

# Cardiology Rounds

AS PRESENTED IN THE ROUNDS OF THE CARDIOVASCULAR DIVISION  
OF BRIGHAM AND WOMEN'S HOSPITAL, BOSTON, MASSACHUSETTS

## How do generalists and specialists compare in cardiovascular care?

JOHN Z. AYANIAN, MD, MPP

The quality and outcomes of care provided by primary care physicians and specialists are increasingly important issues for the health-care system of the United States. Financial and administrative constraints on patients' choice of physicians have become more common as insurers seek to contain the costs of health care. Primary care physicians have been designated by many managed care organizations to serve as "gatekeepers" for their patients, thereby overseeing access to specialists and other medical services. Alternately, some health-care organizations are implementing "disease management" protocols (also known as "carve-outs") whereby chronically ill patients are directed to specialists who coordinate their ongoing care. Through surveys and observational studies, health services researchers have begun to compare the care provided by primary care physicians and cardiologists for patients with cardiovascular disease and the outcomes associated with their care. Many of these studies have evaluated how randomized clinical trials, clinical guidelines, and other evidence-based approaches are applied in practice by primary care physicians and cardiologists. This report reviews what has been learned from these studies as well as the unanswered questions that remain to be addressed as physicians and health-care organizations strive to provide optimal cardiovascular care in the evolving U.S. health-care system.

### A framework for comparing primary and specialty care

To compare primary and specialty care requires an appreciation of the multiple factors that may explain and confound these comparisons. A physician's specialty is often viewed as a straightforward concept marked by the individual's clinical training, focus, and experience, but it can also reflect differing populations of patients, sites of care, and access to colleagues and technology (Figure 1). Comparisons of primary care physicians and specialists may mask important differences within each broad category, such as those between family practitioners and general internists or between invasive and non-invasive cardiologists. Although past studies have focused on discerning differences between primary care physicians and cardiologists, researchers and practitioners must also identify how collaboration can be enhanced between physicians in different specialties to draw on their respective strengths.

Studies comparing primary care physicians and cardiologists have focused on three main areas:

- knowledge and beliefs
- processes of care
- outcomes.

Knowledge and beliefs represent the physician's awareness of important advances in cardiovascular care for which objective data are available, such as the effectiveness of well-studied drugs or procedures, as well as more subjective clinical topics for which uncertainty persists. Processes of care reflect the decisions that physicians make and the resources they utilize in practice, including cognitive skills, tests, and treatments. Patients' outcomes, such as their survival and health-related quality of life, result from a complex interaction of patient characteristics (e.g. age, comorbid illness, socioeconomic factors and preferences), organizational factors (e.g. nurses and other staff, available technology, clin-



BRIGHAM AND  
WOMEN'S HOSPITAL

A Teaching Hospital of

HARVARD MEDICAL SCHOOL

### Cardiovascular Division (Clinical Staff)

Elliott Antman, MD  
Joshua Beckman, MD  
Charles M. Blatt, MD  
Eugene Braunwald, MD  
Christopher Cannon, MD  
Michael Chin, MD  
Mark Creager, MD  
James de Lemos, MD  
Victor Dzau, MD  
Elazer Edelman, MD, PhD  
Kristin Ellison, MD  
James Fang, MD  
Peter Friedman, MD, PhD  
Jonas Galper, MD, PhD  
Peter Ganz, MD  
J. Michael Gaziano, MD  
Marie Gerhard-Hermen, MD  
Samuel Z. Goldhaber, MD  
Thomas B. Graboys, MD  
Robert Giugliano, MD  
Howard Hartley, MD  
John Jarcho, MD  
Paula Johnson, MD  
Wendy Johnson, MD  
Ralph Kelly, MD  
James Kirshenbaum, MD  
Gideon Koren, MD  
Michael J. Landzberg, MD  
Arthur M. Lee, MD  
Dara Lee, MD  
Richard Lee, MD  
Jeffrey M. Leiden, MD  
James Liao, MD  
Peter Libby, MD (Division Chief)  
Leonard Lilly, MD  
Bernard Lown, MD  
Thomas Michel, MD  
Gilbert Mudge, MD  
Patrick O'Gara, MD  
Oglesby Paul, MD  
Marc A. Pfeffer, MD, PhD (Editor)  
Robert Piana, MD  
Jorge Plutzky, MD  
Jeffrey Popma, MD  
Shmuel Ravid, MD  
Sharon Reimold, MD  
Paul Ridker, MD  
Campbell Rogers, MD  
Maria Ruppnick, MD  
Arthur Sasahara, MD  
Jay Schneider, MD  
Christine Seidman, MD  
Andrew Selwyn, MD  
Nicholas Sibinga, MD  
Daniel Simon, MD  
Laurence Sloss, MD  
Scott Solomon, MD  
Lynne Stevenson, MD  
William Stevenson, MD  
Peter Stone, MD  
Michael Sweeney, MD  
Nancy Sweitzer, MD, PhD  
Frederick Welt, MD

