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DEPARTMENT OF HEALTH & HUMAN SERVICES

Agency for Healthcare
Research and Quality

540 Gaither Road
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January 15, 2010

AHRQ FOIA Case No. 10-006

This is in response to your November 14 Freedom of Information Act (FOIA) request addressed to the Agency for Healthcare Research and Quality (AHRQ). You requested a copy of all AHRQ reports produced for Congress during the past three years that are not posted on the AHRQ Web site.

Enclosed are copies of AHRQ reports mandated by Congress.

- "Quality of Care for Heart Disease and Other Cardiovascular Conditions in Women" mandated by H.R.5647 of the Subcommittee on Labor, Health and Human Services, Education, and Related Agencies Appropriations Act, 2007, §109-515;
- "Estimate of the Economic Burden of Late Entry into Medical Care for Human Immunodeficiency Virus (HIV) Infection" mandated by the U. S. Senate 3230 Committee on Appropriations, Subcommittee on Labor, Health and Human Services, Education, and Related Agencies Appropriations Act, 2009. Report No. 110-410;
- "Report to Congress on Obligations, Expenditures, and Unobligated Balances for Comparative Effectiveness Research" mandated by H.R.1, the American Recovery and Reinvestment Act of 2009, P.L. 111-5; and
- "Operating Plan for Comparative Effectiveness Research" as required by the American Recovery and Reinvestment Act of 2009

Provisions of the Act allow us to recover part of the cost for complying with your request. There is no charge for the enclosed information since it is below the $25.00 minimum fee.

If we can be of any further assistance, please do not hesitate to call us at (301) 427-1866.

Prepared by:

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Enclosure (139 pages)

DEPARTMENT OF HEALTH & HUMAN SERVICES

Office of the Secretary

Washington, D.C 20201

JAN 1 4 2008

The Honorable David R. Obey
Chairman
Subcommittee on Labor, Health and
Human Services, Education
and Related Agencies
Committee on Appropriations
House of Representatives
Washington, D. C. 20515

Dear Mr. Chairman:

I am pleased to transmit a report as requested in House Report 109-515, page 141. This report is entitled, "Quality of Care for Heart Disease and Other Cardiovascular Conditions in Women."

Sincerely,

Charles E. Johnson
Assistant Secretary for Resources
and Technology

Enclosure

DEPARTMENT OF HEALTH & HUMAN SERVICES

Office of the Secretary

Washington, D.C. 20201

JAN 1 4 2008

The Honorable James T. Walsh
Ranking Minority Member
Subcommittee on Labor, Health and
Human Services, Education
and Related Agencies
Committee on Appropriations
House of Representatives
Washington, D. C. 20515

Dear Mr. Walsh:

I am pleased to transmit a report as requested in House Report 109-515, page 141. This report is entitled, "Quality of Care for Heart Disease and Other Cardiovascular Conditions in Women."

Sincerely,

Charles E. Johnson
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and Technology

Enclosure

# Report to Congress

# Quality of Care for Heart Disease and Other Cardiovascular Conditions in Women

## Agency for Healthcare Research and Quality

## October 30, 2007

# Contents

# Executive Summary

AHRQ is pleased to present this report, "Quality of Care for Heart Disease and Other Cardiovascular Conditions in Women," in response to the following House of Representatives Appropriations Committee request included in House Report 109-515, which accompanies HR 5647, "the Departments of Labor, Health and Human Services, and Education and Related Agencies Appropriations Act, 2007":

> The Committee is aware that heart disease, stroke and other cardiovascular diseases are the leading cause of death among women. The Committee requests that AHRQ, no later than September 30, 2007, prepare and submit to the Committee, a report on the quality of and access to care for women with heart disease, stroke, and other cardiovascular diseases. The report should contain recommendations for eliminating disparities in, and improving the treatment of, heart disease, stroke, and other cardiovascular diseases in women.

In response, the Agency reviewed various relevant literature citations and analyzed available data on cardiovascular care for women. This report presents a mixed picture of cardiovascular care for women. The literature reviewed suggests that women may be at a disadvantage in terms of some key aspects of perception of their risks of cardiovascular disease (CVD) and of how it is managed, and some outcomes of the care for CVD that is provided. Key gaps in our data and knowledge also were identified. These include limited gender-specific data on processes and outcomes of CVD care, and the dearth of measures of the quality of approaches for diagnosing CVD (and most other diseases), and of measures related to diagnostic errors.

The sample of quality measures data analyzed were weighted towards process measures of care (e.g., provision of accepted therapy) and presents a somewhat more varied picture. It is notable that many of the differences observed between women and men in terms of the quality of CVD care appear to be smaller than the differences between CVD care generally provided and the best care that could be achieved for all patients. Subject to some data limitations, the results presented in this report, and those of the literature reviewed, indicate that there is room for improvement in the care of women in some areas, and room for improvement in the care of patients of both sexes in many others.

CVD as a whole encompasses a large array of conditions, including diseases of the heart itself (e.g., coronary heart disease (CHD), which is the major form), diseases of the blood vessels supplying the brain (i.e., cerebrovascular diseases, including stroke) and diseases of the other blood vessels (e.g., hypertension and aortic aneurysm). In 2004, CVD as a whole accounted for 872,000 deaths, comprising 36% of all deaths seen.[1] Cerebrovascular disease (which includes stroke) contributed roughly 150,000 of these deaths. As a CVD subtype, heart disease was the leading cause of death in the United States, with CHD alone contributing 452,000 deaths among women and men. However, these 452,000 deaths represent only 31% of the deaths that would have been expected if the high mortality rate observed in 1968 had been in effect.[1] CHD is also the number one killer among women.[2] While significant progress has been made in reducing mortality from heart disease over the past three decades, one woman in four still dies from this group of conditions. Women are generally older than men when diagnosed with heart disease

(e.g., with means of 73 vs 65 yrs of age in one study[3]). Therefore, treatment and outcomes may be compromised by the fact that women are more likely to have other chronic conditions when initially diagnosed.

One computer simulation attributed 25% of the decline in CHD deaths seen from 1980 to 1990 to primary prevention (i.e., reduction of risk factors in the population as a whole), with 29% attributed to reduction of risk factors in patients with coronary disease, and 43% attributed to improvements in treatments provided for this condition.[4] A subsequent analysis performed to examine the decrease in U.S. deaths from coronary disease over the period from 1980 to 2000 concluded that approximately half the decline in deaths may be attributable to reductions in major risk factors and approximately half to evidence-based medical therapies.[5] Yet much remains to be done in order to sustain the additional gains that have been made more recently. While current approaches to treating CHD and other forms of CVD are well known, the gaps between knowledge of appropriate prevention and treatment strategies and the care that is actually provided for various conditions are widely acknowledged.[6]

The current report is modeled in part after AHRQ's Congressionally-mandated National Healthcare Disparities Report (NHDR).[7] The current report summarizes a selection of published articles addressing perceived disparities and other aspects of cardiovascular care for women. It also includes illustrative data on an array of process and outcome measures of the quality of health care for women who are at risk for, or already have heart disease and other cardiovascular diseases, including stroke, hypertension, and abdominal aortic aneurysm (AAA). The findings presented in this report illustrate how well the U.S. health care system does in terms of implementing select evidence-based diagnostic and therapeutic interventions.

Nationally representative data used in this report came from various federally affiliated patient and consumer surveys, administrative (billing) data and medical record abstraction studies.[i] Data comparing the rates of preventive services provided to patients with versus those without CVD provide some insight regarding the degree to which providers caring for patients with known CVD focus on risk factor reduction in this higher risk population. A summary of the overall report findings is included in the bullets below and in Table 1, page 7. Note that general categorizations of results as "better," "similar/the same," or "worse" as described below and elsewhere reflect the results of statistical significance testing. However, these categorizations may not necessarily reflect the clinical importance of the differences that were observed. Thus, relatively large differences seen in small samples may not be statistically significant, while relatively small differences seen in large samples may be statistically significant.

- **For measures of preventive care provided to all women and men (i.e., including those who are at risk of developing CVD as well as those who already have it), women fared better than men**:
    - Compared with their male counterparts, women were significantly more likely to have had their blood pressure measured within the preceding 2 years and to be able to state whether their blood pressure was high or normal; to have had their cholesterol checked within the preceding 5 years; and to have been counseled to quit smoking.

[i] More detailed information on sources is provided in the Introduction and Methods section.

- **For measures of screening, prevention, and treatment for women and men with CVD, results were mixed:**
  - Women and men with CVD were equally likely to have had their blood pressure measured within the preceding 2 years and to be able to state whether their blood pressure was high or normal; to have had their cholesterol checked within the preceding 5 years; to have been counseled to quit smoking; to have a usual primary care provider; and to report that their provider usually asks about medications and treatments other doctors may give.
  - Women and men undergoing percutaneous coronary intervention had similar median time intervals from hospital arrival to the initiation of these procedures; and women enrolled in Medicare were as likely as men enrolled in Medicare to have received recommended inpatient care for a heart attack.
  - Women were also as likely as men to have been treated as inpatients with a primary discharge diagnosis of heart failure; and women and men with primary discharge diagnosis of heart failure or stroke had similar rates of inpatient mortality.
  - Women and men with CVD were equally likely to report that their health providers sometimes or never listened carefully, explained things clearly, respected what they had to say, and spent enough time with them; to report that they sometimes or never get appointments for routine care as soon as wanted; to report that they sometimes or never get care for illness or injury as soon as wanted; to be uninsured all year; and to be unable to receive or to be delayed in receiving needed medical care due to financial or insurance reasons.
  - Women fared worse than men for other measures. Women enrolled in Medicare were significantly less likely than men enrolled in Medicare to have received recommended inpatient care for heart failure. Compared with men, women with a primary discharge diagnosis of a heart attack or with a primary procedure code for abdominal aortic aneurysm repair were significantly more likely to die as inpatients.

- **Compared to women without CVD, women with CVD fared either better or about the same across several measures of preventive care or of the patient centeredness, timeliness and access to medical care in general.**
  - Compared to women without CVD, women with CVD were significantly more likely to have had their cholesterol checked within the preceding 5 years; to have been counseled to quit smoking; and to have a usual primary care provider. Women with CVD were significantly less likely than women without CVD to report that they sometimes or never get appointments for routine care as soon as wanted, and women with CVD were significantly less likely to be uninsured all year.
  - Compared to women without CVD, women with CVD were similarly likely to have had their blood pressure measured within the preceding 2 years and to be able to state whether their blood pressure was high or normal; to report that their health providers sometimes or never listened carefully, explained things clearly, respected what they had to say, and spent enough time with them; to report that they sometimes or never get care for illness or injury as soon as wanted; to be unable to receive or to be delayed in receiving needed medical care due to

financial or insurance reasons; and to report that their provider usually asks about medications and treatments other doctors may give.

Table 1 below summarizes the results of the sample data analyzed in this report.

**Table 1. Summary of disparities in measures of quality of and access to care for cardiovascular disease (CVD)**

| | All Women Relative to All Men | Women with CVD Relative to Men with CVD | Women with CVD Relative to Women without CVD |
|---|---|---|---|
| **Better** | **3 Measures—**<br>Screening for high blood pressure<br>Screening for high cholesterol<br>Counseling on smoking | **No Measures** | **5 Measures—**<br>Screening for high cholesterol<br>Counseling on smoking<br>Routine care appointments<br>Health insurance coverage<br>Usual source of care |
| **About the Same** | **No Measures** | **15 Measures—**<br>Screening for high blood pressure<br>Screening for high cholesterol<br>Counseling on smoking<br>Hospitalization for heart failure<br>Recommended hospital care for heart attack<br>Time to initiation of percutaneous coronary intervention<br>Inpatient mortality among heart failure patients<br>Inpatient mortality among stroke patients<br>Patient-provider interactions<br>Routine care appointments<br>Illness or injury care<br>Patient-provider communication<br>Health insurance coverage<br>Usual source of care<br>Patient perceptions of unmet need | **5 Measures—**<br>Screening for high blood pressure<br>Patient-provider interactions<br>Illness or injury care<br>Patient-provider communication<br>Patient perceptions of unmet need |
| **Worse** | **No Measures** | **3 Measures—**<br>Recommended hospital care for heart failure<br>Inpatient mortality among heart attack patients<br>Inpatient mortality among abdominal aortic aneurysm repair patients | **No Measures** |

It is important to note that this report examines specific measures, based largely on the availability of current data from various sources. Thus, the distribution of the specific results presented is not necessarily a comprehensive summary of the overall gender balance of

cardiovascular care in this country. It is important to note that mortality rates and other outcome measures are not adjusted to completely reflect differences in disease severity or co-morbidity seen in different populations. Furthermore, the measures examined have varying implications that are not of equal importance. For example, findings of gender-based differences in mortality may be of considerably more concern than are findings of variation in the performance of specific screening tests. The data available generally did not provide the detail needed to provide potential explanations for the results observed. Nonetheless, the range of results presented here should provide a useful foundation for understanding the current status of care for women who have, or are at risk of developing, CVD.

Although we identified disparities for women in a relatively small proportion of the measures for which we examined data, there is still significant room for improvement. Given that heart disease is the leading cause of death among women, identifying effective interventions is imperative. The closing section of this report, entitled "Moving Forward," identifies some areas where attention is urgently needed and where it might lead to significant improvements in women's access to quality health care for the prevention and treatment of CVD. In addition, this section provides examples of evidence-based guidelines where greater adherence could improve cardiovascular care, including care provided to women specifically. For example, the AHRQ-supported U.S. Preventive Services Task Force (USPSTF) has promulgated several guidelines related to CVD care.[8] These include: routinely screening men aged 35 years and older and women aged 45 years and older for lipid disorders, and treating abnormal lipids in people who are at increased risk of CHD; discussing aspirin chemoprevention with adults who are at increased risk for CHD; screening adults aged 18 and older for high blood pressure. One-time screening for abdominal aortic aneurysm (AAA) by ultrasonography also is recommended for men aged 65 to 75 who have ever smoked. Adherence to these and other evidence-based guidelines as discussed in the body of the report, would significantly improve CVD care for women, and for the U.S. population as a whole. However, progress in adhering to CVD guidelines[9] and in reporting such data[10] has certainly been made.

High quality care relies not only on knowledge about the right care, but also on the existence of an adequate health care system to deliver it. As a result of the high prevalence of CVD among both women and men in the U.S., system-wide improvements in health care delivery can substantially advance care for CVD as well. Therefore, in addition to the more targeted initiatives to improve CVD treatment for women described in this report, broader areas of quality improvement will translate into advancements in care for CVD that are appropriate to its burden on health. These include efforts that foster increased access to care, wider adoption of integrated health information technology systems, and better coordination of care throughout all phases of health and illness. Along with other Federal agencies, State, local, and private organizations, AHRQ provides leadership, coordination and support in several key areas that are aimed at improvements that impact health care broadly across the entire system. It will be critical to maintain, and, where possible, expand these efforts which are likely to yield the most benefit to improve health care broadly, including care for CVD in women.

# Introduction and Methods

Cardiovascular disease (CVD) encompasses an array of conditions, including diseases of the heart itself (e.g., coronary heart disease, which is the major form), diseases of the blood vessels supplying the brain (i.e., cerebrovascular diseases, including stroke) and diseases of the other blood vessels (e.g., hypertension and aortic aneurysm). In 2004, CVD accounted for 872,000 deaths in the United States, which represented 36% of all deaths.[11] Heart disease was the leading cause of death, with CHD alone contributing 452,000 fatalities. Cerebrovascular disease contributed an additional 150,000 deaths.

The crude death rate from CVD peaked in 1968, and it has declined steadily since then.[11] One computer simulation focused on identifying factors associated with the fact that observed coronary heart disease mortality in 1990 was 34% lower than would have been predicted based on risk factor levels, event rates in those with and without coronary disease, and CHD mortality rates seen in 1980.[12] The model attributed 25% of the decline in these deaths to reductions in smoking, high blood pressure, and other risk factors in the general population; 29% to reduction of risk factors in patients with coronary disease; and 43% to improvements in facilities, drugs, and procedures used to treat this condition. A subsequent analysis performed to examine the decrease in U.S. deaths from coronary disease over the period from 1980 to 2000 concluded that approximately half the decline in deaths may be attributable to reductions in major risk factors and approximately half to evidence-based medical therapies.[5]

Although this decline in mortality is encouraging, CHD is still the number one killer among women, who comprise nearly 111 million of the estimated 215 million Americans 20 years of age and older.[13] Each year, nearly 500,000 American women die of CVD, and heart disease alone is the leading cause of death in this population.[14, 15] Based on current data, 1 woman in 4 will die from heart disease, while 1 in 30 will die from breast cancer.[16] Among women who suffer heart attacks, nearly one-fourth die within 1 year and nearly half become disabled, failing to make a full recovery within 6 years.[17] Moreover, women tend to develop manifestations of CVD later in life than do men, and therefore are more likely to have other chronic conditions when they are initially diagnosed, thereby complicating their treatment.

Approaches to treat CVD are well known, but for care of this and other conditions, the gaps between knowing what should be done and actually doing it are widely acknowledged.[18] Understanding when, where, and to whom the American health care system is delivering optimal care—and when health care delivery falls short of its potential—can facilitate the development of interventions to improve preventive, chronic, and acute care for CVD, and can help insure that such care is accessible, patient centered, and timely.

This report provides a broad overview of disparities in cardiovascular care for women. It builds on the National Healthcare Disparities Report (NHDR), a report to Congress produced annually by the Agency for Healthcare Research and Quality (AHRQ) on behalf of the U.S. Department of Health and Human Services (HHS), and in collaboration with an HHS-wide Interagency Work Group that guides the development of the report. With the input of a Federal Interagency Work Group, the NHDR provides a comprehensive national overview of disparities in health care, overall, drawing on dozens of data sources and including measures that are related to

cardiovascular care alone. Specifically, nine measures focus on heart disease, and an additional 18 measures are related to other aspects of cardiovascular care, such as risk factor prevention. Chapter 1, Introduction and Methods in the 2006 NHDR, also may serve as a valuable reference to use with this report. The current report relies heavily on data from the NHDR measure set, but also adds analyses to provide a broader picture of the current state of cardiovascular care for women. Individual sections on preventive, chronic, and acute care, and an additional section on patient centeredness, timeliness, and accessibility of care illustrate the effectiveness of the American health care system across a wide array of components of CVD-related care. The data presented here should not be considered comprehensive because of data availability constraints and other factors that limited the scope of the report. However, this document should be useful as an overview of disparities in cardiovascular care for women, as well as the overarching quality of and access to cardiovascular care for women. Quality health care entails delivering the right health care to the right person in the right way at the right time, every time.[19] Access to health care entails the timely use of personal health services to achieve the best possible health outcomes.[19]

The introductions to each section of the report provide a review of selected articles focusing on potential disparities in CVD care for women. The accompanying, more current data that follow are presented in bar charts which focus on CVD care, making comparisons between:

- All women and all men.
- Women with CVD and men with CVD.
- Women with and without CVD.

