

## Related Brookings Resources

- *Can We Say No? The Challenge of Rationing Health Care*  
Henry J. Aaron and William B. Schwartz, with Melissa Cox (2005)
- "Putting the Lid on Health Care Costs: An Industry Perspective"  
A Brookings Health Policy Forum (October 2005)
- "Managing Conflict at the End of Life"  
M. Gregg Bloche, *New England Journal of Medicine* (June 2005)
- *Coping with Methuselah: The Impact of Molecular Biology on Medicine and Society*  
Henry J. Aaron and William B. Schwartz, eds. (2004)
- "The Insurance Industry in America"  
*Conference Report* by Richard J. Herring and Robert E. Litan (March 2004)
- "A Funny Thing Happened on the Way to Managed Competition"  
Henry J. Aaron, *Journal of Health Politics, Policy and Law* (February 2002)

To receive a weekly e-mail about Brookings news, events, and publications, sign up for the **Brookings Alert** at [www.brookings.edu](http://www.brookings.edu).



1775 Massachusetts Ave. N.W.  
Washington, DC 20036

## Treatment of Coronary Artery Disease: What Does Rationing Do?

HENRY J. AARON

Providing all beneficial care to those who need it is rapidly becoming unaffordable, even for a nation as rich as the United States. The highly decentralized U.S. payment system is unique in its lack of effective levers for limiting health care spending, and managed care has largely been ineffective. A different solution, considered extreme by many in the United States, is rationing.

The need to ration healthcare has long been a reality in the United Kingdom where healthcare spending must be covered by an annual budget accounting for only 7.6 percent of GDP—about half the U.S. share. These decisions are perhaps most difficult in regards to treatment of conditions that are literally matters of life or death, such as coronary artery disease.

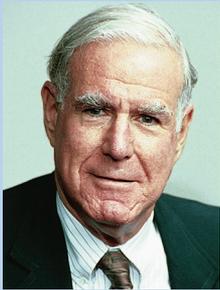
This brief examines reasons for the differences in treatment and outcomes in the United States and Britain, and discusses the difficulty of rationing care in the United States, where a unique payment system now uses income from those with health insurance to cover the medical costs of the uninsured.



A major national debate in the United States about health care rationing is inescapable. The debate will be driven principally by rapidly rising per capita health care spending resulting

primarily from advancing technology and population aging. To make highly beneficial and cost effective care available to all who stand to benefit from it, it will be necessary to curb

All Policy Briefs are available on the Brookings website at [www.brookings.edu](http://www.brookings.edu).



Henry J. Aaron is a Senior Fellow at the Brookings Institution.

spending on high-cost, low-benefit care. But achieving such economies is fraught with analytically difficult and emotionally wrenching choices. In a previous policy brief, I explained how the British have dealt with such choices in the case of diagnostic radiology and why their decisions provide us a window on the problems we will confront. This policy brief will extend that comparison to treatment of heart disease. It will conclude by explaining why the elimination of low-benefit high-cost care will require the extension of health insurance coverage to nearly all Americans.

### HEART DISEASE: THE NUMBER-ONE KILLER

Coronary artery disease causes more deaths in both the United States and Great Britain than does any other illness. The most common surgical treatments for heart disease—coronary bypass grafts and angioplasty—are performed more than four times as often in the United States than in Great Britain. Physicians on both sides of the Atlantic regard this difference as not medically justified. Mortality from heart disease, once higher in the United States, is now lower than in Great Britain. In addition, British patients may live with more pain and limitations from coronary disease than do U.S. patients. Although British patients are reportedly more stoic and less demanding than their U.S. counterparts, biology has not identified a gene coding for stiff upper lips. Stoical attitudes emerge in part to cope with inescapable medical constraints imposed by fiscal reality. If excessively rapid growth of health care spending

forces the United States to curtail outlays, limits will emerge here similar to those found elsewhere.