### Brigham and Women's Hospital

75 Francis Street  
Boston, Massachusetts 02115  
Fax: (617) 732-5291

Cardiovascular Division Website: [www.heartdoc.org](http://www.heartdoc.org)

The editorial content of *Cardiology Rounds* is determined solely by the Cardiovascular Division of Brigham and Women's Hospital. This publication is made possible by an educational grant.

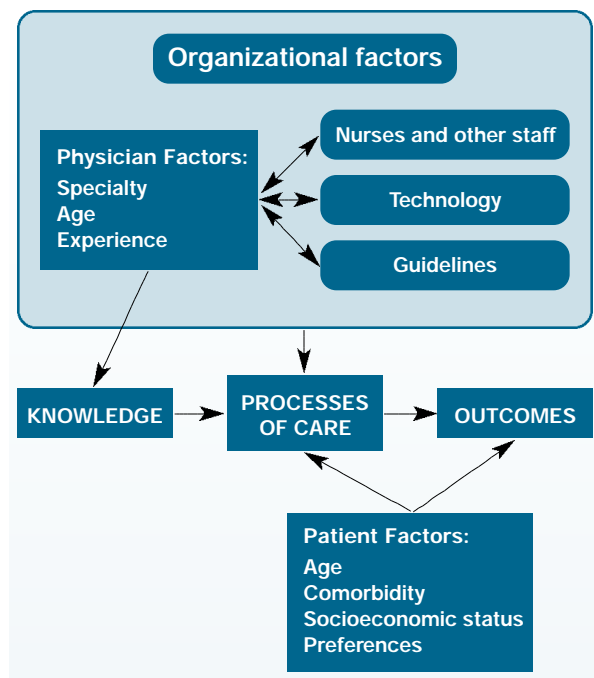
**Figure 1: Clinical and organizational factors associated with a physician's specialty.**



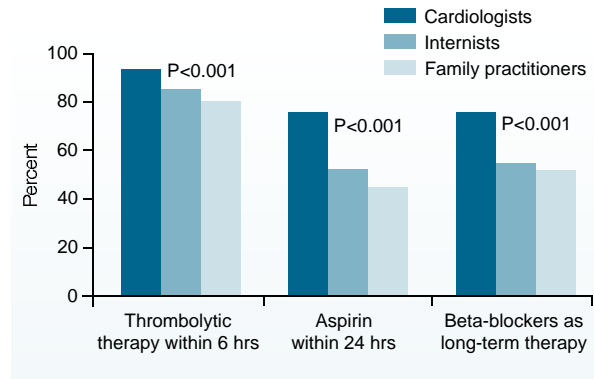
ical guidelines and protocols), and physicians' characteristics (e.g. specialty, age, experience, decision-making and technical skills, interpersonal qualities, and luck!). (Figure 2).

In studies of acute myocardial infarction (AMI), patients treated by cardiologists have been younger and less chronically ill, sought care more promptly, and been treated more often in hospitals offering coronary angioplasty and bypass surgery than patients treated by primary care physicians.<sup>1-3</sup> Such differences are described as "selection effects" or "selection biases" in health-care research. For example, cardiologists' patients may prefer more aggressive treatment, comply better with recommended treatments, and have greater social support and socioeconomic resources – all of which would be associated with better outcomes independent of the type of physician providing care. Unless such selection effects are considered in statistical analyses, their influence on treatments and outcomes may be attributed mis-

**Figure 2: Factors influencing medical outcomes**



**Figure 3. Physicians' beliefs about the effect of drugs for acute MI in patients < age 75. Adapted from Ayanian et al.<sup>4</sup>**



takenly to more easily measured factors such as the physician's specialty.

