

Heart Disease

Key Findings:

- Rates for blood pressure screening are 90%, and rates are over 80% for cholesterol screening in adults 45 or older. However, only about 25% of people with hypertension have it under control.
- Sixty-two percent of smokers who had a routine office visit reported that their doctors had advised them to quit, although less than half of acute heart attack patients who smoke are counseled to quit while in the hospital (42%).
- For heart attack patients, 69% get recommended beta blockers at admission, and 79% are prescribed this therapy at discharge.
- While the national average for administration of ACE inhibitors to heart attack patients is 71%, performance in some States is as high as 90%.

Background and Impact

Heart disease is a complex of diseases of the cardiovascular system that includes heart attack and heart failure. Despite the impressive advances in treating and preventing heart disease in recent years, heart disease remains the leading cause of death, accounting for over 700,000 deaths in 2000 and costing over \$214 billion each year.^{1,2,3} Research, clinical practice, and public awareness have led to significant behavior changes among both medical professionals and the general population over the last few decades.^{4, 5, 6, 7} The development and widespread use of new drugs, surgeries, and devices, such as pacemakers, have reduced mortality and improved care for those with heart conditions.^{8, 9}

Progress has also been made in prevention of heart disease. The rate of smoking in adults has decreased, the rate of cholesterol screening has increased, and most people with hypertension are aware of their condition, due in part to programs like the HHS/NIH National Cholesterol Education Program.¹⁰ Such steps have helped to cut in half the mortality rate from heart attacks over the last four decades.^{11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21} People not only survive heart attacks that would have killed them in the past, but they live longer and healthier lives afterwards with appropriate treatment and lifestyle changes.

Some people are more likely to develop heart disease than others because they have certain risk factors including medical conditions and unhealthy behaviors that make them more vulnerable. Some of these risk factors are modifiable and can be ameliorated by treatment or behavior changes. Modifiable risk factors for heart disease are:

- High blood pressure (or hypertension). High blood pressure is at epidemic levels among Americans. About 50 million American adults—one in four—have hypertension and the risk of developing it increases with age.^{22, 23} One-third of those affected do not know they

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have it.^{24,25,26,27} Of those currently under treatment, approximately 35% have their blood pressure under control.^{28, 29,30,31} Antihypertensive drugs—such as diuretics, beta blockers, ACE (angiotensin converting enzyme) inhibitors, and calcium channel blockers—are available to meet the needs of patients,^{32,33,34} and national screening guidelines for hypertension are well-established.^{35,36}

- High cholesterol (or hyperlipidemia). This condition affects over 65 million Americans and is more prevalent in older age groups.^{37,38} Studies have shown that the higher the level of blood cholesterol, the greater the risk of heart disease.^{39,40,41} Updated national screening and treatment guidelines were released by the HHS/NIH Adult Treatment Panel III of the National Cholesterol Education Program in 2001.
- Smoking. Although smoking rates have come down, smoking is still the leading cause of preventable death.^{42,43}
- Obesity and lack of exercise. In 1999-2000, it was estimated that 30% of American adults (or 59 million people) were overweight.⁴⁴ Maintaining a healthy body weight, exercising regularly, and eating a balanced diet have been shown to help reduce both blood pressure and cholesterol levels.^{45,46} Studies have shown impressive reductions in risk for those who change poor habits to healthy ones.⁴⁷
- Diabetes. Over 17 million people (6.2% of the population) have diabetes, and minorities are more likely to develop the disease than whites. Prolonged periods of hyperglycemia (high blood sugar) are associated with both microvascular and macrovascular disease.⁴⁸ In addition, people with diabetes often also have elevated cholesterol levels. They can sometimes reduce their risk of heart disease by using lipid-lowering medications early in their disease.^{49,50}
- Chronic kidney disease (CKD). Half of all end stage renal disease patients die of heart disease, and 40% of them have it when they begin dialysis. This is due to risk factors common to both conditions, as well as to an independent effect of CKD on arteriosclerosis.

Some factors that make people more susceptible to heart disease, including aging or a genetic predisposition for heart disease, are not modifiable.⁵¹

Some forms of heart disease account for the majority of heart disease morbidity and mortality,^{14,15} including:

- Acute myocardial infarction (AMI). AMI, or heart attack, is when the blood flow to the heart becomes severely reduced or completely blocked off, and little or no oxygen can get to the heart muscle, causing various levels of damage.

- Heart failure, including congestive heart failure (CHF). Heart failure occurs when the heart muscle is too weak to adequately pump blood for the body's metabolic needs.⁵² Such impairment can result in a lack of adequate blood flow to vital organs, including the brain, kidney, and other organs, as well as a backup of fluid into the lungs. Often, heart failure is caused by damage to the heart muscle from a heart attack, which can seriously weaken the left ventricle, the main pumping chamber of the heart. It appears more frequently in old age: over 5 million people, primarily the elderly, suffer from CHF, which is associated with a high rate of hospitalization. CHF is the most frequent discharge diagnosis for Medicare beneficiaries.^{53,54} Treatment of CHF is also one of the single most expensive items in the Medicare budget, accounting for \$12 billion dollars in annual costs.⁵⁵
- Cardiac arrhythmias. This is a group of conditions in which the normal heart rhythm is disturbed, sometimes resulting in an impaired ability to pump blood throughout the body. Most of these conditions are associated with preexisting coronary heart disease, and they are responsible for sudden cardiac death, estimated at about 37,000 deaths annually in the United States.^{56,57,58}

How the NHQR Measures Heart Disease Quality of Care

There is a body of knowledge about providing high quality care to patients with heart disease and people at risk for developing it. There are well-established practices in the areas of prevention and treatment, with corresponding core consensus-based measures currently tracked at the National and State levels. These measures track care in both primary care settings and hospitals, the latter offering greater opportunities to exercise control over and record patient behavior. Some of these same measures have been used successfully in national quality improvement efforts as part of Medicare's QIO program.