### THE TREATMENTS

In the most common form of heart disease, arteries that supply blood to the heart become partially or completely blocked. Partial blockage may result in chest pain. Complete blockage results in death of the part of the heart denied oxygen unless the blockage is quickly cleared. Until the late twentieth century, physicians could do little to prevent the disease or treat the results. Gradually, a diverse menu of treatments became available. Dozens of new drugs can improve function in the failing heart, reduce or even reverse the buildup of plaque and the likelihood of clots that will cause heart attacks, and prevent or reduce permanent damage when heart attacks strike.

Two surgical interventions—coronary artery bypass surgery (CABG) and percutaneous transluminal coronary angioplasty (“angioplasty” for short)—have come into common use. In 2002, approximately 1.2 million patients in the United States and 82,000 in the United Kingdom underwent one of these two procedures. Either angioplasty or coronary artery surgery is clearly indicated in patients with disabling chest pain that is unresponsive to drugs and behavioral changes. These interventions also help patients with “silent” ischemia, a shortage of blood flow to the heart that causes no pain but can interfere with the heart’s pumping, causing fainting or death. Hard evidence that these procedures

extend life expectancy is available only for certain sorts of blockages.

CABG is the preferred therapy for patients with blockages that angioplasty cannot open (such as branching-points in coronary arteries), with very extensive coronary disease, or who suffer heart attacks during angioplasty. Coronary artery surgery initially was extremely invasive and very risky. Mortality rates from surgery now average 2.4 percent but are as low as 0.5 percent if the procedure is performed by an experienced surgeon in a facility that does such procedures often.

Angioplasty was first performed in 1977 in San Francisco. A catheter with a small balloon just behind the tip is typically inserted through a small incision, usually in the groin and threaded upward into the narrowed coronary artery. At that point, the balloon is inflated, thereby enlarging the arterial opening, and when the procedure is successful, increasing blood flow through the previously partly blocked artery, relieving pain and improving heart function. Angioplasty is performed about twice as often as bypass surgery in the United States because it usually avoids the surgical trauma associated with CABG and recovery is quick. Most angioplasty procedures now include the use of stents—metal mesh cylinders that can be expanded by using a balloon to sustain an opening in an artery.

Many early angioplasties provided only temporary relief because blockages soon reappeared in recently opened

arteries. To prevent such “restenosis,” physicians began to insert stents after the arterial passage was widened. These stents are expanded against the arterial wall with the balloon and are left in place when the balloon is removed. Because the stents became sites for scar tissue, new deposits, or blood clots and blockages, they are now usually coated with drugs that dissolve gradually and retard tissue buildup. In the United States, nearly all stents are now coated with anticlotting drugs to discourage future plaque buildups. Such “drug-eluting” stents reduce by 60 to 70 percent the probability of blockage in the year after the procedure. Use of these advanced stents in Britain was delayed, ostensibly because of a lack of evidence on efficacy, but more likely because of cost.

#### COST

Both CABG and angioplasty are costly. In the United States in 2002, CABGs cost an estimated \$60,853 per patient and angioplasties cost \$28,558 (including costs for the procedures and physicians’ charges). In 2002, 515,000 CABGs and 1.2 million angioplasties were performed. As a result, total outlays for these procedures were very large—nearly \$65.7 billion or about 4 percent of total health care spending, and about 7 percent of U.S. spending on direct patient care, four times the share in 1982.

Though staggeringly large in 2002, outlays are almost certainly higher now and headed up—probably way up—for three reasons. The first is increased use of drug-eluting stents. Second, research

*“The gap in treatment rates and expenditure between the United States and the United Kingdom has been huge for more than two decades.”*



*“The British classify as high risk a patient judged to have a 30 percent likelihood of experiencing a serious cardiac event in the next ten years. The U.S. standard for treatment is a 20 percent risk and extends indications for treatment to include a family history of heart disease, a criterion not mentioned in British guidelines.”*

has shown that angioplasty generally improves outcomes for victims of heart attacks and is expected to be used with increasing frequency. Third, the leading edge of the baby boom generation has reached the age when the incidence of heart attacks is high. As more individuals age into these disease-prone years, a growing population—multiplied by an increased rate of treatment within that population and compounded by increasingly costly treatment methods—portends very rapid cost increases.

