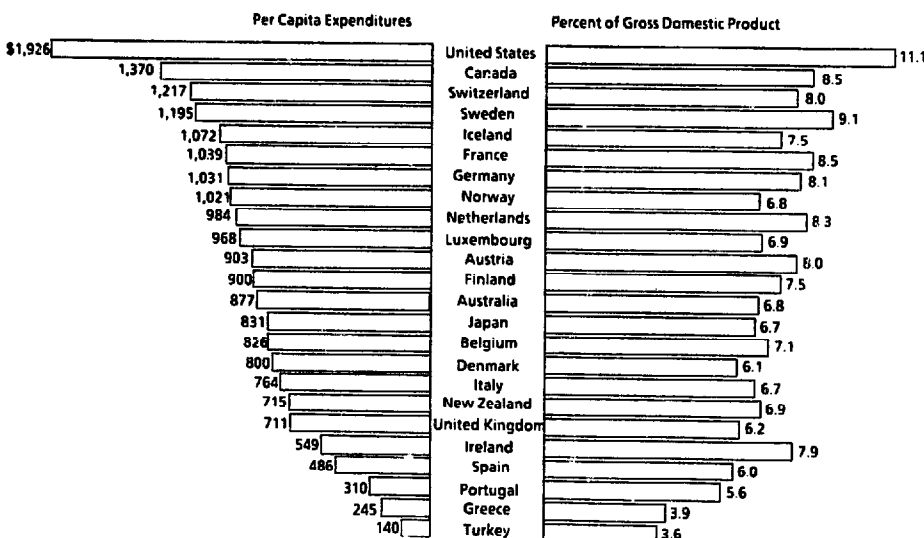


Figure 3. Per capita health spending in U.S. dollars and percent of gross domestic product spent on health in Organization for Economic Cooperation and Development (OECD) countries in 1986.

could also be expanded by including more categories or treatments (heart transplant coverage was recently added).

The major problem in expanding these programs is the limited financial resources both the states and Congress have been willing to commit to health care. Massachusetts, for example, has discovered that implementing a universal entitlement program that increases access without cost controls, even in its earliest phases, leads to rapid rises in total cost. Massachusetts already has the most expensive health care system per capita in the nation (approximately \$3,000) and the state's share of the health care budget is threatening the state's budget and taxation system. Nevertheless, it is likely that a national program will be proposed and probably patterned to some extent after the Massachusetts program—at least in the sense of requiring nearly all employers to provide health insurance to their workers and of devising some method (such as expansion of Medicare and Medicaid) to cover the remaining uninsured, probably by placement in managed care plans. One question central to either approach is what should be covered for everyone; that is, what is the "adequate benefit package" consistent with equity and justice?

B. Experience in Canada and Great Britain

Although the health care system of a country tends to mirror its cultural values and it must be acknowledged that the U.S. has uniquely individualistic values, some lessons should be transferable from England and Canada.

The Canadian system. There are many who point to Canada as a potential model for the U.S. This is partly because in 1971 both Canada and the U.S. spent approximately 7.5% of their respective gross national products on health care. Since then the Canadian percentage has stabilized (8.6% in 1987), whereas the U.S. percentage has continued to rise (11% in 1987). At the same time, the U.S. has large numbers of uninsured and Canada has universal coverage. In Canada the federal government makes a per capita payment to each province, which in turn administers a universal health insurance system. Cost control in Canada has been attained in part by limiting insurance overhead (in 1985 Americans spent \$95 per capita on processing claims, Canadians \$21), central approval of annual operating budgets of all hospitals by the Ministry of Health in each province and a negotiated payment of physicians on a fee for service basis. However, placing budgetary authority in the provincial ministry has made the budgeting decision one that is subject to intense political debate. Additional problems with the system include long waiting lists for elective or semielective catheterization procedures and surgery (5).