Data comparing rates of preventive services provided to patients with versus without CVD provide some insight regarding the degree to which providers caring for patients with known CVD focus on risk factor reduction in this higher-risk population. We acknowledge that assessing the presence of related risk factors among patients already diagnosed with some form of CVD represents chronic care management rather than "screening" in the strictest sense of the word.

By conventional practice, only differences with a p-value of 0.05 or less as calculated using two-tailed tests are listed as statistically significant in the bullet point(s) beneath each chart. However, small sample sizes may keep some clinically important differences from meeting this criterion. In other cases, relatively minor differences may attain statistical significance due to very large sample sizes. Each measure's data source, reference population, and data year are reported beneath each chart. Figures labeled as comparing women and men "with CVD" compare process or outcome measures for female and male patients with specific cardiovascular conditions (e.g., heart failure), as noted in the figure titles.

Data on measures came from the following five sources:

- **Consumer Assessment of Healthcare Providers and Systems (CAHPS®)**
  The CAHPS® program includes a family of surveys designed to gather data from consumers about their experiences with the health care system (health plans, hospitals, hemodialysis centers). Topics include accessibility of the services, communication skills of their providers, helpfulness of the office staff, and customer service. See:

http://www.ahrq.gov/qual/nhdr06/datasources/Agency_for_Healthcare_Research_and_Quality.htm#cahps for more information.

- **Medical Expenditure Panel Survey (MEPS)**
  The MEPS includes two components, the Household Component and the Insurance Component. The Household Component collects information on the types and frequencies of health services used, access to care, cost of services, health insurance coverage, income, and employment. The Insurance Component focuses on the health insurance plans offered to private and public sector employees. See: http://www.ahrq.gov/qual/nhdr06/datasources/Agency_for_Healthcare_Research_and_Quality.htm#meps for more information.

- **Medicare Quality Improvement Organization (QIO) Program**
  The QIO program, sponsored by the Centers for Medicare & Medicaid Services (CMS), consists of a national network of QIO programs in each State, U.S. territory, and the District of Columbia. These QIOs collect data on quality of care, based on reviews of hospital medical records, as well as data from physician offices, nursing homes, and home health agencies. See: http://www.ahrq.gov/qual/nhdr06/datasources/Centers_for_Medicare_and_Medicaid_Services.htm#qio for more information.

- **National Health Interview Survey (NHIS)**
  The NHIS is a household survey conducted through face-to-face interviews by the U.S. Bureau of the Census. It collects data on demographics, health care utilization and access, and health-related behaviors. See: http://www.ahrq.gov/qual/nhdr06/datasources/Centers_for_Disease_Control_and_Prevention.htm#nhis for more information.

- **Nationwide Inpatient Sample (NIS) of AHRQ's Healthcare Cost and Utilization Project (HCUP)**
  Based on all admissions from a weighted sample of 20% of non-Federal U.S. hospitals, the NIS is one of several health care databases generated by HCUP. Using administrative data gathered from discharge abstracts for inpatient stays, NIS generates nationwide estimates of data on inpatient admissions, including demographic variables, diagnoses and procedures, length of stay, discharge status, source of payment, total charges, hospital size, ownership, region, and teaching status. See: http://www.ahrq.gov/qual/nhdr06/datasources/Agency_for_Healthcare_Research_and_Quality.htm#hcup for more information.

Reflecting the convention of many of our data sources, adults are defined as individuals 18 years of age and older. The sources that present summary data for "women with CVD" or "men with CVD" define CVD as follows:

- Medical Expenditure Panel Survey (MEPS)—People who have ever been told they have one or more of the following:
  - Coronary heart disease
  - Angina (chest pain)
  - Heart attack (myocardial infarction)
  - Stroke

- National Health Interview Survey (NHIS)—People who have ever been told they have one or more of the following:
    - Coronary heart disease
    - Angina (chest pain)
    - Heart attack (myocardial infarction)
    - Stroke
    - A heart condition or disease

Admittedly, these definitions of CVD exclude several significant conditions, such as peripheral vascular and cerebrovascular disease.

Table 2 includes all measures presented in the report, organized by report section and listing the source for each measure. A few composite measures are included, as indicated in parentheses in Table 2. Those drawing on data from the QIO Program utilize an opportunities model developed by Qualidigm[20] and used in the CMS Premier Hospital Quality Incentive Demonstration[21] and for public reporting by the Rhode Island Department of Health,[22] among other entities. The model assumes that each patient needs and has the opportunity to receive one or more processes of care, but that not all patients need the same care. The denominator for an opportunities model composite is the sum of these opportunities to receive appropriate care across a panel of process measures. The numerator is the sum of the appropriate care that is actually delivered. The composite measure is typically presented as the proportion of separate instances in which appropriate care is delivered.

The CAHPS®[23] composite measure, using data collected during MEPS interviews, reflects the average of individual components of patient experiences of care. This composite measure is presented as the proportion of respondents who reported that providers "never" or "sometimes" as opposed to "usually" or "always" performed well. For example, if someone responded either "sometimes" or "never" to two of four questions, that represents an aggregate score of 50% for combined "sometimes or never" responses to the four questions as a whole.

**Table 2.** List of measures, by component of care assessed (data source in parentheses)

**Preventive Care**

- Screening for high blood pressure: Adults who had their blood pressure measured within the preceding 2 years and could state whether their blood pressure was normal or high (NHIS)
- Screening for high cholesterol: Adults who had their blood cholesterol checked within the preceding 5 years (NHIS)
- Counseling on smoking: Adult smokers receiving advice to quit smoking (MEPS)

**Chronic Care**

- Screening for high blood pressure: Adults with CVD who had their blood pressure measured within the preceding 2 years and could state whether their blood pressure was normal or high (NHIS)
- Screening for high cholesterol: Adults with CVD who had their blood cholesterol checked within the preceding 5 years (NHIS)
- Counseling on smoking: Adult smokers with CVD receiving advice to quit smoking (MEPS)
- Management of heart failure: Hospitalizations with a primary discharge diagnosis of heart failure per 100,000 adults (HCUP)

**Acute Care**

- Hospital care for heart attack: Recommended hospital care received by Medicare patients with heart attack (QIO) *(composite)*
- Time to initiation of revascularization therapy for heart attack patients: Median time (minutes) from hospital arrival of Medicare heart attack patients to initiation of percutaneous coronary intervention (QIO)
- Hospital care for heart failure: Recommended hospital care received by Medicare patients with heart failure (QIO) *(composite)*
- Inpatient mortality for cardiovascular conditions and procedures:
    - Deaths per 1,000 adult admissions with a primary discharge diagnosis of an acute myocardial infarction (HCUP)
    - Deaths per 1,000 adult admissions with a primary discharge diagnosis of heart failure (HCUP)
    - Deaths per 1,000 adult admissions with a primary discharge diagnosis of stroke (HCUP)
    - Deaths per 1,000 adult admissions with a primary procedure code for abdominal aortic aneurysm repair (HCUP)

**Patient Centeredness, Timeliness, and Accessibility of Care**

*Patient Centeredness*

- Adults whose health providers sometimes or never listened carefully, explained things clearly, respected what they had to say, and spent enough time with them (CAHPS®) *(composite)*

*Timeliness*

- Adults who could sometimes or never get appointments for routine care as soon as wanted (MEPS)
- Adults who could sometimes or never get care for illness or injury as soon as wanted (MEPS)

*Accessibility of Care*

- Patient-provider communication: People with providers who usually asked about medications and treatments other doctors may give (MEPS)
- Health insurance coverage: People under age 65 who were uninsured all year (MEPS)
- Usual source of care: People who had a usual primary care provider (MEPS)
- Patient perceptions of unmet need: People unable to receive or delayed in receiving needed medical care due to financial or insurance reasons (MEPS)

## Preventive Care

Strategies such as screening and counseling focus on early identification and reduction of risk factors in order to prevent or reduce the severity of heart disease, stroke and other forms of CVD. Heart disease and stroke share many of the same risk factors, such as high blood pressure, high cholesterol, cigarette smoking, diabetes mellitus, physical inactivity, and obesity.[24, 25] Screening for risk factors such as high blood pressure and high cholesterol and counseling to quit smoking are important preventive care measures to identify and reduce CVD risk. Well-established evidence-based guidelines recommend that primary care physicians routinely screen all adults to identify and prevent high blood pressure and high cholesterol.[17] These guidelines also recommend that physicians counsel and support smokers to stop smoking, and also identify overweight and obese patients, and counsel them on exercise and weight loss.

The prevalence of heart disease risk factors has been increasing overall in the United States. Only one-third of the U.S. population is free of all CVD risk factors, based on self-reported data from the Behavioral Risk Factor Surveillance System (BRFSS).[26] Women, racial/ethnic minority groups,[27] and persons of low socioeconomic status are at increased risk for not receiving preventive care for heart disease.[28] Compared with men from all racial/ethnic and educational groups, women are more likely to have risk factors for heart disease such as obesity, large waist, high blood pressure, high cholesterol, and physical inactivity. Nonetheless, women also consume more vegetables and fruit than men do[29] and have lower rates of smoking.[30] However, rates of smoking have been rising steeply for teenage girls, and the decline in smoking rates among women has stalled. Furthermore, women with less than a high school education are three times more likely to smoke than college-educated women.

Overall rates of preventive cardiovascular care for both men and women are low, leading to missed opportunities to help reduce the risk of heart disease.[31] Unfortunately, women are even less likely than men to receive some components of preventive cardiovascular care.[32] Reasons for gender differences in such care include limited physician and women's awareness of their risk of CVD from smoking and other risk factors, barriers to accessible and affordable care, and patients' educational and socioeconomic status. These factors lead to missed opportunities to provide preventive care and counseling for women on risk factors for CVD and stroke. As women may seek health care more often then men overall,[33] (even after excluding care for reproductive needs) the preventive cardiovascular care that women do receive may still occur in a lower proportion of all visits than is the case for men.

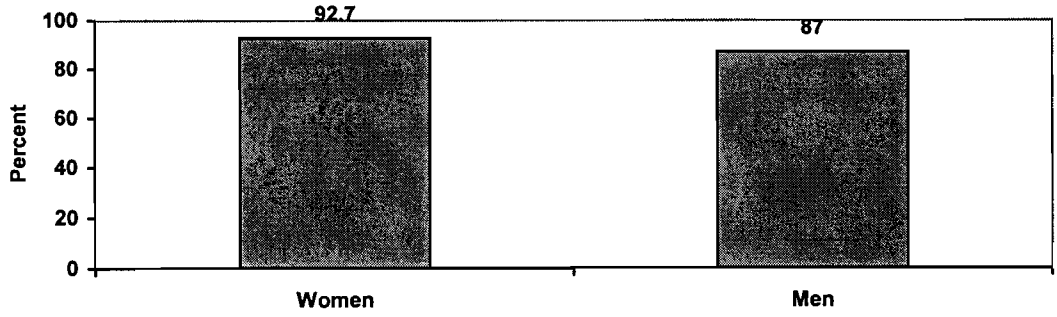
National efforts to increase awareness of heart disease as the leading killer of women from all racial/ethnic groups appear to be having some impact. A nationally representative study of women showed that their awareness of CVD as the leading cause of death nearly doubled from 30% in 1997 to 55% in 2003.[29, 34]

## Screening for High Blood Pressure

About one-third of adults in the U.S. are estimated to have high blood pressure (i.e., to be hypertensive), another third are "pre-hypertensive", and the remaining third have normal blood pressure.[35, 36, 37] The Framingham Heart Study has demonstrated that pre-hypertension increases the risk of major CVD events by 1.5 to 2 times.[38] Recent National estimates for 1999-2004, show that two-thirds of adults age 60 and over had high blood pressure, an increase of 10% from results found for 1988-1994.[39] Between these two periods, hypertension control increased for men from 39% to 51% but remained more or less unchanged for women (35% to 37%). The analysis found that having blood pressure measured within 6 months was significantly associated with greater awareness and treatment in men and women, and greater control in women.

A higher proportion of men than women have high blood pressure, but this is reversed after age 55 when postmenopausal women lose the protective effects of estrogen.[40] A study of postmenopausal women in the Women's Health Initiative revealed that despite similar treatment rates in different age groups, hypertension control is poorer in women over age 70 than in younger women.[41] Oral contraceptive use increases the risk of high blood pressure, especially among obese and older women.[42] Blacks have a higher prevalence of high blood pressure than do Whites, and Black women have the highest rate of high blood pressure of any group.[43, 44] Prevalence of hypertension also is higher among less educated, older, less active, and obese persons. While knowledge of the importance of treating high blood pressure and of strategies to do so is common among physicians, only half of hypertensive patients receive treatment to control their blood pressure.[45]

**Adults who had their blood pressure measured within the preceding 2 years and could state whether their blood pressure was normal or high, 2003**




**Source**: National Health Interview Survey, 2003.
**Reference population**: Noninstitutionalized adults age 18 and over.

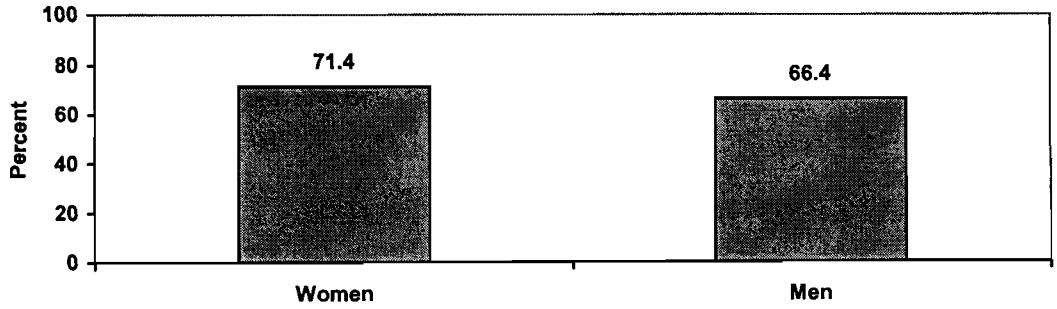
- Women were significantly[ii] more likely than men to have had their blood pressure measured within the preceding 2 years and to have been able to state whether their blood pressure was normal or high.

[ii] Note: Throughout this report, statistical (two-tailed) tests indicate differences between men and women that are statistically significant at the $p<0.05$ level.

## Screening for High Cholesterol

Physicians acknowledge that high cholesterol is an important CVD risk factor.[46] Although screening for this condition has increased considerably, many patients with high cholesterol have historically been untreated or under treated with lipid-lowering drugs.[47, 48, 49] Furthermore, a recent study found that women were less likely than men to have their cholesterol under control, even when they had health insurance and access to health care.[50]

**Adults who have had their blood cholesterol checked within the preceding 5 years, 2003**



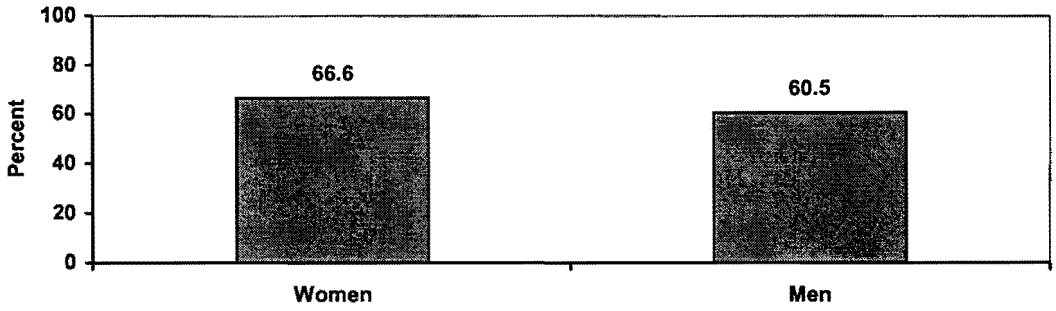

**Source:** National Health Interview Survey, 2003.
**Reference population:** Noninstitutionalized adults age 18 and over.

- Women were significantly more likely than men to have had their blood cholesterol checked within the preceding 5 years.

## Counseling on Smoking

Smoking is a modifiable risk factor for heart disease and other conditions[51] and significantly increases women's risks of death from heart disease.[30] While most physicians recognize the importance of cigarette smoking cessation counseling and have provided some related counseling, less than half of providers routinely counsel their patients about this important risk factor.[52, 53] Other studies have found low rates of smoking cessation counseling among primary care physicians and obstetricians and gynecologists and note that physicians underestimate the effect of smoking as a major risk factor for heart attacks among young women.[54]

**Adult smokers receiving advice to quit smoking, 2004**




**Source:** Medical Expenditure Panel Survey, 2004.
**Reference population:** Noninstitutionalized adults age 18 and over.

- Women were significantly more likely than men to have received advice to quit smoking.