#### TREATMENT RATES

The gap in treatment rates and expenditure between the United States and the United Kingdom has been huge for more than two decades. In the late 1970s, the annual CABG surgery rate was 490 per million in the United States (1979) and 55 per million in the United Kingdom (1977). The CABG rate in the United States was about three times the angioplasty rate. The United Kingdom did not report data on angioplasties, presumably because so few were performed that it was not worth counting them. At that time, the U.S. revascularization rate was at least ten times that in the U.K.

The incidence of both procedures has grown enormously. By 2002, the combined CABG and angioplasty rate in the United States had increased more than twelve-fold to an annual rate of 5,967 per million. In the United Kingdom the combined angioplasty/CABG rate reached 1,380 per million. The relative gap narrowed, even as the absolute gap widened.

Qualitative, as well as quantitative, differences are striking. In 1996, 11

percent of U.S. patients received angioplasty within one day of a heart attack. Two years later, by which time the rate had doubtless risen in the United States, the proportion of patients similarly treated in Scotland was only 4 percent. The British speedily adopted bare metal stents as standard in angioplasties—nearly 90 percent of angioplasties performed in 2001 in the United Kingdom used stents. On the other hand, the British have shunned the newer drug-coated stents, while their use has become routine in the United States. Taken together, treatment advances have improved patients’ outcomes so much that the quality-adjusted price of treatment for heart disease has fallen.

#### MORTALITY FROM HEART DISEASE

Mortality from heart disease has dropped strikingly over the last generation in the United States, the United Kingdom, and most other nations. The pace and timing of improvement in the United States and Britain have differed, however. In 1968 the age-adjusted mortality rate from heart disease was 25 percent lower in the United Kingdom than in the United States. By 2000 the U.K. rate was 7 percent higher.

In the mid-twentieth century, U.S. mortality from coronary disease was among the highest in the world. From 1968 to 2000, age adjusted mortality from heart disease fell just under 70 percent in the United States, first because of faster emergency response times and improved cardiac techniques, then because of the growing use of diuretics and the introduction of beta-

blockers to control hypertension, and later because of CABG and angioplasty.

For reasons that are unclear, mortality from coronary disease increased in Great Britain between 1968 and 1978. Perhaps the delayed effects of wartime privations, an unhealthful diet, or smoking, were at work. Coronary mortality fell sharply in the United States over this period. Starting in the late 1980s, however, British coronary mortality rates fell faster than did those in the United States, despite the far higher U.S. use of advanced medical therapies.

### THE ROLE OF TREATMENT

Estimates indicate that medical interventions accounted for much of the decline in coronary disease mortality in the United States between 1975 and 1995. These interventions included low-tech approaches, such as prescribing aspirin at the onset of or soon after a heart attack, and newer clot-busting drugs. They also included highly sophisticated surgical procedures. In addition, environmental conditions and diet improved. Tobacco consumption began to decline. Routine screening for hypertension, an important risk factor for both heart disease and stroke, became common in the United States. So did widespread use of various drugs to control hypertension. Similar routine screening was, and remains, uncommon in Great Britain. As one British cardiologist put it: “By and large, people in this country would not, if they were perfectly fit and well, go and have things like their cholesterol done.... We don’t have annual physicals in this country, or

biennially or however frequently it’s done.... You go to the doctor when you’re ill.” U.S. cardiologists set a stricter standard than do their British counterparts for distinguishing between high- and low-risk patients. The British classify as high risk a patient judged to have a 30 percent likelihood of experiencing a serious cardiac event in the next ten years. The U.S. standard for treatment is a 20 percent risk and extends indications for treatment to include a family history of heart disease, a criterion not mentioned in British guidelines.

Four possible explanations might account for the very large difference in treatment rates between the United States and the United Kingdom.

First, U.S. patients might be sicker, ignoring the effects of treatment, than are British patients. Differences in levels or trends of mortality rates cannot resolve how much differences in treatment contributed to the fall in coronary mortality. The relative frequency of coronary disease in the two countries, detected and undetected, is, by definition, unknown. What is clear is that, once detected, coronary disease has been and is treated far more aggressively in the United States than in Great Britain.