The British system. Although the Canadian system might require more government involvement than most Americans would like, the British system is more extreme. The British have a fully socialized model under which the government owns the hospitals and physicians are government employ-

ees rather than private contractors (6). This system, adopted in 1948, is based on central (broken down by regions) instead of provincial budgeting and provides universal coverage for 57 million citizens for approximately 6% of the gross national product, or approximately \$750 per capita (less than one third of the U.S. costs).

There is a perception that the system works in Great Britain because people restrain themselves and their expectations for the good of everyone. However, in recent years an increasing percentage (now about 10%) of the British population has sought private health care, a burgeoning industry in the United Kingdom, in order to avoid the implicit and explicit rationing of the National Health Service. Thus, both in Canada and Great Britain, there may be increasing evidence of dissatisfaction with the limitations of government-financed health care systems (7).

The American approach. Over the past two decades we have developed a remarkably rich and heterogeneous health care industry, providing an endless variety of services to a public that seems to have an insatiable appetite for them. However, our capacity and technology have outstripped our ability to pay for all that is possible and wanted. The clamor for more financial resources devoted to health care will inevitably continue—by health care providers, by health care recipients, by the hospital community and by manufacturers of pharmaceutical products, medical devices and equipment. Although many argue that even more dollars funneled into health care are necessary to meet the needs, others counter that the problem is not the amount of money we spend, but how we spend it. Regardless, the national debate will intensify over the coming decade and a likely result will be more regulation of medical practice and health care delivery; those who pay the bill for care will demand more say in how these monies are spent.

In this setting the members of the 21st Bethesda Conference acknowledged that there is a limitation at present in the distribution of financial resources available to fund *optimal* care for all cardiovascular patients. On the other hand, all members of the Conference agreed that the ACC should support universal access to *appropriate* cardiovascular care as an ultimate goal. Furthermore, they urged all cardiovascular care specialists to work locally, regionally and nationally to help develop more effective approaches to providing universal access to appropriate cardiovascular care.

III. Provision of End-Stage Care, Particularly in the Elderly

A. Who Should Decide and the Need for Data

Decisions regarding provision of end-stage care present a dilemma for the individual physician as well as for society in general. There is an extraordinary array of possible services for such patients, but the cost-effectiveness of many management strategies is not clear. Existing data document the

large consumption of health resources at the end of life. Berk et al. (8) demonstrated that 1% of the population consumed 29% of health care dollars in 1980 and that 43% of the high consumption group were over age 65. Data from 1978 (9) showed that 6% of Medicare enrollees who died accounted for 28% of all expenditures and that 30% was spent in the last 30 days of life.

These data must be put in the context of the known aging of our society. In 1990 the total U.S. population will reach >250 million, with approximately 31 million people older than 65 years and almost 3.5 million older than 85 years, representing 13% and 1.4%, respectively, of the entire U.S. population (10). Projections into the next century reveal that an increasing proportion of our population will be elderly or very elderly, with the obvious implications for increasing health care demands. An important corollary is the proportionate decline in the productive wage-earning labor force. These known demographic trends carry obvious and not so obvious implications for balancing increasing health care demands against limited resources.

Apart from the large expenditures in caring for the elderly there is the challenge of deciding how much to do for the hopelessly ill. This is as much a concern of the pediatric cardiologist as it is for the adult cardiovascular specialist. Is it fair to spend large amounts on the hopelessly ill while many in our society fail to receive basic care? Should the money spent on the hopelessly ill be redistributed to programs that may benefit a larger segment of the population? These questions must be discussed from the point of view of the individual physician caring for an individual patient and also from the viewpoint of society in general. The discussion must focus on who in fact will decide the allocation of expensive health care resources. Can we rely on the individual physician to make such judgments? Should these decisions be made by those who pay for health care or by society itself?

Ideally the decision should be based on reliable data available to the individual patient, physician and society in general, documenting the benefit and costs that may be expected from specific diagnostic and therapeutic maneuvers in a given clinical setting. At present third party payers are imposing restrictions on certain types of care without appropriate documentation of efficacy or nonefficacy. The profession and the government should provide strong support for additional well designed clinical trials and sound observational studies to help guide all of us in the best utilization of health care resources.