## Chronic Care

This section focuses on access to and quality of chronic care for women and men with CVD. Chronic care for CVD emphasizes measures that manage the disease and prevent the condition from getting worse.[46] These measures include: counseling on lifestyle (e.g., smoking, diet, obesity, physical inactivity), routine testing and monitoring of blood pressure[55] and of blood lipids including cholesterol, and the use of appropriate medication to manage chronic conditions and prevent acute events. The presence of multiple risk factors increases the risk of heart attack for women as well as for men.[56]

Clinical practice guidelines recommend secondary prevention and management of heart disease for persons with heart conditions, vascular disease, and stroke. In addition to guidelines and measures developed by various groups, [57 58] the American Heart Association (AHA) and the American College of Cardiology (ACC) also have updated clinical guidelines targeting prevention of CVD in women,[59, 60, 61] as follows:

- Routinely assess blood pressure[42, 62] and cholesterol.[63, 64]
- Control high blood pressure and cholesterol[64, 65] with appropriate medications.
- Assess smoking status; advise on smoking cessation.[66]
- Discuss aspirin therapy[59, 67] to prevent acute cardiac events.
- Assess obesity/body mass index (BMI);[68] advise on diet[69] and exercise.[70]
- Prevent[71] and control diabetes mellitus (a risk factor for heart disease).[72]
- Provide influenza vaccination.[73, 74]

As noted earlier, some of the key risk factors for developing CVD, and for increasing the risk of associated complications and death, include high blood pressure, high blood cholesterol, and smoking. National data presented in this report compare the proportion of men and women with CVD who have had their blood pressure and cholesterol checked and received counseling to quit smoking, and compare women with and without CVD on these measures. These national data provide a snapshot of the quality of care for CVD in women. Because the national data we used generally reflected self-reported information from population-based surveys, they may represent underreporting, especially of care more than a few weeks in the past, and of care that is provided to patients with higher utilization.[75, 76]

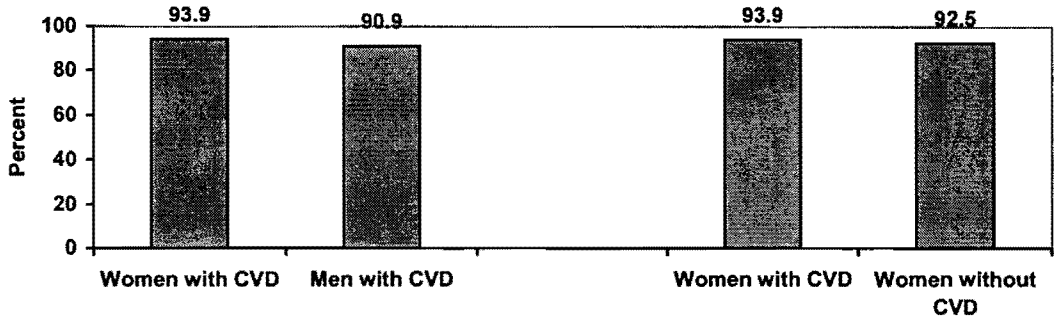
Studies have shown that lack of recognition by patients and physicians of symptoms of heart disease, barriers to care, and socioeconomic status contribute to under-diagnosis and under-treatment of women with this condition.[56] Recent studies have shown there are opportunities for improving the management of CVD for women enrolled in commercial health plans [50] and among female Medicare patients with diabetes[77] (a disease that itself increases risks of CVD-related mortality). Even among women receiving lipid-lowering treatments, those with heart disease or diabetes are less likely to have their cholesterol under control, even after accounting for patients' socioeconomic status and other characteristics.[78]

### Screening for High Blood Pressure

Systolic hypertension (a high reading in the first number of a blood pressure measurement) is a risk factor for heart attack and stroke. However, it can be controlled with medication and/or

lifestyle changes.[79] While awareness (72%) and treatment (62%) have increased among those with high blood pressure, rates of blood pressure control (35%) are still suboptimal, according to data from the National Health and Nutrition Examination Survey (NHANES).[39]

**Adults with CVD who had their blood pressure measured within the preceding 2 years and could state whether their blood pressure was normal or high, 2003**




**Source:** National Health Interview Survey, 2003.
**Reference population:** Noninstitutionalized adults age 18 and over.
**Key:** CVD = cardiovascular disease, as defined in the Introduction and Methods section of this report

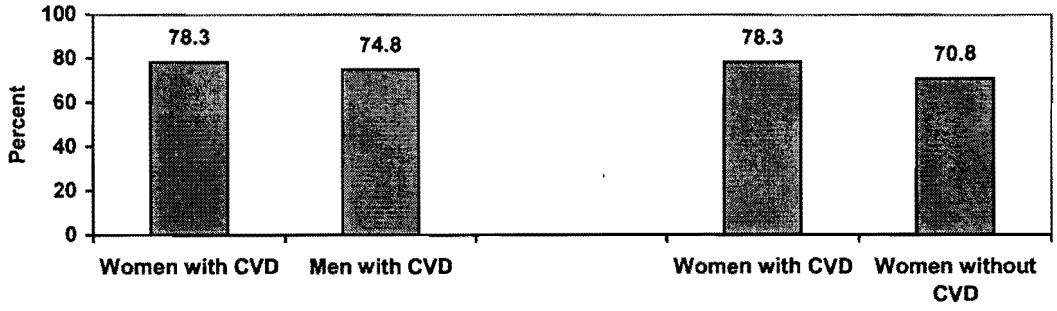
- No statistically significant difference was observed between the percentages of women and men with CVD who had their blood pressure measured within the preceding 2 years and could state whether it was normal or high.
- No statistically significant difference was observed between the percentages of women with and without CVD who had their blood pressure measured within the preceding 2 years and could state whether it was normal or high.

## Screening for High Blood Cholesterol

Clinical practice guidelines recommend that clinicians routinely screen men age 35 years and older and women age 45 years and older for lipid disorders (e.g., high blood cholesterol, high triglycerides, low levels of high-density lipoprotein [HDL]) and treat abnormal lipids in people who are at increased risk of heart disease.[63] Such guidelines also recommend that physicians routinely screen younger adults (men ages 20 to 35 and women ages 20 to 45) for lipid disorders if they have other risk factors for heart disease.

Despite the presence of clinical guideline recommendations, previously identified shortfalls in cholesterol measurement[80] and treatment[81] appear to persist. Women may still be less likely than men to be monitored, to have been prescribed lipid-lowering drugs, and to have their cholesterol controlled.[82, 83, 84, 85]

**Adults with CVD who have had their blood cholesterol checked within the preceding 5 years, 2003**



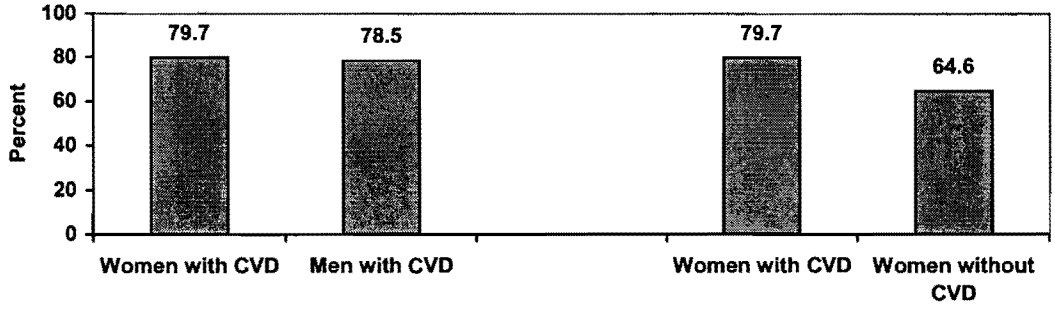

**Source**: National Health Interview Survey, 2003.
**Reference population**: Noninstitutionalized adults age 18 and over.
**Key:** CVD = cardiovascular disease, as defined in the Introduction and Methods section of this report

- No statistically significant difference was observed between the percentages of women and men with CVD who had their blood cholesterol checked within the preceding 5 years.
- Women with CVD were significantly more likely than women without CVD to have had their blood cholesterol checked within the preceding 5 years.

## Counseling on Smoking

Routine assessment of smoking status among persons with or at risk for heart disease is recommended. Physicians also should advise and support all smokers to stop smoking in order to prevent lung disease, heart disease, and stroke.[86]

**Adult smokers with CVD who received advice to quit smoking, 2004**



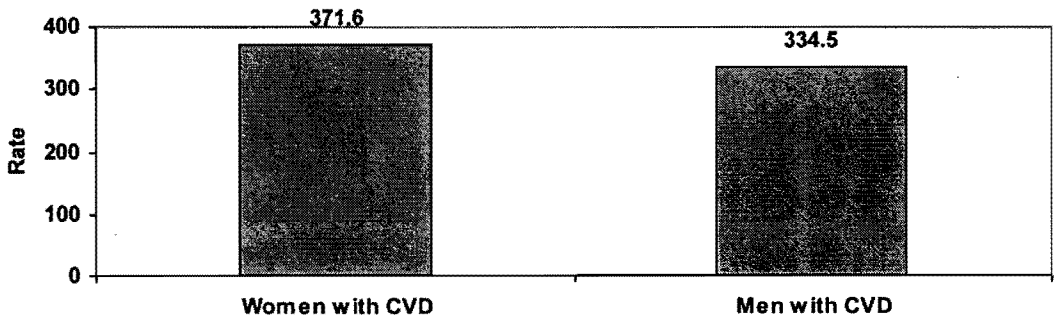

**Source:** Medical Expenditure Panel Survey, 2004.
**Reference population:** Noninstitutionalized adults age 18 and over.
**Key:** CVD = cardiovascular disease, as defined in the Introduction and Methods section of this report

- No statistically significant difference was observed between women and men with CVD who smoked and received advice to quit smoking.
- Women with CVD who smoked were significantly more likely than women without CVD who smoked to have received advice to quit smoking.

## Management of Heart Failure

Various risk factors predict the occurrence of heart failure in women,[87] and elderly women are more likely to have heart failure and face a high burden from the morbidity and mortality associated with this condition. Heart failure is the most common cause for hospital admission under the Medicare program. Clinical practice guidelines for heart failure recommend that physicians evaluate various aspects of patients' circumstances, including daily functioning, medications, diet, BMI and clinical status.[88] Clinical performance measures also assess quality of care provided to adults with chronic heart failure.[89] Hospitalizations with a primary discharge diagnosis of heart failure partly reflect unsuccessful outpatient management of this condition.

**Hospitalizations with a primary discharge diagnosis of heart failure per 100,000 adults age 18 and over**




**Source:** Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2005.
**Reference population:** Noninstitutionalized adults age 18 and over.

- No statistically significant difference was observed between women and men in rates of hospital admissions for heart failure.

## Acute Care

This section focuses on access to and quality of acute care received by patients hospitalized with CHD, aortic aneurysm, and stroke—key conditions among the categories of heart, vascular, and cerebrovascular diseases, respectively. Assessments of the quality of acute care include evaluations of the timely provision of appropriate diagnostic and therapeutic interventions following hospital admission in order to reduce risks and improve survival rates. Inpatient mortality rates for women and men provide some indication of the impact of care processes on patient outcomes, and help determine if gender differences in cardiac care exist.

According to 2004 national data, more women died from heart disease than men in the U.S. Higher female CVD-related mortality was seen across racial/ethnic groups. CVD-related deaths comprised 37.7 % of total deaths for White women compared to 34.5% for White men, and 40% of total deaths for Black women compared 32.7% for Black men.[17] These statistics may partly reflect the racial variation in the management of CHD that has been identified.[90]

Also, other studies have documented separate and/or concurrent variation by gender in the use of various management strategies,[91] including reperfusion with fibrinolytics ("clot-busting") drugs.[92] Other studies indicate that there are gender differences in cardiac diagnoses and treatment recommendations provided for cardiac conditions, even when men and women present with similar symptoms.[93] Studies suggest that women with cardiac conditions are treated less aggressively than men by physicians, and are less likely to receive invasive cardiac procedures.[94, 95] National data for 1994–2002 from the National Registry of Myocardial Infarction (NRMI) found that rates of reperfusion therapy, coronary angiography, and other procedures vary according to race and sex, with no evidence that the differences have narrowed in recent years.[96] Geographic variations in the rates of such services also exist, and factors other than disease incidence, including physician gender,[97] may account for differences in the use of various procedures. One study found that female heart attack patients were less likely than males to be admitted to hospitals capable of performing revascularization procedures, and were less likely than men to undergo revascularization even when admitted to hospitals with this capability.[98] Studies also have shown that differences in willingness to undergo invasive cardiac procedures are unlikely to account for lower procedure rates seen among women.[99] The progression of renal disease (which, among other things, makes patients Medicare-eligible regardless of age) appears to be associated with a narrowing of gender differences in the use of cardiovascular procedures.[100]

NRMI data indicate that heart attack mortality continues to vary according to race and sex.[96] Even among those treated surgically, studies have shown that premature death after myocardial infarction (i.e., heart attack) is higher among women than among men,[101] especially for women under age 70.[102] Women have higher mortality rates than men for cardiac procedures such as diagnostic catheterization, coronary angioplasty, atherectomy, and bypass surgery.[103, 104, 105, 106] While gender differences in outcome have been attributed to disease onset at older age, greater numbers of co-morbidities, and greater severity of heart disease among women, studies have shown that women continue to face a higher risk of mortality than men after a heart attack even after adjusting for these factors.[101] Cardiac rehabilitation after hospitalization for acute cardiac events improves functioning and reduces mortality.[107] While both sexes experience long-term benefits from cardiac rehabilitation, women may actually retain some benefits longer.[108]

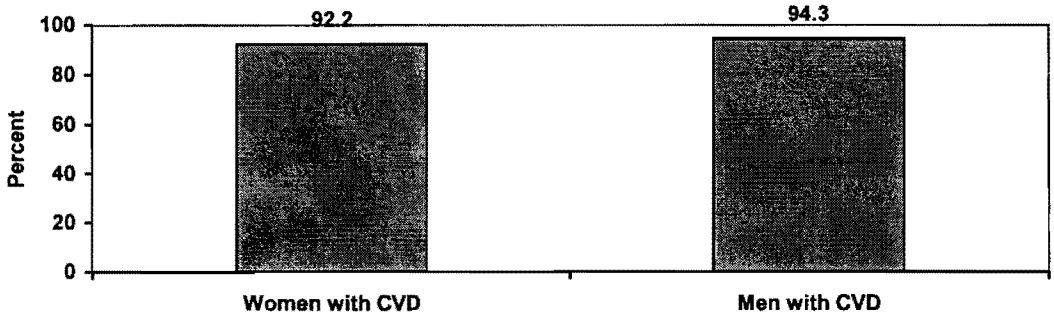
Unfortunately, some studies have found that physicians refer fewer women than men with heart disease for rehabilitation.[109, 110] Women with lower income also are less likely to be referred than higher income women, and minority women are less likely to be referred than White women.[111] Furthermore, women who are referred to cardiac rehabilitation programs may have poorer adherence and attendance than men. This may reflect more frequent coexisting illnesses, family responsibilities, and other factors.[112]

## Hospital Care for Heart Attack

Studies have found gender differences in diagnosis[103, 113] and treatment[114, 115, 116] of heart attack (a blockage of blood flow to the heart muscle). Delayed and missed diagnoses of heart attack in women lead to delays in the timely initiation of treatment. One study found only half of women with heart attacks had been previously diagnosed with heart disease.[117] Another study, which was performed in hypertensive patients, found that more men than women received definitive diagnoses of angina, but that more women than men were diagnosed with vague chest pain.[118] One possible explanation is that different diagnostic strategies were applied to men and women.

Aspirin and beta-blocker drugs prevent repeat heart attacks.[119] For patients hospitalized with a heart attack, recommended care includes: aspirin and beta-blockers within 24 hours of hospital admission and upon discharge, advice to quit smoking among smokers, and receipt of angiotensin-II converting enzyme (ACE) inhibitors or angiotensin receptor blockers (ARBs) for patients with left ventricular systolic dysfunction. The use of such therapies has improved with increased reporting on the quality of care for heart attack by entities including the Centers for Medicare & Medicaid Services.[120, 121, 122]

**Recommended hospital care received by Medicare patients with acute myocardial infarction (heart attack), 2005**




**Source:** Medicare Quality Improvement Organization Program, 2005.
**Reference population**: Medicare beneficiaries hospitalized with a primary discharge diagnosis of acute myocardial infarction.

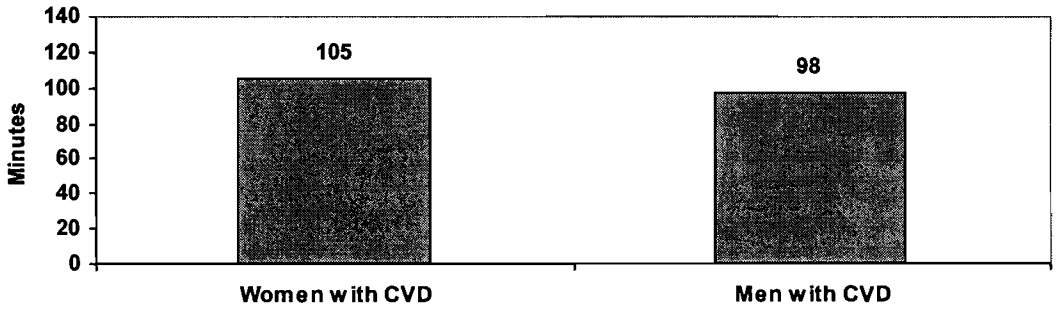
- No statistically significant difference between women and men Medicare patients was observed in the receipt of recommended [iii] inpatient care for heart attack.

[iii] This measure is a composite of the following measures: (1) receipt of aspirin within 24 hours of hospitalization, (2) receipt of aspirin upon discharge, (3) receipt of beta-blockers within 24 hours of hospitalization, (4) receipt of beta-blockers upon discharge, (5) receipt of ACE-inhibitors or angiotensin receptor blockers for left ventricular systolic dysfunction, (6) receipt of counseling about smoking cessation among smokers.

## Time to Initiation of Revascularization Therapy for Heart Attack Patients

The capacity to treat hospital patients in a timely manner is especially important for emergency situations such as heart attacks. For patients suffering from a heart attack, early revascularization (treatment to open blocked arteries in the heart) using fibrinolytic therapy to dissolve the blockage, or procedures such as percutaneous coronary intervention (using balloons, with or without small metal sleeves to open the artery and keep it open) may reduce heart muscle damage and save lives.[123]

**Median time (minutes) from hospital arrival of Medicare heart attack patients to initiation of percutaneous coronary intervention, 2005**



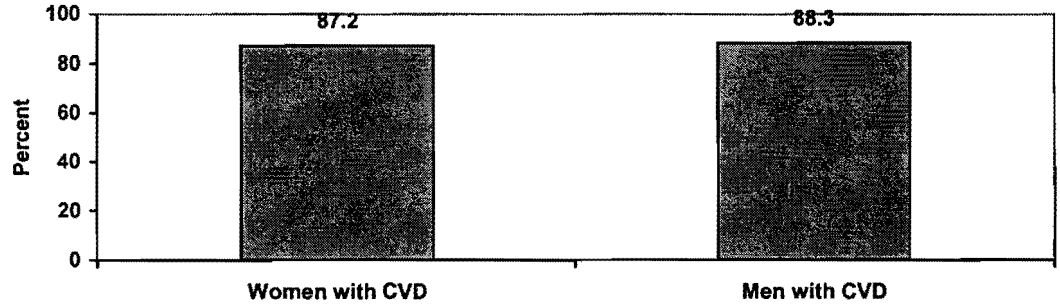

**Source:** Medicare Quality Improvement Organization Program, 2005.
**Reference population:** Medicare beneficiaries meeting all of the following criteria: (1) principal discharge diagnosis of acute myocardial infarction; (2) ST segment elevation or left bundle branch block on the electrocardiogram performed closest to hospital arrival; and (3) percutaneous coronary intervention performed during the hospital stay.