Second, by common perception, resource limits and differences in attitudes toward medical care interact. The British spend less on health care in part because, on the average, physicians believe that conservative medicine is the best medicine and in part because patients in Britain are less demanding than those in the United States. These attitudes have clearly been conditioned by, and are a way of

*“There are 53 percent more cardiologists in New Jersey, which has about one-sixth of the United Kingdom’s population, than in all of the United Kingdom.”*



accommodating to, decades of tight budgets that flatly exclude approaches to medical care that U.S. patients and physicians alike take for granted.

British medical journals have long recognized that more coronary artery surgery and angioplasty should be done in Britain and that, as one cardiologist put it, “more CABG surgery would be carried out if the capacity for it increased significantly.” But another cardiologist noted that even “in...areas [where] there is in practice no limitation on resources...the rate of CABG surgery is lower than in the U.S.” Still another commented that “in this country...we have a tradition in the health service that you don’t offer the treatment until it’s absolutely necessary.”

That patients acquiesce in such parsimonious treatment surprises even British physicians. According to a South Yorkshire general practitioner, commenting in 1995 with apparent admiration, “People from round here cope. They don’t make a fuss. They have depth of character.” And a colleague added, “Patients will be getting angina on a daily basis and they brush it off. It’s almost par for the course. I’m astonished at the laid-backness about this.”

A third factor contributing to differences in British and United States treatment rates may be resource availability. A British cardiologist who was fully aware of research documenting the benefits of angioplasty after heart attacks explained, “I’ve got a waiting list for angioplasty for six months from my elective work.... We would like to go to acute infarct angioplasty [routine angio-

plasty after heart attacks], but...there are very few centers in the United Kingdom doing that.” A British cardiologist with clinical experience in both the United States and Great Britain reported:

Over here, simply because of the logistics and limited resources, many times the patient will be watched. If the pain doesn’t persist and there doesn’t seem to be any urgency, one will discharge the patient, do an exercise test, make sure that there are ECG [electrocardiogram] changes when the heart is stressed and bring the patient back later. And so, one is doing less of that procedure than one would be doing almost automatically in the USA.

Two cardiologists reported that coronary surgery is sometimes constrained by a lack of intensive care beds. There are 53 percent more cardiologists in New Jersey, which has about one-sixth of the United Kingdom’s population, than in all of the United Kingdom. Most British patients with angina are therefore treated by primary care physicians who are not trained to perform or prescribe angiograms and may not be fully versed in the latest research on management of coronary disease.

One U.S. physician who had practiced in a part of Great Britain where coronary mortality is particularly high described the consequences of inadequate resources:

What I saw happening I found very disturbing. If the waiting lists are long [for coronary surgery], you just sort of don’t do as many.

What I saw happening is that in Great Britain, where smoking is fairly prevalent, diet is not exactly low in fat or carbohydrates, there was a significant amount of vascular and coronary disease. You see people at a relatively young age, in their mid-fifties, productive, working, but developing angina to the extent that their angina was severe enough that they actually got studied. And often, we would find three-vessel coronary disease, and they would then be referred for a coronary bypass. But the individuals would be incapacitated by the angina. They would go on a waiting list. And on the waiting lists, about 20 percent of them died of coronaries before they got a bypass.

A final factor that may cause treatment differences is the way doctors are paid. Fee-for-service payment is typical in the United States. Most British specialists and the minority of U.S. surgeons employed by health maintenance organizations are salaried employees. Rates of surgery on patients enrolled in American HMOs are lower than overall surgery rates. Physicians paid on a fee-for-service basis have a stronger incentive to carry out surgery of all kinds than do physicians paid on salary. As one American cardiologist put it: “The entrepreneurial aspect of surgery in this country makes it imperative for surgeons to pursue the recruitment of patients aggressively. There is not only the major income motivation, but also the need to meet all sorts of state standards in terms of the number of cases done per year, solely to justify a

cardiac surgical unit’s existence (greater than 250 a year in many states).”