B. Cost of Technology in End-Stage Care

There is no doubt that medical technology has contributed importantly to many medical advances. However, the medical profession has become heavily dependent on such technology and sometimes uses expensive techniques when

simpler approaches would suffice. In the cardiovascular field, noninvasive testing of all types consumes large amounts of resources even in patients who are not terminally ill. It seems legitimate, for example, to question the value of performing Doppler echocardiographic study to document the severity of a gradient in an asymptomatic 88 year old with clinical findings of calcific aortic valve disease.

Use of life-sustaining techniques in the elderly has been the subject of considerable discussion, and the report of an Advisory Panel for the Office of Technology Assessment (10) provides a detailed review of this topic. The amount of care provided to patients with terminal illness must be based on expectations of the intervention, the patient's perception and values regarding the benefits from such an effort, quality of life and the willingness of society to pay for the care.

C. Patient's Wishes and Physician Liability

Many terminally ill patients do not want intensive care but did not inform their physicians of their wishes and are no longer competent to do so. Part of the routine care of the patient with potentially end-stage disease should be a meaningful discussion of the patient's preferences regarding terminal care, including admission to a coronary care unit, cardiopulmonary resuscitation and other life support methods. These discussions should include consideration of living wills, durable power of attorney for health care decisions and, with the patient's consent, sharing the patient's wishes with family members. It is likely that such discussions will result in a substantial reduction of unwanted terminal care. Cost savings are not the primary reason for such discussions, but the crisis in health care financing provides another reason for ensuring that patients do not receive care that is both expensive and unwanted.

Many physicians have an exaggerated view of the risk of liability for withholding or withdrawing life support from patients. To our knowledge, no physician in the U.S. has ever been found civilly or criminally liable for withholding or withdrawing such support whether the patient was competent or incompetent. Decisions should be based on patient and family preferences, not on an unrealistic fear of legal liability.

In summary, the individual physician must approach the individual patient openly regarding expectations of outcomes from diagnostic and therapeutic strategies. Use of high cost diagnostic techniques should be avoided unless such information will substantively influence the management of that patient. The decision to intervene in a desperately ill patient's end-stage disease must be based not only on clinical judgment, but also whenever possible on reliable, scientifically valid data regarding outcome in that specific clinical setting. Such decisions should ideally be based on full discussion with the patient and family before the terminal event, including use of living wills and durable power of

attorney to ensure compliance with patient directions. All patients must be provided with basic care to relieve suffering and preserve personal dignity at the end of life.

IV. Appropriate Cardiovascular Care and the Cost of Modern Technology

We are probably just at the beginning of the application of modern technology to the biologic sciences. The increasing use of new techniques undoubtedly will continue to escalate the cost of cardiovascular care, and the problem of funding and equitable distribution will be further accentuated (11). Considerations of any new cardiovascular technique include questions of efficacy and safety as well as cost and benefit. These considerations are linked to the possibility of providing an appropriate cardiovascular services package for everyone. A recent report from a Presidential Commission on health care (12) focused on the problem of providing medical care for all members of our society:

Equitable access to health care requires that all citizens be able to secure an adequate level of care without excessive burdens. Decisions of a right to health care have frequently been premised on offering patients access to all beneficial care, to all care that others are receiving or to all that they need—or want. By creating impossible demands on society's resources for health care such formulations have risked negating the entire notion of a moral obligation to secure care for those who lack it. In their place the commission proposes a standard of "an adequate level of care" which should be thought of as a floor below which no one ought to fall not a ceiling above which no one may rise.

The history of the development and application of new techniques is likely to forecast the future. Inventive minds will continue to provide theoretic and prototypic models that, if unfunded by public sources, will eventually find support from sources seeking an investment for future gain and that, if perceived to be useful, will be employed.