- No statistically significant difference between women and men with heart attack was observed in the median time interval from hospital arrival to the initiation of percutaneous coronary intervention.
- However, median intervals for both men and women exceeded the national target of 90 minutes set by the ACC and the AHA.[124]

## Hospital Care for Heart Failure

Heart failure is the most common cause for hospital admission under the Medicare program. Rates of readmission in the 30 days after discharge are estimated at 18% to 25%. Care recommended for patients hospitalized with heart failure includes evaluation of left ventricular ejection fraction and use of ACE inhibitors or ARBs for patients with left ventricular systolic dysfunction.[125] However, there is abundant evidence of overall underutilization of medications such as ACE inhibitors for treating heart failure,[126] with only 10% to 50% of patients receiving the recommended doses of ACE inhibitors.[127, 128, 129, 130, 131] While percentages have improved with reporting on the quality of heart failure care by professional organizations,[89] utilization among women lags behind that of men. Although ACE inhibitors are beneficial in women, one study found that they do not reduce mortality in women with asymptomatic left ventricular systolic dysfunction.[132] This is important because women are less likely than men to be evaluated for systolic dysfunction.[133]

**Recommended hospital care received by Medicare patients with heart failure, 2005**




**Source:** Medicare Quality Improvement Organization Program, 2005.
**Reference population:** Medicare beneficiaries hospitalized with a primary discharge diagnosis of acute heart failure. Patients transferred from other acute care hospitals are excluded from some measures, while patients transferred to other acute care hospitals are excluded from other measures.

- Female Medicare patients were significantly less likely than male Medicare patients to have received recommended[iv] hospital care for heart failure. The statistical significance of the relatively small observed difference reflects the large size of the QIO database.

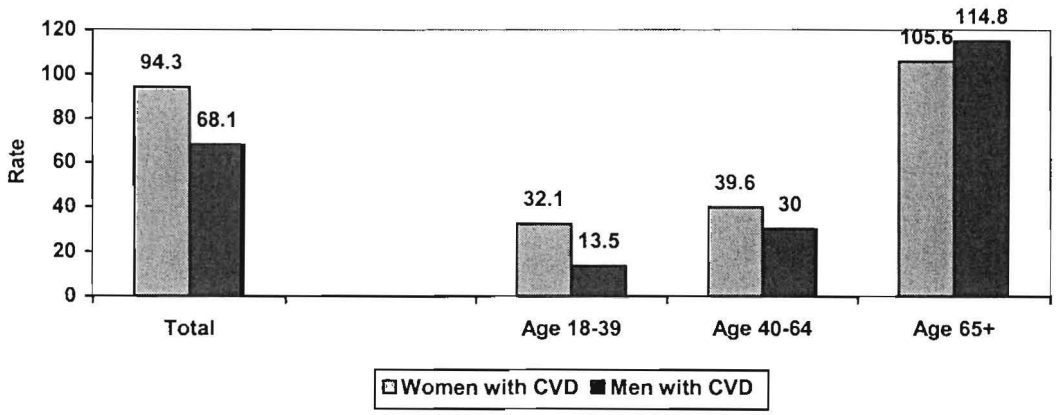
[iv] Composite incorporates the following measures: (1) receipt of evaluation of left ventricular ejection fraction, and (2) receipt of ACE inhibitors or angiotensin receptor blockers (ARBs) for left ventricular systolic dysfunction.

## Inpatient Mortality Associated with Cardiovascular Conditions and Procedures

Although mortality during a hospital stay may reflect patient characteristics, such as illness severity or the presence of comorbid conditions, the quality of health care received may be a contributing factor in some cases. Gender differences in mortality rates from invasive cardiac procedures can stem from a number of factors—differences in treatment effectiveness,[134] disparities in quality of care, and delayed or missed diagnosis,[118, 135] as well as possible variations in underlying patient populations with less physiological reserve and potentially more comorbidities. The effects of age and gender have been found to be a significant predictor of heart attack-related death, even after adjusting for demographic factors, clinical characteristics, and inpatient cardiac care.[136] However, the burden of excess death from heart attacks lies in younger women, who may face increased risks of mortality compared with older women.

**Inpatient mortality for heart attack patients.** An AHRQ-sponsored study found women were less likely than men to receive aspirin, beta-blockers, intravenous heparin, or nitrates within the first 24 hours of hospital admission for heart attack.[116] They also were less likely to undergo coronary angiography, angioplasty, or bypass surgery, and they were more likely to die in the hospital.

**Deaths per 1,000 adult admissions with primary discharge diagnosis of acute myocardial infarction (heart attack), 2005**

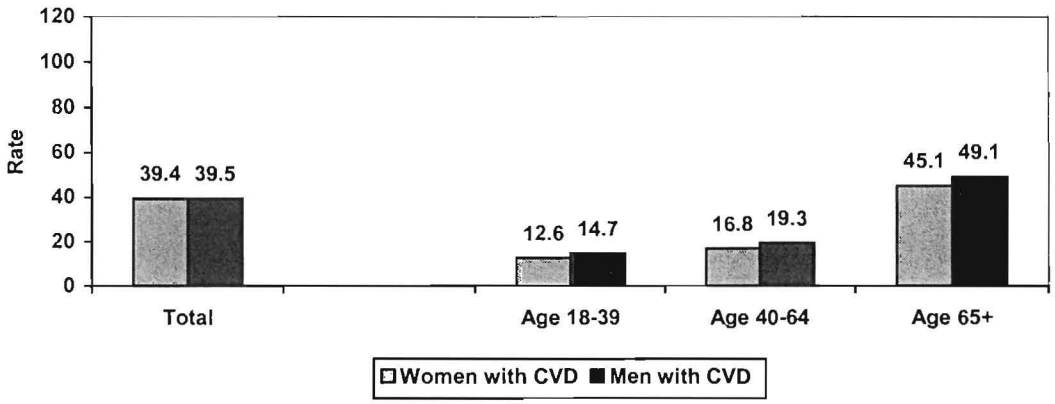



**Source**: Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2005.
**Reference population**: Noninstitutionalized adults age 18 and over. Patients transferred from other acute hospitals are included, while transfers to other acute hospitals are excluded.

- For the entire adult population and for all age groups except age 65 and over, women were significantly more likely than men to die during admissions for heart attack.

**Inpatient mortality for heart failure patients.** Studies have shown women with heart failure face a risk of inpatient mortality similar to that of men, although women who are discharged alive appear to have longer survival than men.[137] Despite similarities in mortality rates, predictors of mortality appear to be different for men and women.[138] Women with heart failure are more likely to have preserved left ventricular function but to present with more comorbidities and at older ages.[139, 140] Some studies suggest that gender may play a role in disease burden and severity, management, and outcomes of heart failure.[139] However, for Medicare beneficiaries, there do not appear to be statistically significant differences between men and women in terms of treatment.[141]

**Deaths per 1,000 admissions of adults with a primary discharge diagnosis of heart failure, 2005**




**Source**: Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2005.
**Reference population**: Noninstitutionalized adults age 18 and over. Patients transferred from other acute hospitals are included, while transfers to other acute hospitals are excluded.

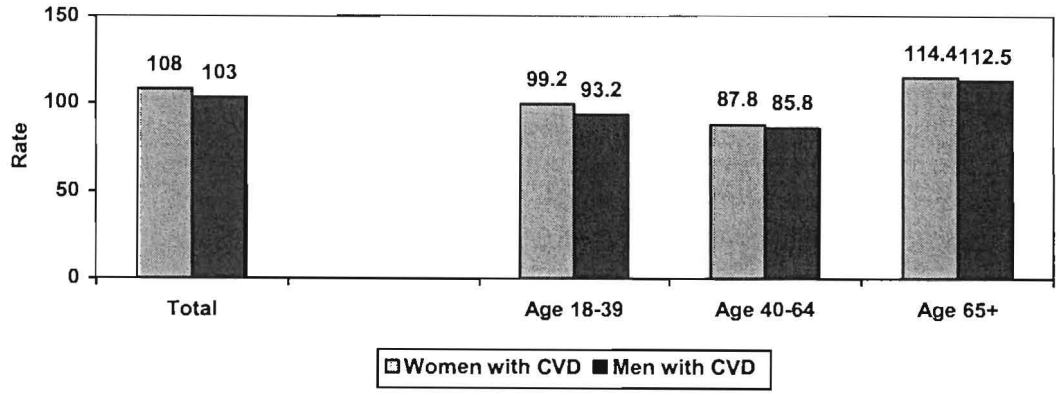
- Women ages 40-64 and 65 and over were significantly less likely than men of similar age to die during admissions with a primary discharge diagnosis of heart failure. However, a significant difference was not observed in the total population.

**Inpatient mortality for stroke patients.** According to the National Institute of Neurological Disorders and Stroke, the risk factors for a stroke (interrupted blood supply to part of the brain with neurological damage that does not rapidly resolve) are high blood pressure, cigarette smoking, heart disease, diabetes, and the previous occurrence of less severe precursor episodes referred to as transient ischemic attacks.[142] On average, someone in the U.S. has a stroke every 45 seconds. Each year about 700,000 people in the U.S. experience a new or recurrent stroke. About 500,000 of these are first attacks, and 200,000 are recurrent attacks.[17]

The American Heart Association and the American Stroke Association, a Division of the American Heart Association, have implemented the "Get-With-The-Guidelines" Program to improve physicians' adherence to recommended acute care for patients hospitalized with stroke.[143] Data from 2004, on more than 40,000 stroke patients from nearly 300 hospitals, indicated high rates of adherence to guidelines for use of antithrombotic and anticoagulation therapy.[144] However, there are opportunities for improvement in some components of stroke care recommended by organizations such as the American College of Chest Physicians,[144] the American College of Physicians and the American Academy of Family Physicians.[145] These include tPA[v] therapy immediately after symptoms appear, treatment to prevent venous thromboembolism (blood clots in the veins), provision of medications to treat high cholesterol, and counseling on smoking cessation and lifestyle changes.

Stroke is the third highest cause of death in the Nation, behind diseases of the heart and cancer. Stroke accounted for about 1 out of every 15 deaths in the U.S. in 2003. Someone dies of a stroke about every 3 minutes, and about 50% of these deaths occurred outside of hospitals. Inpatient mortality may reflect a combination of factors, including the extent of the neurological damage, comorbidities, the speed with which treatment is initiated and the treatment modalities used. For example, stroke patients' mortality and long-term disability are largely influenced by the timeliness of therapy.[146, 147] While inpatient mortality is therefore not necessarily a measure of the quality of stroke care, it may provide some indication of the impact of treatment.

**Deaths per 100,000 adult admissions with primary discharge diagnosis of stroke, 2005**




**Source**: Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2005.
**Reference population**: Noninstitutionalized adults age 18 and over. Patients transferred from other acute hospitals are included, while transfers to other acute hospitals are excluded.

[v] Tissue plasminogen activator (tPA) is a fibrinolytic (clot-busting) drug.

- Across the total population and for adults in every age group, no statistically significant difference between women and men was observed in the rate of inpatient mortality during hospital admissions with a primary discharge diagnosis of stroke.

**Inpatient mortality for patients undergoing abdominal aortic aneurysm repair.** Vascular disease is generally associated with smoking and diabetes[148] and rarely occurs in younger women who do not have these risk factors.[149, 150] Vascular diseases include abdominal aortic aneurysm (AAA), a bulging of the wall of the aorta, which is the main artery that carries oxygenated blood from the heart to the rest of the body. Among vascular diseases, AAA poses the highest risk for mortality, and occurs more frequently among men than among women. The major risk factors for AAA also include a history of ever smoking, age 65 or older, and being White. Almost all deaths from ruptured AAAs occur in men older than 65; most AAA-related deaths occur in men younger than 80. However, among women, AAA is more discovered after age 65 and generally has a familial pattern. Women have a higher risk of presenting with ruptured AAA than men.[151, 152, 153, 154]

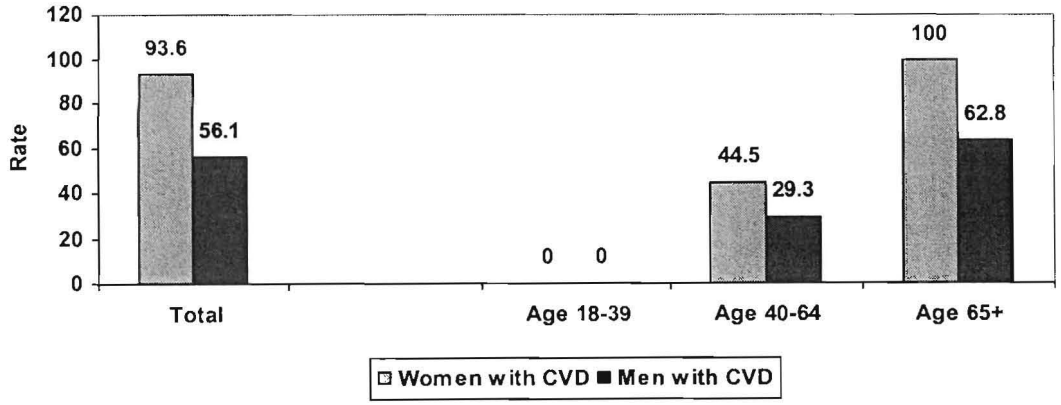
AAAs are associated with approximately 9,000 deaths annually in the U.S.[155] The prevalence of AAAs found in population-based screening studies from various countries is about 4% to 9% in men and 1% in women. The U.S. Preventive Services Task Force currently recommends a one-time ultrasound screening for AAA detection in men ages 65-74 who have ever smoked.[156] While the Task Force makes no recommendation for or against screening in male nonsmokers, it recommends against routine AAA screening in women. Based on an AHRQ-supported evidence review,[157] the Task Force concluded that the potential harms of screening (including psychological effects and risks of more invasive follow-up vascular procedures) for AAA in women 65-74 generally exceed the potential benefits. While individual circumstances may alter the best course, the overall recommendation reflects the small number of AAA-related deaths in this population, with the majority of deaths from AAA rupture occurring in women who are age 80 or older,[158, 159] an age range in which competing health risks are common.

Clinical guidelines from 2003[160] generally recommend elective repair of AAAs with diameters of 5.5 cm or more for the so-called "average" patient, but set the threshold at 4.5 to 5.0 cm for women. This difference may at least partially reflect the fact that women's generally smaller aortic diameter means that aneurysms of a given diameter may represent greater proportional aortic dilatation in women,[161] as well as concerns about increased risks of rupture in women with substantially higher rates of in-hospital mortality.

Despite these published recommendations supporting elective intervention at a lower AAA size threshold for women, a 2007 study using data from AHRQ's Nationwide Inpatient Sample found that women with AAA continue to be more likely than men to present with ruptured aneurysms.[162] The study found that women with ruptured AAAs were less likely than men to receive surgical repair. Among patients with ruptured or intact AAAs treated with either open or endovascular repair, women also experienced higher inpatient mortality rates than men. Surgical repair of ruptured AAA is usually through open aortic repair. Elective repair for intact AAA has increasingly used an endovascular approach which may have lower postoperative complication and inpatient mortality rates, than the open approach, although endovascular repairs may not be

as durable.[163] Even though the overall inpatient mortality rate for AAA declined from 2001-2004, gender differences have persisted. This may partly reflect the later detection of AAA in older women, who more commonly present with ruptured AAA and also may have more co-morbidities. Despite the higher mortality associated with presenting with a ruptured AAA, the relative rarity of this presentation and the potential unintended consequences of screening reduce the support that might otherwise exist for ultrasound screening for AAA in women. This may, at least historically, have served to limit earlier detection of AAA prior to rupture in women.

**Deaths per 1,000 admissions among adults with primary procedure code of abdominal aortic aneurysm repair, 2005**




**Source**: Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2005.
**Reference population**: Noninstitutionalized adults age 18 and over.
**Key**: CVD=cardiovascular disease. Patients transferred from other acute hospitals are included, while transfers to other acute hospitals are excluded.

Women were significantly more likely than men to die when admitted to the hospital for abdominal aortic aneurysm repair across the total population and for adults age 65 and over. Death following AAA repair in people ages 18-39 is rare. For patients ages 40-64, the absence of a statistically significant gender difference in mortality at least partially reflects small numbers.

## Patient Centeredness, Timeliness, and Accessibility of Care

These measures of quality may be relevant to preventive, chronic, or acute care for CVD and other conditions.