### WHAT DIFFERENCE DOES IT MAKE?

Evidence that advanced medical therapy has contributed to the decline in mortality from coronary disease is powerful. Nonetheless, the timing of introduction and rates of use of these therapies are poorly correlated with changes in mortality rates. A comparison of use of these procedures in the United States with those in Scotland, Finland, and Ontario, Canada, found that two to three times as much bypass surgery and three to five times as many angioplasties were performed in the United States as were done in these three places. U.S. mortality one year after an initial heart attack was lower than that in Scotland or Finland but indistinguishable from that in Ontario. This finding is consistent with the view that additional use of modern medical techniques could improve coronary mortality in Scotland. But it also supports the view of British physicians that although Britain uses advanced technology too little, the United States may be using it too much. It is also consistent with findings that U.S. physicians neglect low-cost interventions, such as prescribing aspirin and beta-blockers, which can strongly influence mortality after heart attacks. Coronary mortality rates fell faster in the United Kingdom than in the United States from 1988 to 2000, a period during which use of CABG and angioplasty in the United States grew rapidly. And it is also consistent with the widely held view that other factors including diet, smoking, exercise, and environmental



## Recent Policy Briefs

“Health Care Rationing:  
What it Means”  
Henry J. Aaron  
(December 2005)

“Why Federalism Matters”  
Pietro S. Nivola  
(October 2005)

“Moving Toward Smarter Aid”  
Lex Rieffel and James W. Fox  
(August 2005)

“Nigeria’s Paris Club  
Debt Problem”  
Lex Rieffel  
(August 2005)

---

*Brookings gratefully acknowledges the generosity of The Robert Wood Johnson Foundation, Changes in Health Care Financing and Organization (HCFO) Initiative for its support of this policy brief.*

---

**Editors**  
Jennifer Ambrosino  
Fred Dews

**Production/Layout**  
MillerCox Design

**Vice President for Communications**  
Melissa T. Skolfield

**The Brookings Office of Communications**  
(202) 797-6105  
[communications@brookings.edu](mailto:communications@brookings.edu)

The views expressed in this Policy Brief are those of the author and are not necessarily those of the trustees, officers, or other staff members of the Brookings Institution.

Copyright © 2005  
The Brookings Institution

---

pollution are also potent determinants of coronary disease.

Were the United States to limit growth of health care spending, it seems likely that U.S. physicians would curtail the use of many costly procedures, including coronary artery surgery and angioplasty. The pressure to do so could come from private insurers, businesses paying for health care, or government regulation, depending on the nature of controls. Ideally, care would be withheld in cases where the expected medical benefit was slight. But to impose such limits fairly and efficiently, they should be based on solid information about medical efficacy. Effective limits also require an administrative framework that controls the flow of resources to medical providers and creates incentives to use them in the most medically effective ways.

Finally, attempting to impose such limits when tens of millions of people

are uninsured would threaten gross inequity. The uninsured now receive large amounts of care for which they do not pay. That care is financed by extra charges imposed on the well-insured. If the well-insured were subject to spending limits, the possibility of siphoning off part of those restricted payments to cross-subsidize care for the uninsured would diminish or vanish. To curtail high-cost, low-benefit care for the well-insured without extending coverage to the currently uninsured would threaten denial of even the most basic services to a population that is disproportionately needy. Effective curbs on high-cost, low-benefit health care for the well-insured, however administered, would result in grossly increased discrepancies in the availability of health care. To avoid such an unfortunate outcome, therefore, requires essentially universal health insurance coverage. **B**

**Tell us what you think of this Policy Brief.  
E-mail your comments to [feedback@brookings.edu](mailto:feedback@brookings.edu).**

---

**The Brookings Institution**  
1775 Massachusetts Ave., NW  
Washington, DC 20036

|   |
|---|
| NONPROFIT ORG.<br>U.S. POSTAGE<br>PAID<br>FREDERICK, MD<br>PERMIT NO. 225 |
|---|