A. Effectiveness and Cost of Medical Technology

The assessment that medical technology is effective has generally depended on acceptance by practicing physicians who judge whether or not a technique facilitates patient care. Critical care monitoring and technically based interventions—and their current enormous costs—have come into being in this fashion. Cost to society has not been a determinant of implementation. Even in the current questioning atmosphere of cost assessment, there is no responsible opinion advocating a lessening of the intensity of care for critical illness, although much consideration is given to the question of who should receive it.

Assessment of the future impact of technology has not been remarkably successful in the past. Estimates for the potential use of cardiac pacemakers fell well below their use in current practice. Estimates for the potential use and costs of heart replacement devices have varied by more than 100%. In the development of xerography, two groups sponsored studies on the potential business use of xerographic copying. Both studies indicated that in comparison with the \$15,000 cost of the machine the potential use was too small to warrant investment in development. Both studies based their estimates on the number of carbon copies that went out of offices. Both failed to predict the copying of materials coming into offices and interoffice communication by copies, the major uses once the technology found its way into business. Just as in medical care, this technique became commonplace because of its convenience and perceived but unmeasured cost-effectiveness.

Organ transplantation. This procedure deserves special comment because it was what made rationing of care a public issue in the United States. This was not because the costs were high but because the number of transplant procedures performed was limited by donor availability. Because the demand for transplants will *always* outstrip the supply (13), it has been necessary to determine eligibility as well as who in the eligible pool should get the next available organ.

Experience using social worth criteria (as in the Seattle kidney dialysis selection experience) has proved arbitrary and untenable, as it has become clear that committees composed of white, middle-class citizens apply their own class and racial biases to patient selection. It has also been seen as unjust to base decisions solely on ability to pay. This leaves two major alternatives: letting physicians make the choice or using some random device, such as a lottery, to make the choice. Physician choices tend to have the same biases exposed by the Seattle committee. The publically appointed groups that have debated this issue, most notably the Massachusetts Task Force on Organ Transplantation, have opted for allocation in a two-step process. In step one, an initial screen is used in which only those who are likely to survive "for a significant period of time with reasonable prospects for rehabilitation" are selected. Obviously there is much work to be done in developing more specific criteria for "significant period of time with reasonable prospects for rehabilitation." In step two, members of the resulting pool of potential recipients are chosen for transplant based on a first-come, first-served model, taking into account patient acuity, organ size and tissue match (14).

Role of the individual physician in research and assessment of utilization of procedures and facilities. A serious challenge has been raised for some researchers regarding the indications for appropriate use and the actual appropriateness of some medical and surgical cardiovascular procedures (15,16). Because some third party payers have begun to

adopt these research-based indications as a basis for claims processing, these developments deserve careful attention. Because there are inadequate data to support or refute this approach, the Conference recommends that the ACC support efforts to determine whether overuse of cardiovascular procedures and facilities exists. In addition, because of the prevalence of cardiovascular diseases and the high cost of some diagnostic and therapeutic procedures, each cardiovascular specialist should continue to examine the appropriateness of the utilization of cardiovascular resources and intensive care units relative to meeting the needs of each individual patient. Each specialist should strive to use the smallest number of tests and procedures necessary to provide *appropriate* cardiovascular care. Current guidelines developed jointly by the ACC and the American Heart Association are already available regarding appropriate use of many cardiovascular procedures, and these guidelines should be widely disseminated, used in decision making and regularly updated.

Indeed, the ACC should encourage its members to play an active role in appropriate medical effectiveness or outcome research. Cardiovascular specialists should be encouraged to have their patients included in such research efforts, since ultimately this may favor cost-effectiveness.