The report tracks a number of measures in heart disease quality of care. Some are prevention measures, such as screening for high cholesterol and blood pressure and smoking cessation counseling. Some are measures of treatment quality such as blood pressure control and AMI and heart failure treatment. Antihypertensive medication can reduce high blood pressure.^{59,60,61} Similarly, a class of drugs known as statins can help to reduce high cholesterol.^{62,63} Together, drugs and dietary measures help reduce blood pressure, prevent plaque and clots from forming in the arteries, and prevent heart disease from developing in the first place. Timely administration of both aspirin and beta-blockers upon hospital admission (assuming the patient does not have any contraindications), as well as prescribing these medications when the patient is released, may help reduce morbidity and mortality from AMI.

The measures for AMI and heart failure rely on Medicare data and, as such, track treatment for Medicare beneficiaries only. However, they illustrate the quality of care provided to the population that is at high risk for AMI and heart failure.

How the Nation Is Doingⁱ

Data from this section come from a variety of sources, including medical record abstractions completed for Medicare's QIO national improvement effort and representative national surveys of the general population.⁶⁴

Prevention

The rate of blood pressure screening among adults is 90%, but rates for cholesterol screening and smoking cessation counseling (both during routine office visits and in the hospital) are lower. Blood pressure screening, cholesterol screening and smoking cessation counseling vary significantly by age, race, and sex, suggesting that there is room for improvement. For example, there is a difference of almost 20 percentage points between States with the highest and lowest rates of smoking cessation counseling (80% vs. 62%).

- **Blood pressure screening.** Because hypertension is often without symptoms, patients may have it for years and be completely unaware. It also can worsen over time if untreated. Therefore, screening should begin at an early age (18) and continue regularly so that doctors and patients can take immediate steps to address any significant increase. Ninety percent of Americans reported having their blood pressure checked in the past 2 years. Ninety-three percent of women and 92% of older adults get checked most often, as do blacks at 90%. Hispanics are screened at lower rates than any other racial/ethnic group (84%) (NHIS, 1998).
- **Cholesterol screening.** Rates of screening have increased in the last two decades. According to 1998 NHIS data, 67% of adults had their cholesterol checked in the past 5 years. Over 80% of adults aged 45 or older had their cholesterol checked.
- **Counseling smokers to quit (during routine office visits).** Smoking is the single most important modifiable risk factor for heart disease. In 2000, 62% of smokers who had a routine office visit reported that their doctors had advised them to quit. Those who report poor to fair health are more likely to be counseled to quit (75%) than those who report good to excellent health (58%) (NHIS, 2000).
- **Counseling hospitalized heart attack patients to quit smoking.** Less than half of AMI patients who smoke are counseled to quit while in the hospital (42%). Of these patients, those who are counseled to quit while in the hospital are more likely than those counseled in other settings to still be abstinent from smoking a year later (MEPS, 2000). States vary widely in their rates of counseling (Medicare QIOs, 200-2001).

ⁱ Adjusting for known contributing factors, such as gender, age, and insurance status (multivariate analysis) would allow for more detailed exploration of the data, but this generally was not feasible for this report. Any adjustments that were done are noted in the detailed tables. The data presented in this report do not imply causation.

Treatment

Approximately 85% of AMI patients are administered aspirin upon hospital arrival;^{65,66} rates for other treatments studied in this report are lower (see measures at end of this chapter).

Breakthroughs have been made in the treatment of heart disease over the last four decades, and the clinical community is knowledgeable about these interventions.