### Patient Centeredness

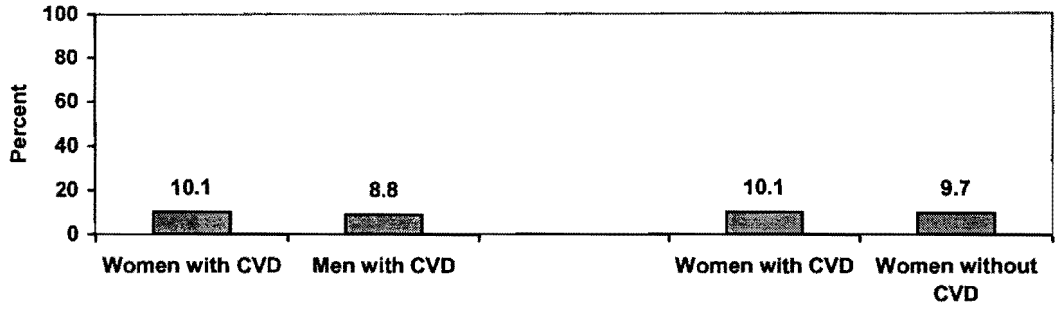
The Institute of Medicine has defined patient centeredness as: "[H]ealth care that establishes a partnership among practitioners, patients, and their families (when appropriate) to ensure that decisions respect patients' wants, needs, and preferences and that patients have the education and support they need to make decisions and participate in their own care."[164] As a core component of quality health care, patient centeredness "encompasses qualities of compassion, empathy, and responsiveness to the need, values, and expressed preferences of the individual patient."[165]

Patient centered care is supported by good patient-provider communication, which both facilitates understanding of patients' needs and preferences and also empowers patients to be proactive in their own care.[164, 166, 167, 168] This style of care has been shown to improve patients' health and health care,[167, 169, 170, 171] while enhancing satisfaction with the overall physician encounter.[172] Unfortunately, there are barriers to patient-provider communication in both directions. About a third of Americans are sub-optimally health literate, lacking the "capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions."[173]

Differences by gender in the management of acute myocardial infarction have been documented.[174, 175] One landmark simulation study found that patient race and gender influence how primary care physicians manage chest pain patients with similar clinical presentations.[176] Blacks and women were less likely to receive recommendations for cardiac catheterization than were Whites and men and were even perceived as being less "likable." Such gender-based variations in perception may complicate patient-provider interactions in cardiac care,[16, 177] with potentially more negative outcomes in female patients compared with male patients. These observations serve as an impetus for assessing patient centered care as it pertains to women with CVD.

**Patient-provider interaction.** This report evaluates a composite measure of patient centeredness. The measure captures patients' experience of care as it pertains to patient-provider communication, including whether or not a patient's health provider listened carefully, explained things clearly, respected what patients had to say, and spent enough time with them.

**Adults whose health providers sometimes or never listened carefully, explained things clearly, respected what they had to say, and spent enough time with them, 2004**




**Source:** Medical Expenditure Panel Survey, 2004.
**Reference population:** Noninstitutionalized adults age 18 and over.
**Key:** CVD = cardiovascular disease.
**Note:** This is a CAHPS® measure.

- No statistically significant difference was observed between the percentages of women and men with CVD whose health providers sometimes or never listened carefully, explained things clearly, respected what they had to say, and spent enough time with them.
- No statistically significant difference was observed between the percentages of women with and without CVD whose health providers sometimes or never listened carefully, explained things clearly, respected what they had to say, and spent enough time with them.

## Timeliness

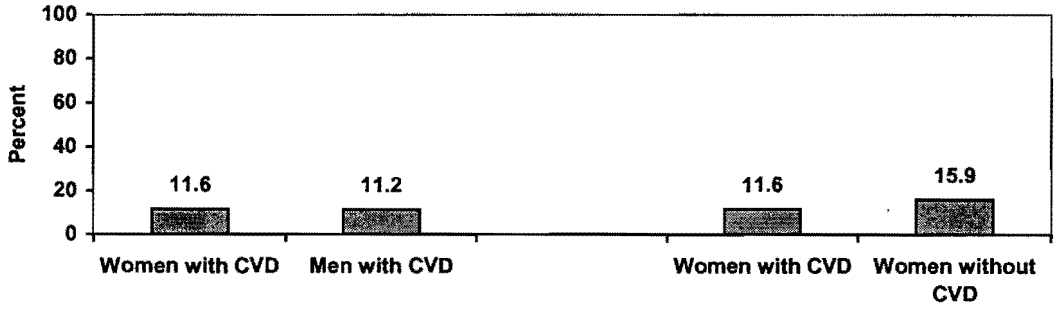
Timeliness is one of six dimensions of quality established by the Institute of Medicine as a priority for improvement in the health care system.[165] Timeliness may be characterized as the health care system's capacity to provide appropriate care quickly after a need is recognized. Lack of timeliness may result in multiple consequences for patients, including emotional distress, physical harm, and financial consequences.

Receiving needed care in a timely manner is essential to positive patient outcomes. Timeliness may prove to be especially important for female cardiac patients, who often experience greater delays in treatment, due to variation in symptom recognition and perceived barriers in access to care [93] or through variations in providers' assessments of their symptoms when compared with those of men.

Aside from the data on revascularization times presented previously, this report also includes two more general measures of the timeliness of care—getting appointments for routine care and getting care for illness or injury as soon as wanted.

**Routine care appointments.** Timely receipt of routine care can promote better health, alleviate discomfort, and prevent potentially serious complications from developing in patients with CVD.

**Adults who can sometimes or never got appointments for routine care as soon as wanted, 2004**

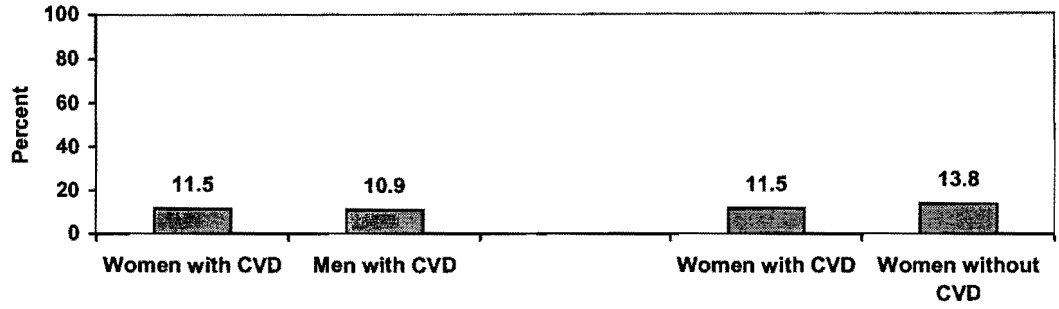



**Source:** Medical Expenditure Panel Survey, 2004.
**Reference population:** Noninstitutionalized adults age 18 and over.
**Key:** CVD = cardiovascular disease.

- No statistically significant difference was observed between the percentages of women and men with CVD who sometimes or never got appointments for routine care as soon as wanted.
- Women with CVD were significantly less likely than women without CVD to sometimes or never have gotten appointments for routine care as soon as wanted.

**Illness or injury care.** The ability of patients to receive treatment for illness or injury in a timely fashion is a key to a patient-focused health system.

**Adults who sometimes or never got care for illness or injury as soon as wanted, 2004**




**Source:** Medical Expenditure Panel Survey, 2004.
**Reference population:** Noninstitutionalized adults age 18 and over.
**Key:** CVD = cardiovascular disease.

- No statistically significant difference was observed between the percentages of women and men with CVD who sometimes or never got care for illness or injury as soon as wanted.
- No statistically significant difference was observed between the percentages of women with CVD and women without CVD who sometimes or never got care for illness or injury as soon as wanted.

## Accessibility of Care

Accessibility of health care means having "the timely use of personal health services to achieve the best health outcomes."[19] Steps essential to attaining good access to care include: gaining entry into the health care system, getting access to sites of care where patients can receive needed services, and finding providers who meet the needs of individual patients and with whom patients can develop a relationship based on mutual communication and trust.

Health care accessibility is measured in several ways including:

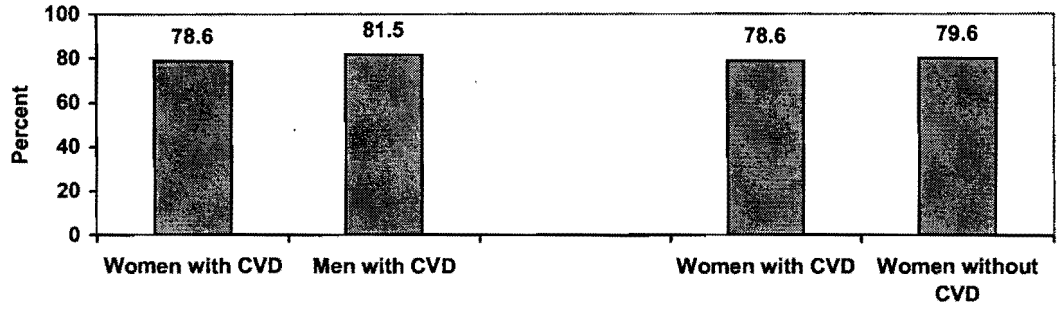
- Structural measures of the presence or absence of specific resources that facilitate health care, such as having health insurance or a usual source of care.
- Assessments by patients of how easily they are able to gain access to health care.
- Utilization measures of the ultimate outcome of good access to care—i.e., the successful receipt of needed services.

This report includes measures of accessibility in the categories of patient-provider communication, health insurance coverage, usual source of care, and patient perceptions of need as follows:

- People with a provider who usually asks about medications and treatments other doctors may give.
- People under age 65 uninsured all year.
- People who had a usual primary care provider.
- Families unable to receive or delayed in receiving needed medical care due to financial or insurance reasons.

**Patient-provider communication.** Prevention of potentially harmful drug-drug interactions is facilitated when physicians routinely ask their patients if they have been prescribed additional medications or are undergoing other treatment regimens.

**Adults with providers who usually asked about medications and treatments other doctors may give, 2004**

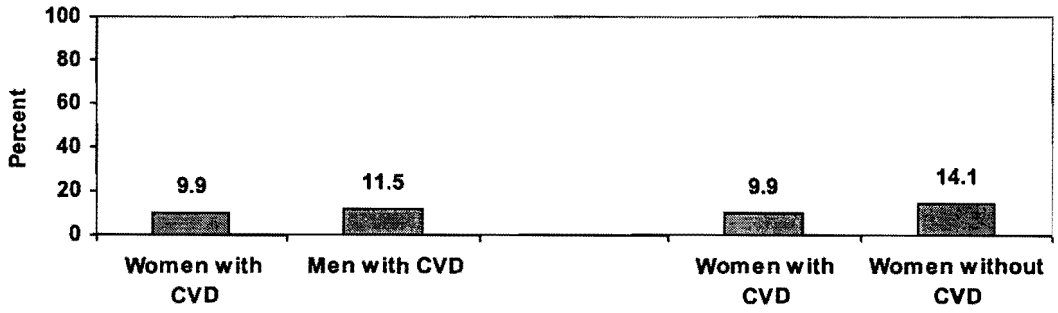



**Source:** Medical Expenditure Panel Survey, 2004.
**Reference population:** Noninstitutionalized adults age 18 and over.
**Key:** CVD = cardiovascular disease.

- No statistically significant difference was observed between the percentages of women and men with CVD who had providers who usually asked about medications and treatments other doctors may give.
- No statistically significant difference was observed between the percentages of women with CVD and women without CVD who had providers who usually asked about medications and treatments other doctors may give.

**Health insurance coverage.** Health insurance facilitates gaining entry into the health care system. Women with health insurance are more likely to obtain needed prevention, primary care, and specialty services, and are more likely to benefit from health care advances than are uninsured women[178] Women are less likely than men to participate in their employer's health plans and are more vulnerable to losing coverage. Over 17 million women were uninsured all year in 2004. Insurance status is important because the uninsured as a group are more likely to die early and have poor health status. The costs of early death and poor health among the uninsured have been estimated to total $65 billion to $130 billion. The uninsured report more problems getting care, are diagnosed at later disease stages, and get less therapeutic care. They are sicker when hospitalized and more likely to die during their stay. The Institute of Medicine estimates that there are 18,000 unnecessary deaths annually due to the consequences of lack of insurance.[179]

**Adults under age 65 uninsured all year, 2004**

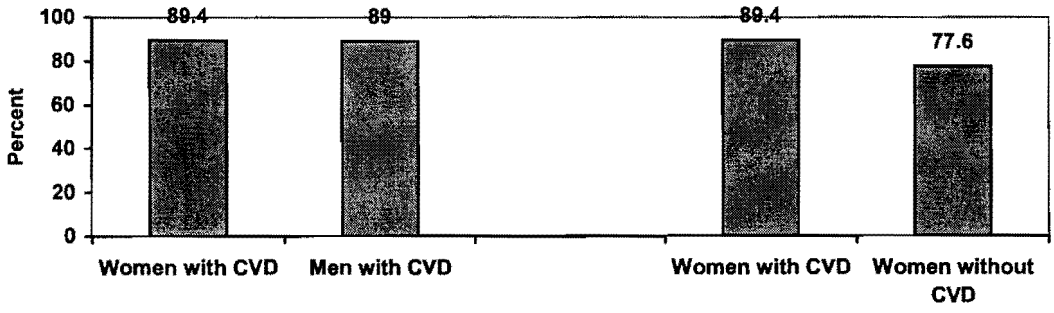



**Source:** Medical Expenditure Panel Survey, 2004.
**Reference population:** Noninstitutionalized adults age 18 and over.
**Key:** CVD = cardiovascular disease.

- No statistically significant difference was observed between the percentages of women and men with CVD under age 65 who were uninsured all year.
- Women with CVD were significantly less likely than women without CVD to have been uninsured all year.

**Usual source of care.** Patients with longstanding relationships with regular care providers express greater trust in their providers; this promotes patient-provider communication and increases the likelihood that patients will receive appropriate care. Continued interaction with a patient over time permits a provider to learn about patient's health needs and to personalize care, thereby promoting both the efficient use of resources and patient satisfaction. Despite the benefits of having a usual source of health care, over 40 million Americans lack such a relationship.[180] Individuals who utilize a specific facility regularly to address their care needs, or have a usual source of care, experience improved health outcomes and reduced disparities and cost. In addition to lower health care costs and lower hospitalizations,[181] women with a usual source of care are more likely to receive preventive services.[182]

**Adults who had a usual primary care provider, 2004**

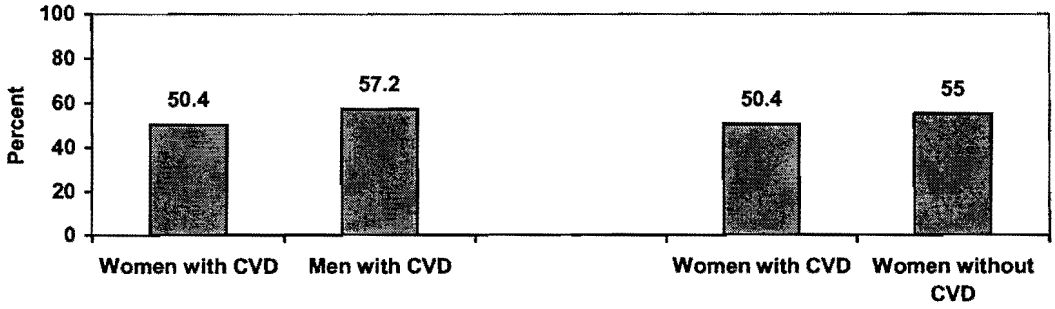



**Source:** Medical Expenditure Panel Survey, 2004.
**Reference population:** Noninstitutionalized adults age 18 and over.
**Key:** CVD = cardiovascular disease.

- No statistically significant difference was observed between the percentages of women and men with CVD who had a usual primary care provider.
- Women with CVD were significantly more likely than women without CVD to have had a usual primary care provider.

**Patient perceptions of unmet need.** Patient perceptions of unmet needs include problems getting care as soon as it is wanted as well as perceived difficulties or delays in obtaining care. Although patients may not always be able to assess their need for care, problems getting care when patients perceive that they are ill or injured likely reflect significant barriers to care. Even insured women may perceive having barriers to needed care; in one study one in every six privately insured women reported postponing or foregoing needed health care for financial reasons.[183] Studies suggest that women may be especially prone to delay care due to cost implications,[179] even when seeking care for known cardiac symptoms.[93]

**Adults who were unable to receive or delayed receiving needed medical care due to financial or insurance reasons, 2004**




**Source:** Medical Expenditure Panel Survey, 2004.
**Reference population:** Noninstitutionalized adults age 18 and over.
**Key:** CVD = cardiovascular disease.

- No statistically significant difference was observed between the percentages of women and men with CVD who were generally unable to receive or delayed receiving needed medical care due to financial or insurance reasons.
- No statistically significant difference was observed between the percentages of women with CVD and women without CVD who were generally unable to receive or delayed receiving needed medical care due to financial or insurance reasons.

# Moving Forward

As heart disease alone is already the number one killer of women in the U.S., the added death toll for various other forms of CVD only heightens the importance of preventing and treating this entire class of conditions. There are gaps in our understanding of underlying disease processes, of the relative *efficacy* of prevention and therapeutic interventions when performed under optimal conditions, and in the relative *effectiveness* of interventions when provided under usual conditions. Even for interventions of proven value, our review of the literature indicates that women experience disparities in access to such care, in having it provided in an optimal fashion, and in attaining the desired outcomes.

However, the data that we analyzed provides a more mixed picture of the quality of cardiovascular care for women. Compared with all men (i.e., including those who are at risk of developing CVD as well as those who already have it), we found that all women were more likely to have had certain CVD risk factors (namely blood pressure, cholesterol and smoking) addressed. Women and men with CVD were equally likely to have had blood pressure, cholesterol and smoking addressed, and to have timely access to patient centered medical care as a whole, with similar perceptions of financial issues related to care access. They had similar rates of hospitalization for heart failure, received recommended components of heart attack care (including timely percutaneous coronary intervention) at similar rates, and similar death rates among hospital episodes of heart failure or stroke. However, women with CVD fared worse than men in some other respects, as reflected by receiving recommended components of inpatient care for heart failure less often than men, and by higher death rates when hospitalized for heart failure or AAA. Many aspects of care could certainly be improved for both genders, regardless of which group fared better. Compared to women without CVD, women with CVD fared either better or about the same across several measures of preventive care, or measures of the patient centeredness, timeliness, and access to medical care, in general.

## Improving the Evidence Base

Addressing gaps in health care for priority populations is part of AHRQ's mission. As such, the Agency maintains a focus on care for women through its measurement and reporting activities, as well as through its grant programs. AHRQ has awarded grants to several academic institutions to study aspects of cardiovascular care for women. A 2006 AHRQ report[184] described AHRQ-supported extramural research on CVD in women. While various findings of AHRQ-supported research were noted, (including many of which have been cited in the current report), the report also discussed how the lack of studies on women limits the usefulness of research on coronary heart disease.