B. Welfare of the Individual Patient and Welfare of Society

The medical profession is driven by an "utmost respect for human life." Public health and welfare are generally not a consideration or at best their consideration is secondary to the consideration of the welfare of an individual patient. In a nontechnologic context, Paul Ramsey (17) defended this attitude on an ethical basis. He posed the question as to whether societal concerns should influence decisions of treatment of an individual patient. In the presence of a perceived advantage to a patient, a physician is inclined or even ethically obliged to employ measures that might be advantageous. Bulger (18) reiterates the question: "How can the physician be the patient's friend and trusted advocate while being a potential rationer at the same time?"

Nevertheless, the lack of health insurance for 37 million of our fellow citizens is unjust, and this inequity is no longer socially or ethically tolerable. A way must be found to provide an adequate level of care for all Americans (12). Charity care is uneven and unreliable; only an entitlement program plus expansion of private insurance can meet society's obligations. It is time that serious work be directed to developing guidelines that could be used to shape an adequate care program. The following principles should be emphasized.

1. Providing adequate care for all should not exclude private insurance. It should be made explicitly clear, as the President's Commission recommended, that the "adequate level of care" should be a floor, not a ceiling. Individuals

with private insurance and other financial resources should be permitted to purchase additional health care. Although this will somewhat undercut equity, outlawing private insurance would be too radical a departure from the traditional American values of autonomy and individualism, and it is not necessary for meeting the goals of providing basic health care to all.

2. Open discussion is necessary. The process by which an adequate benefit package is developed should occur in public, with adequate opportunities for public input during the process. In this regard, Oregon is carrying out an experiment that has raised much discussion. The physician-president of the state senate has further proposed that a panel be appointed by the governor to prioritize medical procedures and interventions. Only those interventions with high priority ratings would ultimately be funded by the state's Medicaid plan, which would be extended to cover all of Oregon's uninsured persons (currently 400,000). The Oregon proposal to prioritize medical interventions on the basis of benefit and cost-effectiveness is sensible planning. If limits are to be imposed, it is rational to impose them most heavily on the least beneficial and least cost-effective interventions in medicine. But the plan is vulnerable to the charge of unfairness, because it rations care only to the poor.

3. Physicians need to actively educate patients. Physicians should take an active part in educating the public about the limits of medicine and in prioritizing medical procedures, both because of their own special expertise and because ultimately it is physicians who will have to explain to their patients why very low priority procedures are not available to those without private funds. Recently a bone marrow transplant for a child in Oregon was not funded by Medicaid in a widely publicized application of this form of rationing. Society will have to decide if such rationing is morally and ethically acceptable.

4. Greater participation in randomized clinical trials is necessary. A greater emphasis should be placed on randomized clinical trials before procedures are admitted to any "adequate benefit package," and physicians should take part in such studies and encourage their patients to participate as well. There mere perception that something works is an inadequate basis to justify the routine use of any medical procedure that carries with it either cost or risk to the patient. All physicians should support studies to determine the relative effectiveness, cost and safety of medical procedures (19), and physicians should use this information in their practice.

One of the most important characteristics of a democratic society is public involvement with major decisions affecting the lives and health of the citizenry. Making adequate medical care available to all will require the definition of *adequate* and the restriction of this package to something less than "everything modern medicine has to offer." Such decisions are too important to be left to physicians alone; public financing and society's wishes demand public ac-

countability of the decision makers. We believe such decisions must be based on adequate information, with solid physician input, but that they should be arrived at in public forums by individuals who are publicly accountable for their decisions.

Currently insufficient data are available to define an adequate cardiovascular package for all Americans. Defining this package will be a long and arduous task and the definition will need to be continually updated as new methods of treatment prove effective and, it is hoped, more cost-effective. The ACC should encourage its members to play an active role in appropriate assessment of medical effectiveness or outcome research. Physicians should ask their patients to be involved in such research efforts. The ACC should be directly involved with both development of guidelines and implementation of an appropriate cardiovascular care package for all Americans.