Acute Myocardial Infarction

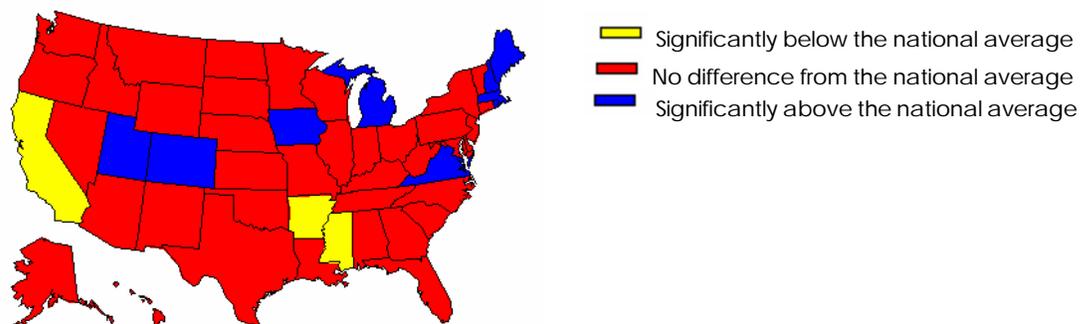
- **Use of aspirin.** Unless contraindicated, aspirin should be given within 24 hours of admission for a heart attack and prescribed to heart attack patients when they leave the hospital. Eighty-five percent of heart attack patients are prescribed aspirin upon admission and at discharge. The national rate for both of these therapies is 85%, but women and the most elderly patients get these therapies least often. States show significant variation in early administration of aspirin after a heart attack, ranging from 69% to 92% (QIO, 2000-2001).
- **Use of beta-blockers.** Unless contraindicated, beta-blockers should be administered within 24 hours of hospital admission for the attack and prescribed when the patient leaves the hospital. The national rates are 69% and 79% respectively, and there is variation among States on both measures, ranging from 60% to 90%. Women and the most elderly patients get these therapies less often than other groups (QIO, 2000-2001).

The map presented in Figure 11 illustrates the Nation's performance in prescribing beta-blockers for heart attack patients when they leave the hospital. Chosen in 1992 as a national priority for improvement by the Medicare QIO program, the national rate rose for Medicare patients from 21% of eligible patients in the early 1990s⁶⁷ to its current level of 79%.

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Figure 11. Percent of AMI patients with beta-blocker prescribed at discharge



Source: Center for Medicare & Medicaid Services, Quality Improvement Organization (QIO) program.

Management of Heart Failure

Two of the three measures in this report track management of heart failure treatment: evaluation of left ventricular ejection fraction, which assesses function of the part of the heart critical to efficient pumping; and, the administration when appropriate of ACE inhibitors at discharge.⁶⁸ National rates for these two measures are 69% and 71% respectively. State variations exist for both of these measures, ranging from 40% to 90% (Medicare QIO, 2000-2001).

Hypertension

Some people with known high blood pressure may not be under treatment.⁶⁹ For those treated, about 53% have their blood pressure under control.⁷⁰ About 23% of individuals with hypertension have their blood pressure under control. Middle-aged adults have slightly higher rates of blood pressure control (33%) than younger adults (NHANES, 1999-2000).

Congestive Heart Failure

From 1998 to 2000, there has been no change in the pattern of hospitalization for CHF, with over 500 people per 100,000 admitted to hospitals for CHF in 2000. Some proportion of these hospitalizations may be avoidable⁷¹ (NHDS, 2000).

What We Don't Know

The evidence base for performance measurement in heart disease is well developed although gaps exist. There is research behind a variety of tested and often cost-effective interventions. Much remains to be learned about the quality of care for heart disease and variations among subgroups and States.

Prevention

Providers can influence patients to quit smoking. Yet almost 60% of heart attack patients who smoke do not get this smoking cessation counseling in the hospital (Medicare QIO, 2000-2001), and about 40% of smokers report not being counseled in the primary care setting (MEPS, 2000). Only 67% of adults report screening for cholesterol. It is not clear why smoking cessation counseling and cholesterol screening rates are not higher.

Treatment

Breakthroughs in treatment of heart disease have enabled more heart patients to survive a heart attack and live well long after having one. Heart failure patients benefit from therapies that allow them to live with reduced heart function. Yet some of these treatments are not being administered to all those who can benefit from them. Older people and women are less likely to receive these therapies. The reasons for this are not clear.^{72,73}

More information is needed on the reasons why some patients treated for hypertension do not have their blood pressure under control. Some physicians are not aware of the recommendations on screening and treatment of hypertension put forth by the Seventh Joint National Committee on Prevention, Detection, and Treatment of High Blood Pressure.⁷⁴ This lack of knowledge might be attributable to the complexity of the guidelines, and some authors have suggested making the guidelines easier to follow.⁷⁵ In addition, the recommended lifestyle modifications—weight loss and exercise—are among the hardest behaviors for physicians to influence.⁷⁶ Finally, patient compliance with recommended drug therapies may be low due to side effects and complicated dosing schedules.⁷⁷

What Can Be Done

Efforts are being made in research and development of new therapies to continually improve cardiac care. NHLBI has made decade-long efforts to reduce coronary heart disease morbidity and mortality through education programs such as the National Cholesterol Education Program, National High Blood Pressure Education Program, and National Heart Attack Alert Program. NHLBI has also mounted community-based programs, called Enhanced Dissemination and Utilization Centers, to promote the application of science-based prevention and reduce cardiovascular risk. CDC has also addressed mortality and morbidity from heart disease with a

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multi-pronged approach: programmatic assistance to States, coordination of an action plan with public health agencies, and the use of data to monitor the Nation's progress, particularly among racial and ethnic groups. Progress is being realized under the State assistance program, where CDC funded 29 States and the District of Columbia to focus on such interventions as getting people to emergency care quickly and lowering blood pressure and cholesterol.⁷⁸ Below are several examples of State activities under this initiative:

- Wisconsin's Cardiovascular Health Program,⁷⁹ established in October 2000, uses a comprehensive approach to help Wisconsin communities reduce the incidence and burden of cardiovascular disease and stroke. Goals of the initiative include developing and coordinating programs with health care partners, and community and advocacy groups to reduce risk factors, with a focus on heart healthy policies and physical and social environmental changes.⁸⁰
- Arkansas, spurred by its ranking as the State with the 5th highest rate of heart disease mortality in the country, engaged the Arkansas Wellness Coalition, a coalition of public and private health agencies and organizations to improve residents' health. Through implementation of peer-reviewed guidelines by practitioners, they hope to raise the standard of cardiac care throughout the State.⁸¹
- In a similar fashion, Maine's Cardiovascular Health Program is addressing heart disease through coalitions that emphasize the implementation of guidelines, train health care providers, and provide community-based support programs.⁸²
- Missouri ranks second among States in the Nation in deaths due to coronary heart disease. Through the Missouri Cardiovascular Health Program, the State has created partnerships to address the needs of patients with cardiovascular disease, diabetes, and hypertension. By tapping into Federally Qualified Health Centers, it reaches the minority populations who disproportionately suffer from these conditions.⁸³
- South Carolina's Cardiovascular Health Program funds eight local communities to focus on promoting public awareness of and participation in activities that reduce morbidity and mortality from heart disease and stroke in the African American community. One of the districts is working closely with faith-based organizations to engage the local community in programs to promote smoking cessation, exercise, and proper nutrition.⁸⁴
- Ten Detroit-area hospitals use a simple tool kit to help remind health care professionals and patients to make use of all of the tests and treatments recommended in national guidelines.⁸⁵ Among other things, the tool kit contains reminders, standard orders for medications and tests, checklists, and educational programs. Items on the tool kit's checklist include, for example, administering aspirin and clot-busters soon after a heart attack and the use of recommended drugs like ACE inhibitors and beta-blockers. Through the use of this tool kit, the rate at which patients receive key treatments has approached 90 percent in some hospitals.⁸⁶

Recent studies reveal that specific, cost-effective methods can be successfully implemented to improve heart disease processes and outcomes. For example, researchers have found that heart attack patients have improved outcomes if they are treated by a cardiologist (either alone or in combination with a primary care doctor) rather than by a primary care doctor alone.^{87,88,89,90,91,92,93,94}

The National Committee for Quality Assurance (NCQA) has instituted a program to recognize physicians who deliver high quality cardiovascular and stroke care through its new Heart/Stroke Recognition Program.⁹⁵

Efforts are also being made to improve public awareness of heart disease. For example, according to the National Registry of Myocardial Infarction 2 Study, one-third of hospitalized AMI patients did not have chest pain symptoms. These patients were more likely to delay going to the hospital compared with patients who did have chest pain, and these patients were also less likely to receive critical therapies such as aspirin within the first 24 hours of admission.⁹⁶ Raising the public profile of heart disease can help to educate both patients and practitioners about steps they can take to improve treatment and outcomes. For example, a recent study showed that one-third of heart attack patients who do not have typical chest pain delay going to the hospital and therefore, are less likely to have critical therapies.⁹⁷ Alerting the public, including providers, to these kinds of facts can prompt them to take action when needed and initiate discussions with their doctors.

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List of Measures

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Measure Title	National	State
Screening for high blood pressure:		
Process: % of people age 18 and over who have had blood pressure measured within preceding 2 years and can state whether their blood pressure is normal or high	Table 1.31 (98)	XXX
Screening for high cholesterol:		
Process: % of adults 18 and over receiving cholesterol measurement within 5 years	Table 1.32a (98)	Table 1.32b (01)
Counseling on risk factors:		
Process: % of smokers receiving advice to quit smoking	Table 1.33a (00)	Table 1.33b (01)
Treatment of AMI:		
Process: % of AMI patients administered aspirin within 24 hours of admission	Table 1.34a	Table 1.34b
Process: % of AMI patients with aspirin prescribed at discharge	Table 1.35a	Table 1.35b
Process: % of AMI patients administered beta blockers within 24 hours of admission	Table 1.36a	Table 1.36b
Process: % of AMI patients with beta blockers prescribed at discharge	Table 1.37a	Table 1.37b
Process: % of AMI patients with left ventricular systolic dysfunction prescribed an ACE inhibitor at discharge	Table 1.38a	Table 1.38b
Process: % of AMI patients given smoking cessation counseling while hospitalized	Table 1.39a	Table 1.39b

Process: Median time to thrombolysis. Time from arrival to initiation of a thrombolytic agent in patients with ST segment elevation or left bundle branch block (LBBB) on the electrocardiogram (ECG) performed closest to hospital arrival time.	Table 1.40a	Table 1.40b
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Process: Median time to PTCA. Median time from arrival to percutaneous transluminal coronary angioplasty (PTCA) in patients with ST segment elevation or left bundle branch block (LBBB) on the electrocardiogram (ECG) performed closest to hospital arrival time.	Table 1.41a	Table 1.41b
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Treatment of acute heart failure:

Process: % of heart failure patients having evaluation of left ventricular ejection fraction	Table 1.42a	Table 1.42b
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Process: % of heart failure patients with left ventricular systolic dysfunction prescribed an ACE inhibitor at discharge	Table 1.43a	Table 1.43b
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Management of hypertension:

Outcome: % of people with hypertension who have blood pressure under control	Table 1.44a (99-00) Table 1.44b (88-94)	XXX
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Management of CHF:

Outcome: Hospital admissions for congestive heart failure (CHF) per 1,000 population ⁱⁱ	Table 1.45a (NHDS00) Table 1.45b (NHDS99) Table 1.45c (NHDS98)	XXX
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ⁱⁱ This measure is one where two comparable national data sources exist, the National Hospital Discharge Survey and the Healthcare Cost and Utilization Project. Both data sources present information on potentially preventable hospital admissions with some slight variation in the measure specifications for individual measures. This report relied on Healthy People 2010 measure specifications to determine which data source should be used in the report for individual measures. More information is available in the Measure Specifications Appendix. More information on the NHDS is available at <http://www.cdc.gov/nchs/about/major/hdasd/nhds.htm>. More information on HCUP and the AHRQ Quality Indicators is available at www.ahrq.gov/data/hcup.

References

- ¹ Centers for Disease Control, National Center for Chronic Disease Prevention and Health Promotion, Fact Sheet, accessed April 1, 2003.
- ² Hennekens CH, Dyken ML, Fuster V. "Aspirin as a therapeutic agent in cardiovascular disease." *Circulation*, 1997, Vol. 96, pp. 2751-2753.
- ³ Almeda FQ et al. "The contemporary management of acute myocardial infarction." *Acute Cardiac Care*, April 2001, Vol. 17, No. 2, pp. 411-434.
- ⁴ Stone, Neil J. Primary Prevention of Coronary Disease. *Hyperlipidemia*. Vol. 1 No. 1 pp.31-49.
- ⁵ Sebregts EHWJ, Falger PRJ, Bar FWHM. Risk factor modification through nonpharmacological interventions in patients with coronary heart disease. *Journal of Psychosomatic Research* Vol. 48, 2000, pp. 425-441.
- ⁶ U.S. Department of Health and Human Services, National Heart, Lung and Blood Institute, Reducing Heart Attack Risk, Six Key steps to Reduce Heart Attack Risk. Website www.nhlbi.nih.gov, accessed April, 2003.
- ⁷ Levy, RI Declining mortality in coronary heart disease. *Arteriosclerosis, Thrombosis, and Vascular Biology*, Vol. 1, 1981, pp. 312-325.
- ⁸ Hlatky MA, et al. "Utilization and outcomes of the implanatable cardioverter defibrillatoar, 1987-1995." *American Heart Journal*, 2002, pp.397-403.
- ⁹ Heidenreich PA, McClellan M. "Trends in Treatment and Outcomes for Acute Myocardial Infaction: 1975-1995." *The American Journal of Medicine*, 2001, Vol. 10,pp.165-174.
- ¹⁰ Fedeer DO, Koro CE, L'Italien GJ. "New National Cholesterol Education Program Guidelines for primary prevention lipid-lowering drug therapy" *Circulation*, 2002, Vol. 105, No. 152, pp.
- ¹¹ Kuller LH, Traven ND, Rutan GH, Perper JA, and Ives DG. Marked decline of coronary heart disease mortality in 35-44 year old white men in Allegheny County, Pennsylvania. *Circulation*, Vol. 80, 261-266, 1989.
- ¹² U.S. Department of Health and Human Services, Agency for Healthcare Research and Quality Evidence Report/Technology Assessment No.26, "Evaluation of technologies for identifying acute cardiac ischemia in emergency departments.", 1998.
- ¹³ Ayanian, J. et al. "Specialty of ambulatory care physicians and mortality among elderly patients after myocardial infarction." *New England Journal of Medicine*, November 21, 2002, Vol. 347, No. 321, pp.1678-1686.
- ¹⁴ Goodney, PP, et al. "Is surgery getting safer? National trends in operative mortality." *Journal of the American College of Surgeons*. Vol. 195, pp. 219-227.
- ¹⁵ Weiss JP et al. "Effectiveness and cost-effectiveness of implantable carioverter defibrillators in the treatment of ventricular arrhythmias among Medicare beneficiaries." *American Journal of Medicine*, May 2002, Vol. 112, pp. 519-527.
- ¹⁶ McGrath PD et al. "Changing outcomes in percutaneous coronary interventions." *Journal of the American College of Cardiology*, Vol. 34, No. 3, pp. 674-680.
- ¹⁷ Henderson A. "Coronary heart disease: overview." *The Lancet*, November 1996, Vol. 348, pp. s1-s4.
- ¹⁸ Heidenreich PA, McClellan M. "Trends in Treatment and Outcomes for Acute Myocardial Infaction: 1975-1995." *The American Journal of Medicine*, 2001, Vol. 10,pp.165-174.
- ¹⁹ Beller GA. "Coronary Heart Disease in the First 30 Years of the 21st Century: Challenges and Opportunities." *Circulation*, 2001, Vol. 103. pp.2428.
- ²⁰ While cardiac mortality is still on the decline in the U.S., the rate of decline may have slowed. See Cooper R. et al. "Trends and Disparities in Coronary Heart Disease, Stroke and other Cardiovascular Diseases in the United States." *Circulation*, 2000, Vol. 102, pp.3137.
- ²¹ See Cooper R. et al. "Trends and Disparities in Coronary Heart Disease, Stroke and other Cardiovascular Diseases in the United States." *Circulation*, 2000, Vol. 102, pp.3137.
- ²² National Institutes of Health, National Heart, Lung, and Blood Institute. NIH News Release, October 15, 2002.
- ²³ U.S. Department of Health and Human Services. National Institutes of Health. National Heart Lung and Blood Institute. National High Blood Pressure Education Program. Working Group Report on Primary Prevention of Hypertension. NIH Publication No. 93-2669. May 1993.
- ²⁴ Jones, Daniel and Hall, John. *Hypertension*, May, 2002.