One important facet of efforts to improve care for women with CVD is the need to update the evidence base for specific interventions as approaches for the diagnosis and management of heart disease evolve. Included among the findings of the AHRQ report cited above are those of two AHRQ-sponsored systematic reviews[185, 186] of the existing evidence pertaining to the diagnosis and management of CHD in women. A review of some 810 articles identified only 162 with evidence regarding CHD care in women. For 42 subtopic areas, where evidence-based content on care for women was deemed to be important, these articles provided good data in women to

address only 6 areas, while 8 areas had fair data, and 28 had weak or no data. AHRQ supports the authors' recommendations that new or updated systematic reviews of research on care for CHD in women should include data on: exercise tolerance testing and echocardiography; aspirin and beta-blockers for secondary prevention; assessment of hypertension, diabetes, hyperlipidemia, homocysteine, smoking, obesity and age as risk factors; smoking cessation; hyperlipidemia treatment as risk factor reduction strategies; and gender-based differences in utilization of various treatment modalities.

In addition, AHRQ's Developing Evidence to Inform Decisions about Effectiveness (DEcIDE) program includes projects examining the effectiveness of B-adrenergic antagonists on the risk of re-hospitalization in adults with diagnosed heart failure and the effectiveness of the isosorbide dinitrate/hydralazine combination ("BiDil") in treating heart failure. As a whole, the Agency recommends continued research in these areas.

Other Federal agencies actively involved in research to improve cardiovascular care for women include the National Heart, Lung, and Blood Institute (NHLBI) of the National Institutes of Health. NHLBI supports a vast portfolio of intramural and extramural research vital to our understanding of the biomedical mechanisms, clinical efficacy, and real-world effectiveness of potential interventions. Notable among NHLBI's extramural research activities relevant to CVD in women is the Women's Health Initiative (WHI).[187] WHI is a 15-year research program addressing the most common causes of death, disability, and impaired quality of life in postmenopausal women. This initiative focuses on CVD, cancer, and osteoporosis. The three major components of the initiative were: a randomized controlled clinical trial with various therapeutic approaches to prevention, an observational study to identify predictors of disease, and a study of community approaches to developing healthier behaviors.

Due to the dearth of trial data on CVD care in women, AHRQ supports the recommendations of various researchers and of the NIH Revitalization Act of 1993.[188] Provisions of this Act include directives that all clinical trials have adequate numbers of female participants and that gender-based analysis be performed whenever possible. The results of such analyses are urgently needed in a wide range of research areas related to CVD treatment, and each funding agency should determine how best to marshal their resources.

While some evidence based guidelines address use of diagnostic tests (e.g. evaluation of left ventricular functioning in heart failure patients), a major gap is the availability of recognized measures assessing diagnostic accuracy or diagnostic errors (misdiagnosis, missed diagnosis or delayed diagnosis). AHRQ recognizes that diagnostic errors in ambulatory care settings (including emergency departments) comprise a notable and costly fraction of all medical errors. Such errors as related to CHD diagnosis in the emergency department[189, 190] may be of particular relevance to gender disparities in CVD care. AHRQ intends to support research designed to gain a better understanding of the incidence, cost, determinants, and strategies for preventing or mitigating diagnostic errors in ambulatory care settings through a new Special Emphasis Notice.[191]

The Centers for Disease Control and Prevention (CDC) produces the Women and Heart Disease Fact Sheet[192] and provides ongoing surveillance of heart disease and its risk factors stratified by gender.

## Encouraging Adherence to Evidence-Based Guidelines

In May 2007, a Congressional briefing[193] sponsored by the National Committee for Quality Assurance, the Jacobs Institute on Women's Health, and others highlighted the findings of recent studies on gender disparities in cardiovascular care. The studies, which included two AHRQ-funded projects,[50,177] highlighted the independent effects of race, socioeconomic status, and gender on cholesterol control and other risk management strategies seen in commercial insurance and Medicare managed care enrollees. Based on these results, and the variation seen both across and within plans, AHRQ recommends that these patterns of disparity be more closely examined and that the significant opportunities for improvement highlighted by this variation be pursued. The study results also suggested that different interventions may be necessary to improve the quality of cardiovascular care for men and women.

The AHRQ supports adherence to evidence-based guidelines related to CVD care. These include guidelines promulgated by the AHRQ-supported U.S. Preventive Services Task Force (USPSTF)[194] including the following recommendations for clinicians:

- Routinely screen men aged 35 years and older and women aged 45 years and older for lipid disorders and treat abnormal lipids in people who are at increased risk of coronary heart disease. (2001); (Update in Progress)

- Discuss aspirin chemoprevention with adults who are at increased risk for coronary heart disease (CHD). Discussions with patients should address both the potential benefits and harms of aspirin therapy. (2002)

- Screen adults aged 18 and older for high blood pressure (2003); (Update in Progress)

- One-time screen for abdominal aortic aneurysm (AAA) by ultrasonography in men aged 65 to 75 who have ever smoked. (2005)

CDC also has participated in the development of guidelines for CVD prevention in women.[195] CDC additionally co-sponsored two international conferences on women and heart disease and stroke in 2000 and 2005; the former conference led to the Victoria Declaration on Women, Heart Disease, and Stroke (2000).[196] AHRQ supports the principles of the declaration, which encourages the public and private sectors to:

> "...marshal their efforts and invest resources in the prevention and management of heart diseases and stroke among women in both developed and developing countries, and to adopt the following five values as the foundation for the development, implementation and evaluation of all policies, programs and services: health as a fundamental human right; equity; solidarity in action; participation; and accountability."

AHA also has updated its guidelines for preventing CVD in women to state that lifetime risk (rather than short-term risk) should be the focus. Also included in the 2007 Guidelines for Preventing Cardiovascular Disease in Women are new directions for using aspirin, hormone therapy, and vitamin and mineral supplements in heart disease and stroke prevention in women.[197] Examples of other AHA guidelines and performance measures related to prevention and treatment of CVD are cited elsewhere in this report.[61, 89, 124]

Despite clear evidence showing that hypertension treatment reduces the incidence of stroke, heart attacks, and premature death, a study commissioned by AHRQ found that treatment for high blood pressure in the U.S. often does not conform to evidence-based guidelines.[198] Therefore, AHRQ supports greater study of best practices for blood pressure control and of ways to improve partnerships among researchers, practitioners, and patients to improve guideline adherence. Furthermore, Americans need to become more aware of the dangers of high blood pressure and its potential impact on their lives.

AHRQ's supports the development of inter-agency partnerships such as the AHRQ Medicaid Care Management Learning Network. In this partnership, AHRQ works with several States with Medicaid care management and disease management programs targeting Medicaid beneficiaries with heart failure and other conditions. Typical interventions include in-person and telephone-based care management, self-care, patient education, and provider education. Some states have additional, more targeted interventions such as distributing bathroom scales and other home monitoring devices to participants. Although the programs do not focus specifically on women, they all provide services to underserved populations.

AHRQ partners with AHA in various other activities aimed at enhancing cardiovascular care for women. AHRQ staff are involved (writing group co-chair, discussant) in writing AHA/American College of Cardiology (ACC) recommendations for establishing systems to increase timely revascularization in ST-segment elevation myocardial infarction. AHRQ staff members also serve on the AHA/ACC Writing Committee for Clinical Data Standards on Acute Coronary Syndromes and Coronary Artery Disease, as well as a liaison member of the AHA Quality of Care and Outcomes Research Steering Committee. AHRQ is cosponsoring the AHA's update of their Evidence-Based Guidelines for Cardiovascular Disease Prevention in Women, and also has encouraged involvement of the U.S. Preventive Services Task Force in this work.

AHRQ supports other non-Federal entities in their encouragement of guideline adherence, as evidenced by AHRQ's partnerships with groups such as the Alliance for Cardiac Care Excellence[199] (of which AHRQ is a founding member). This coalition comprises roughly 30 health care organizations that together seek to ensure that every hospitalized cardiovascular patient in the U.S. receives the right care, at the right time, every time. The coalition's objective is to ensure that 95%-100% of heart attack and heart failure patients receive care that meets all 12 of the cardiac care quality measures as set forth by the National Quality Forum.

AHRQ supports efforts to promote accurate reporting of data that patients, insurers, policy-makers and others can use to make informed choices about providers. Tools to support such reporting include Hospital Compare,[200] which was created by the Centers for Medicare and

Medicaid Services (CMS) and other entities within the Department of Health and Human Services, as well as other members of the Hospital Quality Alliance (HQA). By using this tool, the general public can search for information about the quality of care from hospitals in their area. Another tool that can be used by purchasers as well as consumers to compare health care performance is the Healthcare Effectiveness Data and Information Set (HEDIS).[201] HEDIS focuses on health plans, rather than hospital care, using a defined measure set addressing several health care issues (e.g., asthma medication use, persistence of beta-blocker treatment after a heart attack, controlling high blood pressure, and comprehensive diabetes care).

Pay-for-performance appears to have been associated with improved adherence to evidence-based guidelines for outpatient care. For example, a CMS demonstration project on care of diabetes (which is itself a risk factor for CVD) found that ten participating physician groups achieved benchmark or target performance on at least seven of ten clinical quality measures, including three measures addressing CVD risk factors.[202] Evidence-based measures addressing heart failure, coronary artery disease and hypertension will be added in future years. CMS also reports that most acute care hospitals are meeting goals relating to the reporting of health care quality measures.[203]

Public reporting itself also may have contributed to improved guideline adherence. For example, prescription of beta blockers before discharge in heart attack patients was recently removed from the HEDIS measure set because previously uneven performance has improved so much that adherence is now uniformly high.[204] Additional levers are needed, and this is a prime focus for CMS. For CVD care, this focus is evidenced by CMS activities including the LifeMasters Disease Management for Dual Eligible Beneficiaries demonstration.[205] This demonstration will provide disease management services to Florida beneficiaries dually eligible for Medicaid and Medicare who suffer from advanced-stage congestive heart failure, diabetes, or coronary heart disease.

Public reporting initiatives such as those cited above have the potential to improve quality.[206] However, various stakeholder groups, including AHA, have raised issues related to the rigor of reporting methods, the adequacy of risk-adjustment and various intended versus unintended consequences of public reporting efforts.[207, 208, 209, 210] Thus, AHRQ supports careful consideration of the possible positive and negative effects of specific public reporting initiatives.

### Increasing Public Awareness

AHRQ recommends continuation of Federal and private sector initiatives such as those already underway to increase public awareness of the importance of CVD care for women. These include NHLBI's national "Heart Truth" campaign,[211] which aims to heighten women's awareness about their risks of heart disease and to encourage them to talk with their doctors and to take appropriate action. This campaign produces "The Healthy Heart Handbook for Women,"[16] which describes risk factors for heart disease as well as action plans that women can use to improve their health. Other NHLBI resources include the Red Dress Pin—the national symbol for women and heart disease awareness—a speakers' kit, and other materials for health care professionals and patients.

A recent review coauthored by AHRQ and NHLBI staff and others indicated that possible gender differences in the clinical presentation of acute coronary syndromes did not support the need for different messages designed to increase women's versus men's awareness of early symptoms.[212] AHRQ applauds efforts to increase awareness and to decrease delays in both women and men.[213]

CDC initiatives seeking to promote women's cardiovascular health and reduce disparities in treatment include a program called Well-Integrated Screening and Evaluation for Women Across the Nation (WISEWOMAN).[214] This program helps women with little or no health insurance gain access to screening and lifestyle interventions that can reduce risks of heart disease and other chronic conditions. The program includes projects in 14 or more States, addressing risk factors including high blood pressure and cholesterol, nutrition and weight management, physical inactivity, and tobacco use. CDC also supports "National Wear Red for Women Day", which is conducted to raise awareness of the importance of heart health among women.

The Federal Office on Women's Health (OWH) has numerous programs dedicated to improving the cardiovascular health of women.[215] Its "Heart Health" programs include national campaigns, Web-based programs, meetings and conferences, evaluation programs, publications and programs specifically targeting minority women. Each year the office cosponsors the "Heart Truth Campaign" (targeting women ages 40-60), "National Women's Health Week", and "Women's Checkup Day". All of these campaigns are aimed at raising awareness about the dangers of CVD in women and the importance of taking necessary steps to prevent the onset of disease.[216] OWH has supported the National Black Nurses Foundation in launching the Web-based "For Your Heart" pilot project. This program has sought to reduce CVD among African-American women by increasing health awareness and reducing risky behaviors. OWH also launched the "Heart Healthy Women" Web site and the "Steps to Healthier Women" Web site.[217] These two Web sites provide comprehensive information on the diagnosis and treatment of CVD and on how to make healthier choices. Complementary public awareness activities in the private sector include the American Heart Association (AHA)'s "Go Red for Women Campaign,"[218] which also encourages women to improve their heart health.

## A Final Word

This report documents some important successes as well as some gaps in improving quality of care for women who are at risk for, or already have, heart disease and other cardiovascular conditions. However, more information is needed if further progress is going to be made in reducing the consequences of CVD among women in the U.S. Numerous quality improvement initiatives in development or already underway should highlight the importance of reducing gender disparities in CVD care and narrowing the gap between what is known and what is done in this and other clinical areas.[18] However, the absence of gender disparities does not necessarily indicate that appropriate care is consistently provided. Where quality is considerably less than optimal for both groups, focusing on improving it for all patients should improve the care provided to women. Differences in current quality measures between women and men appear to often be smaller than the difference between care routinely provided and best possible care for all with CVD. Only where care appears reasonable for one gender but not for the other should serious consideration be given to focusing efforts on improving care for patients of the more disadvantaged gender.

Educational programs to enhance consumer and provider awareness should focus on empowering patients and providers to make risk-factor and treatment modifications to help reduce disparities in health care and its outcomes. Finally, the vast array of activities undertaken by national and regional governmental and private entities should be closely coordinated to make these efforts as complementary as possible, while minimizing both gaps and the duplication of efforts.

High quality care relies not only on knowledge about the right care, but also on the existence of an adequate health care system to deliver it. As a result of the high prevalence of CVD among both women and men in the United States, system-wide improvements in health care delivery can substantially advance care for CVD as well. Therefore, in addition to the more targeted initiatives to improve CVD treatment for women, broader areas of quality improvement will translate into advancements in care for CVD that are proportional to its burden on health. These include efforts that foster increased access to care, wider adoption of integrated health information technology systems, and better coordination of care throughout all phases of health and illness. Along with other Federal agencies, State, local, and private organizations, AHRQ provides leadership, coordination and support in several key areas that are aimed at improvements that impact health care broadly across the entire system. It will be critical to maintain, and, where possible, scale up these efforts which are likely to yield the most benefit to improve health care broadly, including care for CVD in women.

In the past three decades, much progress has been made in the field of CVD prevention and management. However, it will be the coordination of public and private programs that will drive future progress in heart disease and cardiovascular conditions for women.

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**Executive Summary**

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**Body of Report**

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# Report to Congress

## Estimate of the Economic Burden of Late Entry into Medical Care for Human Immunodeficiency Virus (HIV) Infection

## Agency for Healthcare Research and Quality (AHRQ)

## February 24, 2009

Carolyn M. Clancy, M.D., Director, AHRQ

FEB 25 2009

Date

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## Executive Summary

The Agency for Healthcare Research and Quality (AHRQ) is pleased to present this report, "Estimate of the Economic Burden of Late Entry into Medical Care for HIV Infection," in response to requests from the Senate (S. Rep. No. 110-410, at 141 (2008)) and House of Representatives Appropriation Committees:

> *The Committee recognizes the high economic burden associated with a positive diagnosis of HIV/AIDS. The Committee encourages AHRQ to prepare a study comparing the economic burden of an early diagnosis to that of a later diagnosis.*

Research has shown that a substantial proportion of persons with Human Immunodeficiency Virus (HIV) infection are not diagnosed or do not enter medical care until relatively late in the disease course, when their immune systems have been severely compromised. Such late presenters may incur greater costs than persons who begin treatment sooner after being infected. This study estimates the difference in direct medical care costs between late and early presenters. A late presenter is defined as a patient who enters care with a CD4 count <= 200 cells/mm$^3$; this is a cutoff for an AIDS diagnosis. The complementary group who enter HIV treatment with CD4 count greater than 200 cells/mm$^3$ will, for convenience, be referred to as early presenters.

This study uses data from 10 HIV care sites participating in the HIV Research Network (HIVRN) project. Medical record data for 12,298 patients who entered HIV care at one of the HIVRN sites between 2000 and 2006 provided information on hospital admissions, outpatient visits to the HIV clinic, prescribed antiretroviral medications, and prescribed medications to prevent opportunistic infections such as Pneumocystis jirovecki pneumonia (PCP). Patients provided from 1 to 8 years of data. Because these data are not based on a probability sample of persons receiving treatment for HIV infection, the results do not necessarily generalize to the

population of all HIV-infected persons receiving medical care, nor to the full U.S. population of persons infected with HIV, which includes those not receiving medical care for HIV.

Costs for each of the services enumerated above were estimated and totaled for each patient. Average costs per year were compared for late versus early presenters to care. This study does not attempt to estimate lifetime costs of care, as such an estimate would necessarily rely on unverified assumptions concerning the lengths of time that early versus late presenters spend at different levels of disease severity.

The results of this study show that patients with HIV infection who present for care late in the course of their disease incur higher direct HIV treatment costs than those who initially present earlier in the disease process. In multivariate analysis, late presenters incurred an average of $15,456 more in HIV treatment costs per year in care than early presenters. Contrary to expectations, over the time period encompassed in this study, a survival difference between early and late presenters could not be detected. It is possible that survival differences would emerge if the observation period were to be extended. If this were to occur, then the difference in lifetime costs between early and late presenters might diminish or even reverse itself, as early presenters would accrue costs over a longer time period.

Although this study does not estimate lifetime costs of care, and although costs for other medical and non-medical services have not been included in the analyses due to lack of available data, the cost differential estimated in this study points to potential cost savings from expediting diagnosis and entry into care for persons with HIV infection.

Congress has encouraged AHRQ to conduct a study to compare the economic burden of an early HIV diagnosis to that of a late HIV diagnosis:

> The Committee recognizes the high economic burden associated with a positive diagnosis of HIV/AIDS. The Committee encourages AHRQ to prepare a study comparing the economic burden of an early diagnosis to that of a later diagnosis.

This report describes the research approach to addressing this question and presents results relevant to this issue.

## Study Design Considerations

In considering the possible design of such a study, it was clear that original data collection would not be feasible in the proposed time frame, with a due date for a completed report to be delivered by April 9, 2009. The time required to develop a plan for sampling patients with HIV infection, contact and enroll organizations that might serve as sites for recruiting patients, develop and pretest data collection instruments, and apply for and receive approval from Institutional Review Boards would far exceed the nine months between the Congressional request and the report's due date. Actually collecting data from a sufficient sample of HIV patients and analyzing the resulting data would require many additional months.