### Physicians' knowledge and beliefs

Several studies have compared the knowledge and beliefs of primary care physicians to those of cardiologists. These studies have focused in two areas: 1) drug therapy for AMI, congestive heart failure (CHF), hypertension, and hypercholesterolemia; and 2) risks and appropriateness of recommendations for use of invasive cardiac procedures. In a survey of physicians in Texas and New York, cardiologists were more likely than internists and family practitioners to believe thrombolytic therapy, aspirin, and beta-blockers improve survival for AMI patients (Figure 3), and cardiologists were more likely to report prescribing these drugs.<sup>4</sup> Nonetheless, about one-quarter of cardiologists did not believe aspirin or beta-blockers were "very likely" to reduce post-MI mortality. Within each specialty, physicians in Texas were less likely than those in New York to believe that beta-blockers reduce mortality.

In a national survey regarding the use of angiotensin-converting enzyme (ACE) inhibitors, about 90% of cardiologists, internists, and family practitioners reported they would prescribe an ACE inhibitor to a hypothetical patient with chronic CHF.<sup>5</sup> However, cardiologists were more likely than internists and family practitioners to report they would prescribe an ACE inhibitor to a patient with newly symptomatic congestive heart failure (86%, 76%, 72%;  $P < 0.01$ ) or a patient with asymptomatic left ventricular dysfunction after an AMI (94%, 70%, 58%;  $P < 0.01$ ). Physicians in this survey also reported the usefulness of various sources of information regarding CHF therapies. Primary care physicians rated colleagues as more useful than did cardiologists, consistent with a recent survey in which general internists reported more frequent use than cardiologists of informal or "curbside" consultations.<sup>6</sup> Cardiologists cited original research articles and review articles as more useful than did primary care physicians. Both groups of physicians rated continuing medical education and textbooks as moderately to very useful, clinical guidelines as moderately useful, and pharmaceutical companies as mildly to moderately useful sources of information.

In another national survey regarding evidence-based preventive treatments, primary care physicians and cardiologists

**Table 1. Use of cardiac drugs for acute MI by physician specialty**

	Thrombolytic therapy (%)*	Aspirin (%)	Beta-blocker (%)	Calcium channel blocker (%)
<b>Alabama, Connecticut, Iowa, Wisconsin (1992-93)<sup>1</sup></b>				
Cardiology	66	85	52	59
Internal Medicine	60	79	40	58
Family Medicine	59	74	35	52
General Practice	60	69	36	52
<b>Texas (1990)<sup>2</sup></b>				
Cardiology	60	66	30	70
Internal Medicine, Family Medicine, or General Practice	47**	52	21	65**
Internal Medicine, Family Medicine, or General Practice with Cardiology Consultation	—	58	40	—
<b>Minnesota (1992-93)<sup>3</sup></b>				
Cardiology	73	85	57	—
Internal Medicine or Family Medicine	59	81	40	—
Internal Medicine or Family Medicine with Cardiology Consultation	73	86	59	—
*Among eligible patients				
**Includes patients with cardiology consultations				

were similarly likely to recommend treating a hypothetical patient with systolic hypertension or hypercholesterolemia (about 80 to 90% of physicians in each group). In contrast, 97% of cardiologists, 56% of general internists, and 45% of family practitioners would recommend coronary artery bypass graft (CABG) surgery for a patient with stable angina and a 75% stenosis of the left main coronary artery.<sup>7</sup> Primary care physicians who would not recommend surgery underestimated both the risk associated with left main disease and the benefits of CABG surgery. This study suggests familiarity and experience may be key mediators of differences in knowledge between specialties. Hypertension and hypercholesterolemia are very common conditions in the daily practice of both primary care physicians and cardiologists, whereas cardiologists have much more experience evaluating and advising patients with severe coronary artery disease.