- ²⁵ Given that elevated blood pressure is asymptomatic, it is not surprising that this is the case. See Alderman, MH et al. "Hypertension Guidelines: Criteria that might make them more clinically useful." *American Journal of Hypertension*, 2002, Vol. 15, pp. 917-923.
- ²⁶ Alderman, MH et al. "Hypertension Guidelines: Criteria that might make them more clinically useful." *American Journal of Hypertension*, 2002, Vol. 15, pp. 917-923.
- ²⁷ American Heart Association. *Know the Facts, Get the Stats*. 2003
- ²⁸ Schwartz: *Current Opinion in Cardiology*. Vol. 14 No.2, March 1999. pp.161-174.
- ²⁹ National Institutes of Health-National Heart Lung and Blood Institute, National High Blood Pressure Education Program. NIH Publication No. 98-4080, November, 1997
- ³⁰ Burt VL et al., "Prevalence of hypertension in the US adult population: results from the third National Health and Nutrition Examination Survey, 1988-1991. *Hypertension* 1995 Vol. 25, pp.305-313.
- ³¹ Hansson, Lennart "Hypertension Management in 2002: Where Have We Been? Where Might We Be Going?" *American Journal of Hypertension*, 2002, Vol. 15 pp. 101S-107S
- ³² Mitchell GF, Izzo JL, Jr., Lacourciere Y, Ouellet JP, Neutel J, Qian C, et al. Omapatrilat reduces pulse pressure and proximal aortic stiffness in patients with systolic hypertension: results of the conduit hemodynamics of omapatrilat international research study. *Circulation* 2002;105(25):2955-61.
- ³³ Zanchetti A, Bond MG, Hennig M, Neiss A, Mancia G, Dal Palu C, et al. Calcium antagonist lacidipine slows down progression of asymptomatic carotid atherosclerosis: principal results of the European Lacidipine Study on Atherosclerosis (ELSA), a randomized, double-blind, long-term trial. *Circulation* 2002;106(19):2422-7.
- ³⁴ In addition, the Agency for Healthcare Research and Quality (AHRQ) recently updated its clinical guidelines regarding blood pressure monitoring, providing critical guidance to practitioners regarding the most effective way to target therapies. This update included an examination of blood pressure measurement outside the office setting; specifically, ambulatory monitoring and self-measured blood pressure. See U.S. Department of Health and Human Services, Agency for Healthcare Research and Quality, Evidence Report/Technology Assessment Number 63, November, 2002.
- ³⁵ Hensrud, DD. "Clinical Preventive Medicine in Primary Care: Background and Practice: 3. Delivering Preventive Screening Services." *Mayo Clinical Proceedings*, 2000, Vol. 75, pp. 381-385.
- ³⁶ Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *JAMA* 2003;289:2560-72.
- ³⁷ The updated Adult Treatment Panel III (ATP III) guidelines released in 2001 by the National Cholesterol Education Program III expand the number of Americans eligible for cholesterol-lowering lifestyle intervention to 62 million from the previous 52 million under earlier guidelines, and the number eligible for drug treatment to 36 million from the previous 13 million.
- ³⁸ U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, Hypertension Fact Sheet, accessed April, 2003.
- ³⁹ Sebrechts EHWJ, Falger PRJ, Bar FWHM. Risk factor modification through nonpharmacological interventions in patients with coronary heart disease. *Journal of Psychosomatic Research* Vol. 48, 2000, pp. 425-441.
- ⁴⁰ Gotto AM, Grundy SM. Lowering LDL Cholesterol, *Circulation* 1999.
- ⁴¹ Yusuf S, Anand, S. Cost of Prevention: the case of lipid lowering. *Circulation*, 1996 Vol. 93, pp. 1774-1776.
- ⁴² *Ibid.*
- ⁴³ U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. *Cigarette smoking among adults, United States, 1998*.
- ⁴⁴ U. S. Department of Health and Human Services, Centers for Disease Control and Prevention, NCHS. "Prevalence of overweight and obesity among adults: United States, 1999-2000" from NHANES, Health E-Stats, 1999-2000.
- ⁴⁵ Sesso HD, Paffenbarger RS, Lee IM. Physical activity and coronary heart disease in men: the Harvard alumni study. *Circulation*, 2000 Vol. 102, No. 975. pp.
- ⁴⁶ Markus, Adam "American Obesity Ballooning." *Health Scout News*, Tuesday, October 8, 2002. www.hon.ch/news/hsn/509528.html
- ⁴⁷ Cardiological Society of India, New Delhi, *Indian Heart Journal*. Prevention, Detection, Evaluation, and Treatment of Hypertension. 1999. Vol. 51, No. 4pp. 381-96.
- ⁴⁸ Cardiovascular diseases are the cause of death for approximately 65% of diabetics. See Grundy SM et al., "Diabetes and cardiovascular disease." *Circulation*, 1999, Vol. 100, pp. 1134-1146.