For these reasons, it was decided that the most feasible approach would be to conduct analyses of existing data, specifically, data from the HIV Research Network (HIVRN). Starting in 2000, the HIVRN has been funded by AHRQ, with co-funding from the Health Resources and Services Administration, the Substance Abuse and Mental Health Services Administration, the Office of AIDS Research at the National Institutes of Health, and the Office of the Assistant Secretary for Planning and Evaluation. Under a contract with Johns Hopkins Medical Institutions, data on patients from several large HIV care providers across the U.S. have been obtained each year since 2000. The HIVRN has one of the largest current databases relevant to health services utilization by people with HIV infection. In view of the large sample size in the

HIVRN, the scope and quality of the data, and the immediate availability of the data, the decision was made to use HIVRN data to address the Congressional request.

To address the complex question of the economic burden of early versus late HIV diagnosis using HIVRN data, several issues must be considered. One is the definition of "economic burden". For purposes of this study, economic burden is defined as direct medical costs associated with the treatment of HIV infection. Conceptually, several definitions of economic burden, differing in generality, could be considered. In addition to direct HIV-related medical care costs, the following are potential additional components of economic burden:

- lifetime medical care costs for treatment of HIV infection;
- direct medical care costs for other comorbidities (e.g., cancers, metabolic disorders, diseases associated with aging);
- indirect costs of the disease (e.g., time lost from work);
- broader costs/benefits from a societal perspective, such as potential HIV infections prevented due to patients' taking Highly Active Antiretroviral Therapy (HAART), leading to lower viral load, which subsequently makes HIV transmission more difficult.

Unfortunately, these alternative conceptions of "economic burden" would either require data unavailable in the HIVRN or would necessitate making a long string of tenuous assumptions. In particular, estimates of lifetime costs typically involve models of the probabilities of transitions between different states of severity of HIV disease and estimates of the length of time spent in each state; to our knowledge, separate models for early versus late presenters to care have not been developed. Therefore, as a first analysis of economic burden, this report focuses on direct, HIV-related annual medical care costs; this focus has the virtues of clarity, simplicity, and available data.

A second issue pertains to HIV diagnosis date. Information on HIV diagnosis date is often unavailable in medical records. For example, patients may have received their first

positive HIV test result from a testing site unaffiliated with an HIV medical care provider. The HIV diagnosis date is often irrelevant from a clinical perspective when a patient is seen initially by a care provider, who must focus on the patient's current condition. In addition, this date is self-reported by patients, and the amount of error in these reports is not known. As a result, in the HIVRN data, the date of first positive HIV test is missing for half of the sample. In contrast, the enrollment date is known in the HIVRN data. The date of enrollment is typically the first visit to the HIV care provider (i.e., clinic) for primary HIV-related care. (In some instances, the enrollment date may reflect an inpatient admission to treat an HIV-related illness.) The enrollment date is typically captured in administrative records and thus does not rely on patients' recall. Therefore, the starting point for analyses of HIVRN data will be the date of enrollment in HIV care, not the date of first HIV-positive diagnosis.

The use of the enrollment date, rather than the HIV diagnosis date, raises a third issue. To be most relevant to the original Congressional question, the enrollment date should reflect the first entry into the HIV care system. Many patients do not seek care immediately after finding out that they are HIV-infected; as they are often asymptomatic, a period of time may be required to adapt psychologically to this situation. For the period between notification of HIV infection and first HIV-related treatment, the patient is not receiving any HIV-related services, and the direct medical care costs are thus zero. However, it is possible that some patients in the HIVRN did receive HIV care from another provider before coming to the participating HIVRN provider. For such patients, the HIVRN data would not capture all of their HIV-related care costs from the inception of their treatment. For example, early-stage patients whose immune systems are not severely compromised might receive care from their original, generalist primary care provider and only seek treatment from an HIV-specific provider when their conditions deteriorate and more complex interventions are required. To minimize the possibility of omitting costs incurred

prior to enrollment in the HIVRN clinic, analyses should focus on a subset of patients who may plausibly be considered to be naive to treatment prior to their enrollment date.

A fourth issue pertains to the definition of "early" versus "late". The Centers for Disease Control define late diagnosis as developing AIDS within one year of HIV diagnosis. (CDC, 2003). However, given the lack of information on HIV diagnosis date for a large proportion of patients in the HIVRN data, this definition cannot be used. Other studies define late entry into care as having a compromised immune system at first presentation for HIV care, indicated by AIDS-related symptoms and conditions, such as CD4 cell counts at or below 200 (Klein, Hurley, Merrill, and Quesenberry, 2003; Krentz, Auld, and Gill, 2004; Mugavero, Castellano, Edelman, and Hicks, 2007). From a clinical standpoint, the status of the immune system at the time of entry into care is more significant than the status at diagnosis. This study defined late presenters into care as those patients whose initial CD4 test recorded in the HIVRN data was at or below 200.

## Methods

The HIV Research Network (HIVRN) is a consortium of 13 clinics that provide primary and subspecialty care to HIV-infected adult patients. Sites abstract specified data elements from patients' medical records; abstracted data are assembled into a uniform database. Ten sites that collect comprehensive inpatient and outpatient data on adult patients were included in this study. The 10 sites are located in the Eastern (6), Midwestern (1), Southern (1), and Western U.S. (2). Nine of the sites have academic affiliations.

**Inclusion Criteria.** The considerations outlined above led to the following inclusion criteria for the study: (1) Patients had to have an HIVRN enrollment date between 2000 and 2006. Data on health service utilization prior to 2000, when the HIVRN began collecting data, are not available, preventing calculation of some health care costs for individuals who enrolled prior to 2000. (2) Patients were aged 18 or older at time of enrollment. Treatment of pediatric

HIV infection differs from that in adults, and it is preferable to keep these groups of patients distinct in analyses. (3) Patients had to have received HIV-related primary care for at least one year between 2000 and 2007. Receipt of HIV-related primary care was defined by having one or more outpatient visits to the HIV care provider and having at least one CD4 test recorded in a year. (4) Patients could not have received care prior to enrollment. As noted above, health services utilization data are not available for patients who received treatment prior to HIVRN enrollment. Patients who started an antiretroviral drug or who had an outpatient visit to the HIV provider prior to enrollment were excluded. Application of these criteria results in a sample of 14,360 patients.

**Dependent Variable.** The outcome variable for the study is the annual cost of HIV-related medical care services. Non-medical services -- such as case management, social work, health education -- are not included, as data were not collected on use of such services. In addition, medical care costs for non-HIV-related conditions -- such as treatment for comorbidities, mental health services, or substance abuse counseling -- are not included; not only were relevant data not collected at all sites, but there is controversy regarding the degree to which such services can, or should, be attributed to HIV infection.

Data from medical records at HIVRN sites provided information on inpatient days, outpatient visits, and prescribed antiretroviral (ARV) or opportunistic illness (OI) prophylaxis medications. We counted the total numbers of outpatient visits to the HIV primary care provider (i.e., HIVRN clinic) and inpatient days for each patient, from enrollment through 2007. The medical record data provided detailed information on all prescribed ARV medications, including start and stop dates. Data on medications to prophylax against PCP (*Pneumocystis jiroveci* pneumonia) and MAC (*Mycobacterium avium* complex) were also obtained. For each patient, we calculated the number of days that each medication had been prescribed between enrollment and the end of 2007.

**Cost Calculations: Inpatient Costs per Day.** Medical record data do not contain expenditure information, and most patients cannot accurately report the costs of their care. Consequently, we obtained inpatient cost information from AHRQ's Healthcare Cost and Utilization Project (HCUP) State Inpatient Database (SID), which contains hospital discharge abstract data covering inpatient stays from all short-term non-Federal community hospitals in participating states. SID data include primary and all secondary diagnoses for each inpatient stay, the length of stay (LOS, calculated as the difference between the admission and discharge date) and the total charges for the hospitalization. We used data for calendar year 2006 from 10 states: California, Colorado, Florida, Iowa, Illinois, Kansas, Maryland, New Jersey, New York, and Washington.

We identified HIV-related hospitalizations in patients who were $\geq$ 18 years old at admission by examining all primary and secondary diagnoses listed in the discharge abstract. All hospitalizations with a primary or secondary International Classification of Diseases, ninth edition (ICD-9 CM) diagnosis codes that included 042.0 through 044.9, inclusive, were selected as HIV-related hospitalizations.

Hospital charges for each admission were converted to costs by multiplying by an inpatient cost-to-charge (ICC) ratio. All-payer hospital-specific ICC ratios were based on data from standard accounting files of the Centers for Medicare and Medicaid Services. If a hospital-specific ICC was not available, then a group average ICC was used, where the grouping was based on the hospital's state, ownership, urban or rural location, and size. The group average ICC was used for 19% of the admissions, and the hospital-specific ICC was used for the rest.

For 84,906 HIV-related admissions in the SID with data available for total charges and LOS, the length of stay ranged from 1 to 295 days, with a mean of 7.81 days. The mean cost per day was $2,014.66. Since payors must pay all costs, the mean is a more relevant measure in cost analyses than the median. Therefore, for our cost analysis, we used the mean cost. Total

inpatient costs were obtained by multiplying the number of inpatient days between enrollment and December 31, 2007 by the daily cost.

**Pharmaceutical Costs.** Computation of costs for each medication was based on 2006 Red Book average wholesale price (AWP). It is recognized that the AWP overestimates the actual pharmaceutical costs. A report by the Office of the Inspector General for the Department of Health and Human Services compared AWP to the average manufacturer's price (AMP), which is the average unit price paid to manufacturers by wholesalers for retail drugs, calculated from actual sales transactions. For single source brands, at the median the AMP was 23% less than the AWP; for generic drugs, the AMP was 70% less than the AWP at the median. We discounted the published AWP by 23% for all medications, as we could not distinguish generic vs. brand for many of the drugs. (Although Zidovudine is available in generic form, most patients are not receiving Zidovudine as their only antiretroviral medication, and compounds including Zidovudine, such as Trizivir, are not available generically. Bactrim and Azithromycin are, however, available generically, and our cost estimates for these drugs would be upper bounds.)

We assumed that standard dosages were prescribed. For each antiretroviral (ARV) or opportunistic infection (OI) prophylaxis medication, the discounted monthly cost was multiplied by the number of months each patient was prescribed the medication, between enrollment date and December 31, 2007, to obtain total expenditures for antiretroviral medication and for OI prophylaxis medication.

**Outpatient Visit Costs.** The estimated unit cost for an outpatient visit with the HIV primary care provider was based on estimates from the HIV Cost and Services Utilization Study [HCSUS], which estimated costs in 1998. Costs were inflation-adjusted to 2006 dollars using the gross domestic product (GDP) price deflator. The GDP price deflator is preferred to using the medical component of the Consumer Price Index, as the CPI covers only 60 percent of the

economy, omitting, for example, government purchases. We used $221.08 as the cost of an outpatient visit. For total outpatient visit costs, we multiplied the number of visits by the cost per visit.

**Total Costs.** We summed costs for outpatient visits, inpatient days, ARV drugs, and OI drugs to obtain total costs between enrollment and 2007 for each patient in the analytic sample. We refer to these as "cumulative" costs.

**Independent variables.** The major independent variable is based on the first recorded CD4 test for each patient. This is the test closest in time to the HIVRN enrollment date. Late presenters to care are defined as those patients whose first CD4 cell count was 200 or lower, whereas "early" presenters had initial CD4 counts greater than 200.

Medical records provided information on patients' sex, age, race/ethnicity, and HIV transmission risk factor. Risk factor was coded as men who have sex with men (MSM), heterosexual transmission (HET), injection drug use (IDU, including IDU in conjunction with other risk factors), and other or unknown. For gender, 77 patients who were coded as "transsexual" were combined with females. Age as of January 1, 2000 was categorized as 30 or younger, 31-40, 41 to 50, and 51 or older. Race/ethnicity was categorized as White, Black, Hispanic, and other/unknown.

**Analyses**

Because patients enrolled at different times, and because patients were not receiving care every year after enrollment, the observation period varies across patients. To provide a standardized time frame, we counted the number of years each patient was receiving primary care and analyzed total costs per year in care.

It is possible that late presenters will have a shorter period of survival after enrollment than early presenters. This could produce a situation in which initial costs for late presenters exceed costs for early presenters, but total costs over a period of time are lower for late

presenters because shorter survival means that they accrue costs for a shorter period of time. To examine this possibility, initial analyses compare the time under observation for early versus late presenters. Subsequent analyses compare mean total costs per year in care for early versus late presenters. Finally, multivariate regression analyses adjust for gender, age, race/ethnicity, HIV risk factor, year of enrollment, and site (the latter to capture possible practice variations across providers).

## Results

### Analytic Sample

The inclusion criteria for this study specified that analyses would be conducted on patients who enrolled between 2000 and 2006, inclusive. Of 39,184 patients from 10 sites in the HIVRN database, 16,806 (43%) were enrolled prior to 2000 or after 2006; another 1,200 patients (3.1%) had missing data for enrollment date. Thus, 21,178 patients were known to be enrolled between 2000 and 2007. Of this group, 555 patients were under the age of 18 at the time of enrollment and were removed from analyses. Another 1,517 patients (7.4% of 20,623 adult patients) were removed from analyses because they had missing information on outpatient visits, CD4 tests, or demographic characteristics. To focus analyses on patients who presumably entered HIV care for the first time at their HIVRN clinic enrollment, analyses excluded 5,761 patients (30% of 19,106) who had an outpatient visit date, or a CD4 test date, or a medication start date more than 1 month prior to the month of enrollment. Finally, 395 patients who had been enrolled but were not active in any year, as defined by having both a CD4 test and an outpatient visit recorded in a calendar year, were also removed from analyses, as there may be gaps in the data for these patients; 22 additional patients were missing the result for the initial CD4 test, and thus could not be classified as early versus late presenters. These decisions resulted in an analytic sample of 12,928 patients.

### Sample Characteristics

Table 1 reports characteristics of the analytic sample, both overall (across all enrollment years) and also by enrollment year. The sample was predominantly male (71.2%) and of minority race/ethnicity (23.5% non-Hispanic Caucasian). Major HIV transmission groups included men who have sex with men (34.6%) and heterosexual transmission (35.9%). Most patients were between 30 and 50 years of age, although 7.3% were older than 50. Over 20% had suppressed levels of HIV-1 RNA (< 400) for their first recorded viral load test. Finally, 36.7% had CD4 counts less than 201 cells/$mm^3$ for their first recorded CD4 test, reflecting delayed entry into care.

Enrollment cohorts differed in demographic and clinical characteristics. The proportion of men rose in later enrollment cohorts, as did the proportion of non-Hispanic whites. Proportions of Black and Hispanic patients declined slightly from earlier to later cohorts, as did the proportion of patients with an IDU HIV risk factor. The proportion entering care late fluctuated only minimally across enrollment cohorts, with the proportion of late presenters slightly lower in the 2006 cohort than the 2000 cohort (35.8% versus 37.7%). Between 2004 and 2006, the proportion of late presenters remained stable at just over 35%.

**Factors Associated with Late Entry**

Table 2 reports associations between late entry into HIV care and demographic characteristics. Gender, race/ethnicity, HIV risk factor, and age were each significantly associated with entering care late in the disease course. Men were more likely to enter care late than women. White patients were less likely to present late than Black or Hispanic patients. Patients who acquired HIV infection by heterosexual transmission were more likely to enter care late than either men who had sex with men, or injection drug users. Patients in the youngest age group were less likely to have late entry than older patients. These results were also obtained in a multivariate logistic regression of late entry, which adjusted for HIVRN site and year of enrollment (results not shown).

**Observation Periods**

As noted above, patients in the analysis were observed for varying periods of time. This affects total costs, as individuals with a longer observation period have more opportunity to use services and accrue costs. Obviously, patients who enrolled in 2000 could potentially be followed for eight years, while those who enrolled in 2006 could contribute only two years of data. Possible survival differences between early and late presenters also could affect the length of the observation period.

We counted the number of years that each patient was actively receiving HIV care. As noted above, "active" receipt was defined by having one or more outpatient visits and one or more CD4 tests in a calendar year. The number of active years under observation could range from 1 to 8. Patients could drop out of active status; many patients had years of inactivity interspersed with active years.

Table 3 shows the distribution of total active years, by whether the patient was a late entrant. The distributions were similar for both early and late presenters. A trend for late presenters to be active for a shorter period of time than early presenters was **not** observed. The chi-square test of association between entry status and total years was not significant (chi-square = 13.9, df=7, p=0.052). Late presenters were observed for a mean of 2.90 years, versus 2.95 years for early presenters. Table 4 presents more detailed distributions of active observation years, by entry status and enrollment year. Again, the distributions of early and late presenters are similar, within enrollment year.

As a further sensitivity analysis, we included intermittent inactive years in the count of total years under observation. An intermittent inactive year occurred between two active years; inactive years before the first active year or after the last active year were not counted. Again, the distributions were similar for early and late presenters, and the chi-square test was not statistically significant (chi-square=11.8, df=7, p=0.11).

Table 5 reports a multivariate linear regression analysis of total active years under observation. Adjusting for demographic characteristics, HIVRN site, and enrollment year, the expected number of active years was 0.02 higher for late presenters than for early presenters, a nonsignificant result. Men had fewer active years than women, and Hispanic patients were observed slightly longer than whites. Patients with heterosexual or IDU HIV risk factors had fewer years in the database than those in the MSM category. Time under observation increased for older age groups. (Similar results were obtained when intermittent active years were included in the total.)

**HIV Per-Year Treatment Costs**

Cumulative HIV care costs over the observation period for each patient, not adjusting for differences in observation periods, ranged from $221.08 to $915,472, with a mean of $50,319 and a median of $33,858. Among late presenters, the mean cost (not controlling for variations in observation period) was $70,756 (95% Confidence Interval [CI] = 68,884 – 72,627), while among early presenters the mean cost was $38,457 (95% CI = 37,422 – 39,491).

HIV care costs per active year, in 2006 dollars, ranged from $221.08 to $384,079, with a mean of $20,178 and a median of $12,023. The mean costs per active observation year were $29,978 (95% CI=28,967 – 30,990) for late presenters and $14,489 (95% CI = 14,023 – 14,954) for early presenters. The difference in mean cost was $15,490, with a 95% confidence interval (CI) from $14,376 to $16,603. Thus, patients who presented for HIV care late had considerably higher expenditures per year than those who began treatment earlier in the disease course.