Such familiarity may explain other differences between generalists and specialists in their beliefs about the risks and appropriateness of invasive cardiac procedures. In a survey of U.S. and British physicians, cardiologists provided consistently lower estimates than internists of the risk of coronary angiography, angioplasty, and bypass surgery.<sup>8</sup> In a more recent survey of primary care physicians and cardiologists in California, Florida, New York, Pennsylvania, and Texas, non-invasive and invasive cardiologists rated angiography as more appropriate than did primary care physicians for patients with a complicated AMI (eg, persistent chest pain or pulmonary edema).<sup>9</sup> Among primary care physicians, those with greater experience treating AMI patients viewed angiography as more appropriate for these indications than did those with less experience. However, for patients with an uncomplicated AMI, non-invasive cardiologists and primary care physicians had

similar views of the appropriateness of coronary angiography, and both groups viewed angiography as less appropriate than did invasive cardiologists. This study highlights the need to compare physicians both between *and* within different specialties

### Process of care: use of cardiac drugs

Because of the complex interaction of the various factors outlined in Figure 2, significantly better treatment may yield only small reductions in mortality, thereby requiring large sample sizes to demonstrate statistically significant differences in outcomes. Thus, process measures are often more sensitive than outcome measures to detect important differences in quality of care.<sup>10,11</sup>

Three studies have assessed the use of cardiac drugs for patients hospitalized with AMI (Table 1). In a study of 8241 AMI patients age 65 and older in Alabama, Connecticut, Iowa, and Wisconsin during 1992 and 1993, about one-quarter of patients were admitted by a cardiologist, about three-fifths by an internist or family practitioner, and the remainder by other types of physicians.<sup>3</sup> Patients admitted by cardiologists were more likely to receive thrombolytic therapy, beta-blockers, aspirin, and calcium channel blockers, but not ACE inhibitors, than those admitted by internists or family practitioners.

In a comparable study of 1620 patients age 65 to 79 treated at 285 hospitals in Texas during 1990, approximately one-third of patients were treated by an attending cardiologist in the hospital, and two-thirds were treated by an attending primary care physician; about two-fifths of the latter group were also evaluated by a consulting cardiologist.<sup>5</sup> The cardiologists' patients received thrombolytic therapy, aspirin and

**Table 2. Patient mortality after acute MI by physician specialty**

	Unadjusted mortality rate (%)			Adjusted odds ratio for mortality (95% confidence interval or P value)		
	In-hospital	30-day	1-year	In-hospital	30-day	1-year
<b>Alabama, Connecticut, Iowa, &amp; Wisconsin (1992-93)<sup>1</sup></b>						
Cardiology	12.4	15.7	27.3	—	—	0.88 (P<0.001)
Internal Medicine	15.8	20.3	34.0	—	—	1.00
Family Medicine	13.4	20.4	34.7	—	—	0.98 (P=N.S.)
General Practice	14.6	22.1	36.1	—	—	1.06 (P=N.S.)
<b>Texas (1990)<sup>2</sup></b>						
Cardiology	14.9	16.6	24.4	—	0.94 (0.67-1.32)	1.01 (0.76-1.35)
Internal Medicine, Family Medicine, or General Practice	17.4	20.8	29.5	—	1.00	1.00
<b>Pennsylvania (1993)<sup>16</sup></b>						
Cardiology	8.6	—	—	1.00	—	—
Internal Medicine	12.0	—	—	1.26 (1.17-1.35)	—	—
Family Medicine	11.1	—	—	1.29 (1.18-1.40)	—	—

calcium channel blockers, but not beta-blockers, more often than patients of internists and family practitioners. Among patients with an attending primary care physician and a consulting cardiologist, aspirin use approached that of patients with an attending cardiologist, and beta-blocker use was actually higher with consultative care than with an attending cardiologist.

Consultative care was also evaluated in a study of 1716 AMI patients of all ages hospitalized at 22 Minnesota hospitals during 1992 and 1993.<sup>3</sup> About one-third of patients had an attending cardiologist, one-half had an attending internist, family practitioner, or general practitioner with a consulting cardiologist, and the rest received care solely from an attending generalist physician. Use of thrombolytic therapy, aspirin, and beta-blockers was equivalent for patients who had an attending cardiologist or consulting cardiologist, and both groups received these drugs more often than patients who had no cardiologist involved in their care.