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- ⁴⁹ Meigs JB et al., Metabolic control and prevalent cardiovascular disease in non-insulin dependent diabetes mellitus(NIDDM): The NIDDM patient outcomes research team". The American Journal of Medicine, Vol. 102, January 1997, pp. 38-47.
- ⁵⁰ Erdman DM et al. "The impact of outpatient diabetes management on serum lipids in urban African-Americans with type 2 diabetes." Diabetes Care, January 2002, Vol. 25, No. 1, pp.9-15.
- ⁵¹ Assmann G, Cullen P, Jossa F, Lewis B, Mancini M. Coronary Heart Disease: Reducing the Risk. Arteriosclerosis, Thrombolysis Vascular Biology. August, 1999. Vol. 19. pp. 1819-1824.
- ⁵² Young, JB. New therapeutic choices in the management of acute congestive heart failure. Reviews in Cardiovascular Medicine. Vol. 2 Suppl. 2 S19-S24.
- ⁵³ American Heart Association. 2000 heart and stroke statistical update. Dallas TX: American Heart Association; 1999.
- ⁵⁴ Fonarow, GC. The treatment targets in acute decompensated heart failure. Reviews in Cardiovascular Medicine. Vol. 2 Supl. 2 2001. pp. S7-S12.
- ⁵⁵ National Committee for Quality Assurance (NCQA). Public Comment Draft Document for Heart/Stroke Recognition Program (HSRP), 2003.
- ⁵⁶ U.S. Department of Health and Human Services, Agency for Healthcare Research and Quality, Evidence Report/Technology Assessment, No. 12 "Management of new onset atrial fibrillation".
- ⁵⁷ Every N, et al. "Risk of sudden versus nonsudden cardiac death in patients with coronary artery disease.: American Heart Journal, Vol. 144, pp.390-396.
- ⁵⁸ Baine, WB, Yu W, Weis KA. "Trends and outcomes in the hospitalization of older Americans for cardiac conduction disorders or arrhythmias, 1991-1998." Journal of the American Geriatrics Society, June 2001, Vol. 49, pp.763-770.
- ⁵⁹ The NIH recently concluded the ALLHAT (Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial), and found that while all of the drugs helped to significantly lower blood pressure, diuretics were by far the most effective and the least expensive of the available options⁵⁹. See *JAMA*, "Major Outcomes in High-Risk Hypertensive Patients Randomized to Angiotension-Converting Enzyme Inhibitor or Calcium Channel Blocker vs. Diuretic" Vol. 288 No. 23, December 18, 2002.
- ⁶⁰ ALLHAT Officers and Coordinators for the ALLHAT Collaborative Research Group. The Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial. Major outcomes in high-risk hypertensive patients randomized to angiotensin-converting enzyme inhibitor or calcium channel blocker vs diuretic: The Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT). *JAMA* 2002 Dec 18;288(23):2981-97.
- ⁶¹ National Institutes of Health, National Heart, Lung and Blood Institute, NIH News Release, December 17, 2002.
- ⁶² Ayanian JZ et al. "Use of cholesterol-lowering therapy by elderly adults after myocardial infarction." *Archives of Internal Medicine*, May 13, 2002, Vol. 162, pp. 1013-1019.
- ⁶³ Gotto AM, Kuller, LH. "Eligibility for Lipid-Lowering Drug Therapy in Primary Prevention." *Circulation*, 2002, Vol. 105, pp.136.
- ⁶⁴ Note that data from the Medicare QIO national improvement efforts apply only to the Medicare population.
- ⁶⁵ The need for administration of aspirin goes beyond recent heart attack patients, and extends to heart disease patients more generally. A recent study at a Centers for Education and Research on Therapeutics (CERTs), sponsored by the Agency for Healthcare Research and Quality (AHRQ), showed that while over 80% of patients with heart disease take aspirin, those who don't are more likely to have comorbidities such as diabetes or hypertension. Those who didn't take aspirin had twice the risk of dying. See Cliff RM et al., in the March 2002 *American Journal of Cardiology*.
- ⁶⁶ Cliff RM et al., "Underuse of aspirin in a referral population with documented coronary artery disease." *American Journal of Cardiology*, March 2002, Vol. 89, No.6, pp.653-661.
- ⁶⁷ Soumerai SB, McLaughlin TJ, Spiegelman D, Hertzmark E, Thibault G, Goldman L. Adverse outcomes of underuse of beta-blockers in elderly survivors of acute myocardial infarction. *JAMA* 1997;277(2):115-21.
- ⁶⁸ Patel AR and Konstam, MA. Recent advances in the treatment of heart failure. *Circulation Journal*. February 2002, 66:117-121.
- ⁶⁹ McInnes GT. Integrated approaches to management of hypertension: Promoting treatment acceptance. *American Heart Journal* . Vol. 138, NO. 3, Part 2, pp. S252-S255.