General Perspectives on Allocation of Limited Resources

1. The ethical allocation of health care resources requires the understanding of the relation among the physician, patient and society.
2. The College acknowledges that there is a limitation to the resources available for the care of the cardiovascular patient and therefore:
 - a. The cardiovascular specialist should examine the appropriateness of the use of facilities and procedures in meeting the specific needs of the patient.
 - b. The cardiovascular specialist should use the smallest number of procedures necessary for appropriate cardiovascular care.
 - c. The cardiovascular specialist should work locally to provide optimal utilization of existing resources. Current American College of Cardiology and American Heart Association guidelines are already available regarding appropriate use of many cardiovascular procedures and these guidelines should be widely disseminated, incorporated into decision making and regularly updated.
 - d. The College should encourage its members to play an active role in carefully designed medical effectiveness or outcome research. Physicians should be encouraged to have their patients included in such research efforts.
3. The College should be directly involved in the development of guidelines for appropriate cardiovascular care for all patients.
4. The College supports universal access to appropriate cardiovascular care.
5. The cardiovascular specialist should work locally, regionally and nationally to help develop universal access to appropriate cardiovascular care.

Recommendations

- The College should devise and support efforts to determine the appropriate use of existing and emerging technology, procedures, facilities and other resources.
- The College should undertake a major national meeting on the subject of the allocation of limited resources in our society.

References

1. Department of Health and Human Services, Health Care Financing Administration. National Health Expenditures, 1986-2000. Health Care Financing Review 1987;8:1-36.
2. Schieber GJ, Poullier JP. International health spending and utilization trends. Health Affairs 1988;7:105-12.
3. A special report of the Robert Wood Johnson Foundation. Access to Health Care in U.S.: Result of 1986 Survey. Princeton NJ: Robert Wood Johnson Foundation, 1986.
4. Himmelstein D, Woolhandler S, et al. A national health program for the United States. N Engl J Med 1989;320:102-8.
5. Evans R, Lomas J, Barar M, et al. Controlling health expenditures—the Canadian reality. N Engl J Med 1989;320:571-7.
6. Arron HJ, Schwartz WB. The Painful Prescription. Washington DC: Brookings, 1984.
7. Wigle ED. Convocation lecture: the rationing and rationalization of cardiac care—American or Canadian style? J Am Coll Cardiol 1988;12:572-6.
8. Berk ML, Monheit AC, Hagan MM. How the U.S. spent its health care dollar: 1929-1989. Health Affairs 1988;7:46-60.
9. Riley G, Lubitz J, Pihoda R, Stevenson MA. Changes in distribution of Medicare expenditures among aged enrollees, 1969-82. Health Care Financing Review 1986;7:53-62.
10. Life-Sustaining Technologies and the Elderly. U.S. Office of Technology Assessment, July 1987.
11. Davis K. The role of technology demand and labor markets in the determination of hospital costs. In: Perlman M, ed. The Economics of Health and Medical Care. New York: John Wiley, 1974.
12. President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research. Securing Access to Health Care: The Ethical Implications of Differences in the Availability of Health Services. Volume 1. Report. Washington, DC: US Government Printing Office, March 1983.
13. Annas GJ. The paradoxes of organ transplantation. Am J Public Health 1988;78:621-2.
14. Massachusetts Task Force on Organ Transplantation. Report of the Massachusetts Task Force on Organ Transplantation. Boston: Massachusetts Department of Public Health, 1984.
15. Chassin MR, Kosecoff J, Solomon DH, Brook RH. How coronary angiography is used. JAMA 1987;258:2543-7.
16. Kosecoff J, Chassin MR, Fink A, et al. Obtaining clinical data on the appropriateness of medical care in community practice. JAMA 1987;258:2538-42.
17. Ramsey P. The ethics of a cottage industry in an age of community and research medicine. N Engl J Med 1971;284:700-6.
18. Bulger RJ. Technology, Bureaucracy and Healing in America: A Post-modern Paradigm. Ames, IA: University of Iowa Press, 1988.
19. Roper WL, Wikenwerder W, Hackbarth GM, Krakauer H. Effectiveness in health care. N Engl J Med 1988;319:1197-202.