One other study assessed cardiac drug use among 890 patients with unstable angina at a Michigan hospital during 1992.<sup>12</sup> Similar to the reports of AMI described above, patients of cardiologists were more likely than patients of internists to receive aspirin and beta-blockers. However, in a national study of 280 post-MI patients who received ambulatory care from 150 cardiologists in 17 network-model health plans during 1992, fewer than half of eligible patients were prescribed beta-blockers,

underscoring the need for even cardiologists to increase their use of this effective therapy.<sup>13</sup>

#### Process of care: use of cardiac procedures

Studies of AMI care have shown substantial differences in the use of coronary angiography and angioplasty by physician specialty, with smaller differences or equivalent rates for non-invasive cardiac tests and CABG surgery. In Alabama, Connecticut, Iowa, and Wisconsin, cardiologists' patients were more likely than internists' or family practitioners' patients to undergo stress testing (14%, 11%, 9%), echocardiography (55%, 52%, 43%), coronary angiography (49%, 30%, 18%), angioplasty (13%, 7%, 4%), and bypass surgery (10%, 5%, 3%) (all P<0.01).<sup>1</sup> In Texas, however, cardiologists' patients had procedure rates similar to those of generalist physicians' patients for stress testing (20%, 16%; P=0.07) and echocardiography (46%, 43%; P=0.13), slightly higher rates for bypass surgery (14%, 10%; P=0.02), and much higher rates for angiography (63%, 37%; P<0.001) and angioplasty (20%, 9%; P<0.001).<sup>2</sup> However, the importance of distinguishing the use of procedures by invasive and non-invasive cardiologists was evident in a study of 292 AMI patients at one Massachusetts teaching hospital. In this study, invasive cardiologists' patients were more likely than non-invasive cardiologists' patients to receive angioplasty (33% vs. 19%, P=0.02) but not CABG surgery (13% vs. 12% P=0.84).<sup>14</sup>

Studies of patients with other manifestations of coronary artery disease have confirmed these substantial differences by specialty in the use of coronary angiography and angioplasty. Among patients with unstable angina at one Michigan hospital, cardiologists' patients were much more likely than those of internists to undergo angiography (61% vs. 27%) and angioplasty (40% vs. 7%) (both  $P < 0.001$ ).<sup>12</sup> In a study of 243 patients who had positive exercise tests in four Los Angeles hospitals, patients with a cardiologist were more likely than those without a cardiologist to receive coronary angiography when deemed necessary by clinical appropriateness criteria (74% vs. 44% at 12 months;  $P < 0.001$ ).<sup>15</sup>

### Outcomes

Three studies with statewide samples have compared mortality rates of AMI patients by physician specialty (Table 2). All three have found substantially lower *unadjusted* mortality rates for patients of cardiologists compared to those of internists and family practitioners. After adjusting for characteristics of patients and hospitals, however, these differences in mortality were narrowed but still significant in Alabama, Connecticut, Iowa, and Wisconsin at one year and in Pennsylvania during initial hospitalizations.<sup>1,16</sup> In contrast, no significant mortality differences were evident by physician specialty in Texas at 30 days or one year after adjusting for potential confounders.<sup>2</sup> In this Texas study, admission to a hospital offering angioplasty and CABG surgery was associated with significantly lower adjusted mortality at one year (odds ratio: 0.68; confidence interval: 0.47, 0.98), suggesting that organizational factors associated with physician specialty may be important mediators of differences in outcomes. None of these studies of AMI care have assessed symptoms or functional outcomes of patients who survived.

Only limited data are available on the outcomes of ambulatory care of cardiovascular disease by specialty. Among patients with hypertension in Boston, Chicago, and Los Angeles, cardiologists used more resources than general internists and family practitioners,<sup>17</sup> but their patients had comparable clinical and functional outcomes, including blood pressure control and functional status at two years and mortality at seven years.<sup>18</sup>

### Summary of prior research findings

The studies described above demonstrate several principal findings. Cardiologists report greater awareness than primary care physicians about the effectiveness of several key drugs for AMI patients, including thrombolytic therapy, aspirin, beta-blockers, and ACE inhibitors. In practice, these differences in knowledge are associated with greater use of the first two therapies, but less clear differences with respect to other two. When primary care physicians involve cardiologists as consultants, their use of thrombolytic agents, aspirin, and beta-blockers approaches or equals that of attending

cardiologists. In contrast, cardiologists, internists, and family physicians are similarly likely to believe in the effectiveness of drug therapy for hypertension and hypercholesterolemia, and with hypertension their patients have similar outcomes.