⁷⁰ Hajjar I, Kotchen T. Trends in prevalence, awareness, treatment, and control of hypertension in the United States, 1988-2000. *JAMA*. 2003;290:199-206.

⁷¹ For example, a recent study found that some antihypertensive medications may also improve left ventricle functioning, a critical factor in the development of congestive heart failure. See Bella, J. et al in *Circulation*, February, 2002.

⁷² A study published in 2000 revealed that Medicare beneficiaries in both managed care and fee-for-service received coronary angiography less often than recommended, and that increasing age was associated with lower rates of the procedure, one that helps to reduce cardiac deaths. See Guadagnoli, E et al., "Appropriateness of coronary angiography after myocardial infarction among Medicare beneficiaries: Managed care versus fee for service." *New England Journal of Medicine*, November 16, 200, Vol. 343, pp.1460-1466.

⁷³ Guadagnoli, E et al., "Appropriateness of coronary angiography after myocardial infarction among Medicare beneficiaries: Managed care versus fee for service." *New England Journal of Medicine*, November 16, 200, Vol. 343, pp.1460-1466.

⁷⁴ Trilling JS, Froom J. "The Urgent Need to Improve Hypertension Care." *Archives of Family Medicine*, Vol. 9, Sept/Oct 2000, pp. 794-801.

⁷⁵ Alderman MH et al. "Hypertension Guidelines: Criteria that might make them more clinically useful." *American Journal of Hypertension*, 2002, Vol. 15, pp. 917-923.

⁷⁶ Ibid.

⁷⁷ Hansson L. "Hypertension management in 2002: Where have we been? Where might we be going?" *American Journal of Hypertension*, 2002, Vol. 15, pp. 101S-107S.

⁷⁸ U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Preventing Heart Disease and Stroke: Addressing the Nation's leading killers. Fact sheet, accessed April, 2003.

⁷⁹ Wisconsin Department of Health and Family Services, "Wisconsin Cardiovascular Health Program," www.dhfs.state.wi.us/Health/cardiovascular/index.htm.

⁸⁰ Ibid.

⁸¹ U.S. Department of Health and Human Services, Centers for Disease Control and Prevention (CDC), National Center for Chronic Disease Prevention and Health Promotion, Exemplary State Programs Fact Sheet, accessed April, 2003.

⁸² Ibid.

⁸³ Ibid.

⁸⁴ Ibid.

⁸⁵ Dave Erickson, "For Your Best Practices File: Detroit's "Heart Attack Kit," *Healthcare News and Ideas for Medical Conference Organizers*, March 23, 2001, p. 1, www.medicalmeetings.net/newsarticle.asp.

⁸⁶ Ibid.

⁸⁷ Benatar D, Bondmass M, Ghitelman, J, Avitall, B. "Outcomes of chronic heart failure." *Archives of Internal Medicine*, vol. 163, February 10, 2003, pp. 347-352.

⁸⁸ Malach M, Quinley J, Imperato PH, Wallen, M. "Improving lipid evaluation and management in Medicare patients hospitalized for acute myocardial infarction." *Archives of Internal Medicine*, March 26, 2001. Vol. 161, No. 6, pp. 839-44.

⁸⁹ Nallamothus, S. et al. "The role of hospital volume in coronary artery bypass grafting: Is more always better?" *Journal of the American College of Cardiology* Vol.38, No.7 December 2001, pp.1923-1930.

⁹⁰ Ayanian, J. et al. "Specialty of ambulatory care physicians and mortality among elderly patients after myocardial infarction." *New England Journal of Medicine*, November 21, 2002, Vol. 347, No. 321, pp.1678-1686.

⁹¹ This may be related to findings from a June 2001 study in the *Journal of General Internal Medicine*, Vol. 16 pp. 351-359, by Majumdar SR et al. These researchers found that generalists were less likely than were cardiologists to use thrombolytics and aspirin for heart attack patients.

⁹² Majumdar SR et al. "Influence of physician specialty on adoption and relinquishment of calcium channel blockers and other treatments for myocardial infarction." *Journal of General Internal Medicine*, June 2001, Vol. 16, pp. 351-359.

⁹³ Improvement in patient treatment and outcomes due to specialist involvement should be seen along a continuum of lesser to greater involvement, rather than as an either/or proposition, according to Ayanian et al. in an article in the *American Journal of Medicine*, February 15, 2000.

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⁹⁴ Ayanian JZ et al. "Generalists and specialists caring for patients with heart disease: United we stand, divided we fall." *American Journal of Medicine*, February 15, 2000, Vol. 103, No. 3, pp.259-261.

⁹⁵ National Committee for Quality Assurance (NCQA) Public Comment Draft Document for Heart Stroke Recognition Program (HSRP), 2003.

⁹⁶ DHHS, "HHS Announces Women's Heart Attack Day and Highlights the Red Dress Project to Educate Woman About Heart Disease," Press Release, February 21, 2003, p. 1. www.dhhs.gov/news/press/2003pres/20030221.html.

⁹⁷ Canto, JG et al. "Prevalence, clinical characteristics, and mortality among patients with myocardial infarction presenting without chest pain." *JAMA*, June 28, 2000, Vol. 283, No. 24, pp.