Cardiologists believe more strongly than primary care physicians in the appropriateness of coronary angiography for AMI patients, and they utilize it much more often for their patients with an AMI, unstable angina, or a positive exercise test. Cardiologists also use angioplasty more often for AMI patients. Invasive cardiologists believe more strongly than non-invasive cardiologists in the appropriateness of angiography after an uncomplicated AMI, and they may also be more likely to use angioplasty in this setting. For patients with severe coronary artery disease, many primary care physicians underestimate the benefits of CABG surgery, although these have been demonstrated in randomized trials.

Limited data on AMI outcomes suggest that cardiologists' patients have lower mortality than patients of primary care physicians, but differences between these two groups of patients in their clinical characteristics and sites of care may explain some or most of this difference. No differences in outcomes of ambulatory care have been demonstrated between cardiologists and primary care physicians.

### Directions for future research in cardiovascular disease

In the competitive U.S. health care system, physicians, hospitals, and health plans are facing increasing pressure to demonstrate how effectively they can deliver high-quality care with optimal outcomes. Physicians in different specialties, such as cardiologists and primary care physicians, may fear they are competing with each other for a limited supply of patients and income. In such an environment, it would be unfortunate if research comparing different specialties was used primarily to partition patients among them, rather than enabling primary care physicians and specialists to work together more effectively. As one author reviewing comparative studies of primary and specialty care has noted, "The differences ... are not as striking or important to the health of the public at large as those deficiencies in disease management, preventive care, and health maintenance that are common to all physicians."<sup>19</sup> Underuse of beta-blockers and overuse of calcium channel blockers are examples of such common deficits in care.

As efforts to improve care move forward, a number of questions remain to be answered. For example, when should specialists provide "principal" (rather than consultative) care, such as for patients with severe coronary artery disease or congestive heart failure? How do specialists perform when faced with clinical issues outside of their specialty? What mix of primary and specialty care in the *ambulatory* setting yields optimal treatment and outcomes for patients with cardiovascular disease?

What balance of primary and specialty care do patients prefer?

Recognizing the value of specialists' focused expertise and generalists' integrative skills, both groups of physicians can help their patients most constructively by defining their respective roles and improving their systems of care. These efforts may include:

- establishing local guidelines for formal and informal consultations;
- enhancing communication and information systems so care is well-coordinated between generalist and specialist physicians;
- identifying underuse of effective therapies and overuse of ineffective ones;
- implementing interventions within medical groups, hospitals, and health plans to improve the quality of cardiovascular care across specialties.

By taking these steps at the local, regional, and national levels, practicing cardiologists, internists, and family practitioners can ensure that their patients derive the full benefits of established and new therapies for cardiovascular disease.

#### References

1. Jollis JG, DeLong ER, Peterson ED, et al. Outcome of acute myocardial infarction according to the specialty of the admitting physician. *N Engl J Med* 1996; 335:1880-7.
2. Ayanian JZ, Guadagnoli E, McNeil BJ, Cleary PD. Treatment and outcomes of acute myocardial infarction among patients of cardiologists and generalist physicians. *Arch Intern Med* 1997; 157:2570-6.
3. Willison DJ, Soumerai SB, McLaughlin TJ, et al. Consultation between cardiologists and generalists in the management of acute myocardial infarction. *Arch Intern Med* 1998; 158:1778-83.
4. Ayanian JZ, Hauptman PJ, Guadagnoli E, Antman EM, Pashos CL, McNeil BJ. Knowledge and practices of generalist and specialist physicians regarding drug therapy for acute myocardial infarction. *N Engl J Med* 1994; 331:1136-42.
5. Chin MH, Friedmann PD, Cassel CK, Lang RM. Differences in generalist and specialist physicians' knowledge and use of angiotensin-converting enzyme inhibitors for congestive heart failure. *JGIM* 1997; 12:523-30.
6. Keating NL, Zaslavsky AM, Ayanian JZ. Physicians' experiences and beliefs regarding informal consultation. *JAMA* 1998; 280:900-4.
7. Friedmann PD, Brett AS, Mayo-Smith MF. Differences in generalists' and cardiologists' perception of cardiovascular risk and outcomes of preventive therapy in cardiovascular disease. *Ann Intern Med* 1996; 124:414-21.
8. Poses RM, McClish DK, Smith WR, et al. Physicians' judgements of the risks of cardiac procedures: differences between cardiologists and other internists. *Med Care* 1997; 35:603-17.
9. Ayanian JZ, Landrum MB, Normand S-LT, Guadagnoli E, McNeil BJ. Rating the appropriateness of coronary angiography - do practicing physicians agree with an expert panel and with each other? *N Engl J Med* 1998; 338:1896-1904.
10. Mant J, Hicks N. Detecting differences in quality of care: the sensitivity of measures of process and outcome in treating acute myocardial infarction. *British Medical Journal* 1995; 311:793-6.
11. Brook RH, McGlynn EA, Cleary PD. Measuring quality of care. *N Engl J Med* 1996; 335:966-9.
12. Schreiber TL, Elkhatib A, Grines CL, O'Neill WW. Cardiologist versus internist management of patients with unstable angina: treatment patterns and outcomes. *J Am Coll Cardiol* 1995; 26:277-82.

13. Brand DA, Newcomer LN, Freiburger A, Tian H. Cardiologists' practices compared with practice guidelines: use of beta-blockade after acute myocardial infarction. *J Am Coll Cardiol* 1995; 26:1432-6.
14. DiSalvo TG, Paul SD, Lloyd-Jones D, et al. Care of acute myocardial infarction by noninvasive and invasive cardiologists: procedure use, cost, and outcome. *J Am Coll Cardiol* 1996; 27:262-9.
15. Borowsky SJ, Kravitz RL, Laouri M, et al. Effect of physician specialty on use of necessary coronary angiography. *J Am Coll Cardiol* 1995; 26:1484-91.
16. Nash IS, Nash DB, Fuster V. Do cardiologists do it better? *J Am Coll Cardiol* 1997; 29:475-8.
17. Greenfield S, Nelson EC, Zubkoff M, et al. Variations in resource utilization among medical specialties and systems of care. Results from the Medical Outcomes Study. *JAMA* 1992; 267:1624-30.
18. Greenfield S, Rogers W, Mangotich M, Carney MF, Tarlov AR. Outcomes of patients with hypertension and non-insulin-dependent diabetes mellitus treated by different systems and specialties. Results from the Medical Outcomes Study. *JAMA* 1995; 274:1436-44.
19. Donohoe MT. Comparing generalist and specialty care. Discrepancies, deficiencies, and excesses. *Arch Intern Med* 1998; 158:1596-1608.



**John Z. Ayanian, MD, MPP**, graduated from Duke University and received his medical degree from Harvard Medical School. He also received a master's degree in public policy from the Kennedy School of Government at Harvard. He completed his medical residency and general medicine fellowship at Brigham and Women's Hospital. He is currently

Assistant Professor of Medicine and Health Care Policy at Harvard Medical School, and is also Director of the General Medicine Fellowship and the Section on Health Services and Policy Research in the Division of General Medicine at Brigham and Women's Hospital.

Dr. Ayanian's research interests include the impact of physicians' beliefs and characteristics on the quality of health care and the effect of patients' socio-demographic characteristics on their access to care and clinical outcomes. He is currently studying the effects of primary and specialty care on the treatment, survival, and functional outcomes of post-MI patients in the ambulatory setting. He is also investigating the use of cholesterol-lowering therapy for post-MI patients in community practice and the clinical management of women with coronary heart disease in the Nurses' Health Study. Dr. Ayanian is a Generalist Physician Faculty Scholar of the Robert Wood Johnson Foundation, and he has received the 1998 Young Investigator Award of the Association for Health Services Research.

Brigham and Women's Hospital,  
Cardiovascular Division website:

[www.heartdoc.org](http://www.heartdoc.org)