Table 6 shows mean cumulative HIV treatment costs (and standard errors), stratified by late entry and number of years under observation. As expected, total costs were greater for longer observation periods. More important, for each observation period, total costs for late presenters were notably higher than costs for early presenters, ranging from 2.4 times higher for the 2000 cohort to 1.4 times higher for the 2006 cohort.

Table 7 shows analogous results for total costs per active observation year. Treatment costs were highest for patients observed for only one year. This may be due to more frequent monitoring of new patients to establish treatment regimens, or it may be due to higher inpatient service utilization. Over longer observation periods, treatment costs per year appeared to stabilize for both early and late presenters. For early presenters, HIV treatment costs varied between $13,000 and $12,000 per year for observation periods between 3 and 8 years. For late presenters, treatment costs varied between $20,000 and $18,000 per year for those observed for 5-8 years. Thus, even after equating the time period during which services are used, late presenters incurred between 1.7 and 1.4 times the annual costs of early presenters.

Table 8 reports results of a multivariate linear regression analysis of costs per active observation year. The model explained 15% of the variation in costs per year, which is typical for analyses of cost data. Controlling for HIVRN site, enrollment year, and demographic characteristics, late presenters on average incurred $15,456 more in treatment costs than early presenters (95% CI = 14,503 – 16,409). This figure is quite close to the unadjusted difference in costs per year ($15,490).

Black and Hispanic patients incurred significantly more treatment costs than white patients ($2,151 and $2,618, respectively). Patients with an HIV risk factor of IDU were $3,783 more expensive than MSM patients. Older patients, especially those older than 50, had higher costs than those aged less than 31. Finally, compared with patients who enrolled in 2000, those who enrolled more recently had lower costs per year, with the difference rising to $10,173 lower for 2006 enrollees.

**Sensitivity Analyses**

To determine the stability of the results to alternative definitions of the analytic sample, two sensitivity analyses were conducted. The first analysis further restricted the sample to patients whose first recorded HIV-1 RNA (viral load) test was above 400. With standard (not

ultra-sensitive) viral load tests, a value of 400 represents virologic suppression. Presumably, if newly enrolled patients were naïve to antiretroviral therapy, their viral loads would be above 400; a reading of 400 or less could imply that the person had received HIV treatment prior to enrollment (perhaps at another care provider). The second sensitivity analysis selected from the original analytic sample only those patients who (1) had data on date of HIV diagnosis, and (2) enrolled in the same year as the diagnosis of HIV. This presents another approach to defining groups who are unlikely to have been treated for HIV prior to enrollment.

Tables 9 and 10 present results of multivariate linear regression analyses of HIV care costs per year, analogous to the analysis presented in Table 8. For the first sensitivity analysis (Table 9), eliminating patients whose first HIV-1 RNA test was <=400, indicating suppressed viral load, reduced the analytic sample to 10,122 patients. However, the results were similar to those in the main analysis (Table 10). In particular, the adjusted cost difference per year between late and early presenters was $16,325 more for late presenters.

For the second sensitivity analysis, limiting the analytic sample to those who enrolled in the same year as their first positive HIV test reduced the number of observations to 3,441. Despite this major change in the sample, late presenters were estimated to cost $8,149 more per year than early presenters, repeating the pattern found in previous analyses. In sum, the two sensitivity analyses are consistent with the main analysis in showing that late presenters have higher per-year costs of HIV care than early presenters.

## Discussion

The results of this study show that patients with HIV infection who present for care late, as defined by an initial CD4 count below 201 cells/mm$^3$, incur higher direct HIV treatment costs than those who initially present earlier in the disease process. In multivariate analysis, late presenters incurred an average of $15,456 more in HIV treatment costs per year in care than early presenters. This can be construed as one (conservative) estimate of the "economic burden"

of late HIV infection. A smaller study of HIV patients in Alberta, Canada, similarly found that yearly medical care costs for late presenters were over twice as high as costs for early presenters, with the adjusted cost difference being $9,723 (Krentz, Auld, and Gill, 2004).

This estimate is conservative because costs for several types of service have not been included. Costs for treatment in the Emergency Department have not been included, nor any costs for home care or long-term care. This information is either not collected in the HIVRN, or not consistently collected. In addition, costs for treating comorbidities have not been included; many HIV patients take a variety of medications to treat other conditions, such as diabetes, liver-related problems, or conditions associated with the aging process (Engels, Biggar, Hall et al., 2008; Lucas, Lau, Atta, et al., 2008; Reidel, Gebo, Moore, Lucas, et al., 2008; Heath, Hogg, Chan et al., 2001; Mary-Krause, Cotte, Simon, et al., 2003). The costs of these medications may equal that of antiretroviral treatment. Unfortunately, HIVRN resources to date have been limited and have not permitted the extraction of data on medications to treat comorbid conditions in more than one or two sites. Moreover, the costs for outpatient visits were limited to visits to the HIV care provider; visits to other clinics (e.g., ophthalmology, OB-GYN) or non-HIV-focused providers were not included in the tally of outpatient visits.

Non-medical service use was not included in calculations of costs. Many HIV patients receive mental health and/or substance abuse treatment (Burnam et al., 2001); costs of psychotropic medications can be substantial. Data on use of other social services, such as case management, transportation services, or benefits counseling, are difficult to extract or missing from medical records, leading to an underestimate of total costs for all services, medical and non-medical.

The current estimate of direct HIV-related medical care costs is based, at most, on an eight-year time window. A more inclusive estimate of economic burden would attempt to extend the results to lifetime costs of care. Such an effort would require complex modeling and is

beyond the scope of the current report. It should be reiterated that prior studies have found that persons who present late for HIV care survive for a shorter length of time than those who begin treatment early (Kaplan, Hanson, Karon et al., 2001; Palella, Deloria-Knoll, Chmiel et al., 2003). However, recent advances in HIV therapy have improved survival rates, even for patients with the most compromised immune systems (Mocroft, Ledergerber. Katalama et al., 2003). For the observation period encompassed in this study, late presenters did not differ substantially from early presenters in time under care, which was an unexpected finding. It is possible that survival differences would emerge if the observation period were to be extended. If this were to occur, then the difference in lifetime costs between early and late presenters might diminish or even reverse itself, as early presenters would accrue costs over a longer time period.

Between 2000 and 2006, the proportion of newly enrolled patients with low CD4 cell counts remained relatively stable. Other studies (Keruly and Moore, 2007) have shown that the average CD4 count at entry into care has not increased in recent years. Many persons with HIV infection do not begin to receive medical care until their immune systems have already been severely damaged. Not only does this limit the potential benefit of antiretroviral therapy, but, as demonstrated in these analyses, late presentation increases the annual costs of treatment by several thousand dollars. Getting infected people into care quickly requires shortening the period between infection and testing positive for HIV, and also reducing the time between first positive HIV test and presentation for treatment. Unless these time periods are reduced, late diagnosis and entry into care will continue to create a heightened economic burden.

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**Table 1. Sample Characteristics, Overall and by Enrollment Year (N=12,928)**

| | Total | Overall | Enrollment Year | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Variable | N | Percent | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| Gender | | | | | | | | | |
| Female | 3,727 | 28.8 | 32.3 | 31.0 | 26.7 | 27.1 | 28.3 | 26.6 | 26.4 |
| Male | 9,201 | 71.2 | 67.7 | 69.0 | 73.3 | 72.9 | 71.7 | 73.4 | 73.6 |
| Race/ethnicity | | | | | | | | | |
| White non-Hispanic | 3,031 | 23.5 | 20.7 | 22.5 | 25.3 | 26.0 | 25.0 | 23.2 | 23.3 |
| Black non-Hispanic | 6,251 | 48.1 | 50.6 | 48.7 | 47.7 | 46.0 | 46.5 | 48.1 | 46.8 |
| Hispanic | 3,234 | 25.0 | 27.4 | 26.2 | 24.5 | 25.1 | 25.3 | 22.0 | 21.7 |
| Other/Unknown | 448 | 3.5 | 1.3 | 2.5 | 2.5 | 2.9 | 3.2 | 6.7 | 8.3 |
| HIV Risk Group | | | | | | | | | |
| MSM | 4,467 | 34.6 | 30.0 | 32.5 | 36.7 | 39.9 | 34.0 | 36.6 | 36.2 |
| Hetero | 4,636 | 35.9 | 37.5 | 37.2 | 31.4 | 33.3 | 37.4 | 35.3 | 38.4 |
| IDU | 2,464 | 19.1 | 24.1 | 22.4 | 18.9 | 16.7 | 16.8 | 14.8 | 14.0 |
| Other/Unknown | 1,361 | 10.5 | 8.5 | 7.9 | 12.9 | 10.2 | 11.8 | 13.3 | 11.4 |
| Age in 2000 | | | | | | | | | |
| ≤30 | 3,451 | 26.7 | 19.5 | 22.6 | 24.3 | 28.6 | 32.3 | 32.7 | 35.6 |
| 31-40 | 5,388 | 41.7 | 43.3 | 42.0 | 44.3 | 41.3 | 38.7 | 41.5 | 38.3 |
| 41-50 | 3,141 | 24.3 | 27.4 | 27.0 | 23.8 | 23.8 | 23.3 | 20.5 | 20.4 |
| 51+ | 948 | 7.3 | 9.8 | 8.3 | 7.6 | 6.4 | 5.8 | 5.2 | 5.7 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Late Entry | | | | | | | | | |
| No | 8,180 | 63.3 | 62.3 | 61.4 | 64.0 | 62.7 | 64.7 | 65.0 | 64.2 |
| Yes | 4,748 | 36.7 | 37.7 | 38.6 | 35.9 | 37.3 | 35.3 | 35.0 | 35.8 |
| HIV-1 RNA < 400 | | | | | | | | | |
| No | 10,122 | 78.3 | 79.0 | 79.4 | 80.8 | 77.8 | 76.4 | 75.5 | 77.5 |
| Yes | 2,806 | 21.7 | 21.0 | 20.6 | 19.2 | 22.2 | 23.6 | 24.5 | 22.5 |
| Enrollment Year | | | | | | | | | |
| 2000 | 2,673 | 20.7 | | | | | | | |
| 2001 | 2,265 | 17.5 | | | | | | | |
| 2002 | 1,905 | 14.7 | | | | | | | |
| 2003 | 1,579 | 12.2 | | | | | | | |
| 2004 | 1,681 | 13.0 | | | | | | | |
| 2005 | 1,531 | 11.8 | | | | | | | |
| 2006 | 1,294 | 10.0 | | | | | | | |

**Table 2. Associations between Late Entry and Patient Characteristics**

| | Percentage with Late Entry | Chi-Square Test of Independence |
|---|---|---|
| Gender | | 44.6, df=1, p=0.001 |
| Female | 32.3% | |
| Male | 38.5 | |
| Race/Ethnicity | | 40.1, df=3, p<0.001 |
| White non-Hispanic | 31.9 | |
| Black non-Hispanic | 38.4 | |
| Hispanic | 37.8 | |
| Other/Unknown | 39.1 | |
| HIV Risk Group | | 38.4, df=3, p<0.001 |
| MSM | 35.4 | |
| Heterosexual | 38.5 | |
| IDU | 33.1 | |
| Other/Unknown | 41.7 | |
| Age in 2000 | | 74.5, df=3, p<0.001 |
| $\leq 30$ | 30.7 | |
| 31-40 | 38.8 | |
| 41-50 | 38.6 | |
| 51+ | 40.6 | |

**Table 3. Distribution of Active Years in Care for Early and Late Presenters**

| Number of Active Years | Early Presentation | Late Presentation | Total (n) |
|---|---|---|---|
| 1 | 31.7% | 31.7% | 31.7% (4,097) |
| 2 | 22.9 | 22.9 | 22.9 (2,957) |
| 3 | 13.8 | 13.5 | 13.7 (1,771) |
| 4 | 10.5 | 9.4 | 10.1 (1,304) |
| 5 | 7.6 | 7.3 | 7.5 (969) |
| 6 | 6.6 | 6.5 | 6.6 (848) |
| 7 | 4.3 | 5.3 | 4.7 (603) |
| 8 | 2.7 | 3.4 | 2.9 (379) |
| N | 8,180 | 4,748 | 12,928 |

**Table 4. Distribution of Active Observation Years, by Entry Status and Enrollment Year**

Late Presenters

Total Active Observation Years

| Enrollment Year | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | N |
|---|---|---|---|---|---|---|---|---|---|
| 2000 | 30.0% | 21.0% | 8.1% | 5.6% | 5.5% | 6.6% | 7.6% | 15.9% | 1,007 |
| 2001 | 31.1 | 13.2 | 10.2 | 7.6 | 7.9 | 10.2 | 19.9 | 0 | 874 |
| 2002 | 29.9 | 17.7 | 11.1 | 8.6 | 10.8 | 21.9 | 0 | 0 | 685 |
| 2003 | 27.5 | 18.7 | 14.4 | 13.6 | 25.8 | 0 | 0 | 0 | 589 |
| 2004 | 33.3 | 17.5 | 17.5 | 31.6 | 0 | 0 | 0 | 0 | 594 |
| 2005 | 33.2 | 28.4 | 38.4 | 0 | 0 | 0 | 0 | 0 | 536 |
| 2006 | 40.6 | 59.4 | 0 | 0 | 0 | 0 | 0 | 0 | 463 |

Early Presenters

Total Active Observation Years

| Enrollment Year | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | N |
|---|---|---|---|---|---|---|---|---|---|
| 2000 | 27.4% | 20.3% | 10.0% | 6.9% | 6.8% | 7.3% | 8.2% | 13.2% | 1,616 |
| 2001 | 35.1 | 15.3 | 9.4 | 8.0 | 7.1 | 9.6 | 15.6 | 0 | 1,391 |
| 2002 | 24.3 | 17.5 | 11.6 | 11.5 | 11.8 | 23.4 | 0 | 0 | 1,220 |
| 2003 | 26.5 | 18.4 | 14.6 | 14.0 | 26.6 | 0 | 0 | 0 | 940 |
| 2004 | 32.1 | 18.0 | 17.5 | 32.2 | 0 | 0 | 0 | 0 | 1,087 |
| 2005 | 36.6 | 27.5 | 35.8 | 0 | 0 | 0 | 0 | 0 | 995 |
| 2006 | 45.4 | 54.5 | 0 | 0 | 0 | 0 | 0 | 0 | 831 |

**Table 5. Linear Regression Analysis of Total Active Years Under Observation**

| Variable | Coefficient | 95% Confidence Interval |
|---|---|---|
| Late Entry | | |
| No (reference) | ---- | ---- |
| Yes | 0.02 | (-0.05, 0.08) |
| Gender | | |
| Female (reference) | ---- | ---- |
| Male | -0.19*** | (-0.27, -0.12) |
| Race/Ethnicity | | |
| White non-Hispanic (reference) | ---- | ---- |
| Black non-Hispanic | 0.03 | (-0.06, 0.12) |
| Hispanic | 0.16*** | (0.07, 0.26) |
| Other/Unknown | 0.02 | (-0.16, 0.20) |
| HIV Risk Factor | | |
| MSM (reference) | ---- | ---- |
| HET | -0.11** | (-0.20, -0.03) |
| IDU | -0.42*** | (-0.51, -0.32) |
| Other/Unknown | -1.03*** | (-1.15, -0.92) |
| Age in 2000 | | |
| ≤30 (reference) | ---- | ---- |
| 31-40 | 0.09* | (0.01, 0.17) |
| 41-50 | 0.27*** | (0.18, 0.36) |
| 51+ | 0.43*** | (0.30, 0.56) |

Note: The analysis also included HIVRN site and enrollment year (results not shown).

*** $p<.001$

** $p < .01$

* $p < .05$

**Table 6. Mean Cumulative HIV Treatment Costs, by Late Entry and Number of Active Observation Years**

| Number of Years | Late Entry | |
|---|---|---|
| | No | Yes |
| 1 | 18,189 (621) | 44,011 (1,342) |
| 2 | 26,464 (861) | 57,226 (1,800) |
| 3 | 38,666 (1,255) | 72,880 (2,340) |
| 4 | 48,838 (1,593) | 83,708 (2,825) |
| 5 | 60,161 (1,885) | 99,702 (3,075) |
| 6 | 75,552 (2,297) | 112,689 (3,925) |
| 7 | 90,947 (3,441) | 124,315 (4,680) |
| 8 | 101,116 (4,356) | 142,603 (6,636) |

Note: Entries are mean cumulative cost, with standard error in parentheses.

**Table 7. Mean HIV Treatment Costs Per Year, by Late Entry and Number of Active Observation Years**

| Number of Years | Late Entry | |
|---|---|---|
| | No | Yes |
| 1 | 18,189 (621) | 44,011 (1,342) |
| 2 | 13,232 (431) | 28,613 (930) |
| 3 | 12,889 (418) | 24,293 (780) |
| 4 | 12,209 (398) | 20,927 (706) |
| 5 | 12,032 (377) | 19,940 (615) |
| 6 | 12,592 (383) | 18,782 (654) |
| 7 | 12,992 (492) | 17,759 (669) |
| 8 | 12,639 (544) | 17,825 (830) |

Note: Entries are mean cost per year, with standard error in parentheses.

**Table 8. Linear Regression Analysis of HIV Treatment Costs per Active Observation Year**

| Variable | Coefficient | 95% Confidence Interval |
|---|---|---|
| Late Entry | | |
| No (reference) | ---- | ---- |
| Yes | 15,456*** | (14,502 – 16,409) |
| Gender | | |
| Female (reference) | ---- | ---- |
| Male | 509 | (-627 - 1,645) |
| Race/Ethnicity | | |
| White non-Hispanic (reference) | ---- | ---- |
| Black non-Hispanic | 2,151** | (864 – 3,438) |
| Hispanic | 2,618*** | (1,189 – 4,048) |
| Other/Unknown | -3,538*** | (-6,228 -- -847) |
| HIV Risk Factor | | |
| MSM (reference) | ---- | ---- |
| HET | 736 | (-527 – 2,000) |
| IDU | 3,783*** | (2,379 – 5,186) |
| Other/Unknown | 4,237*** | (2,531 – 5,943) |
| Age in 2000 | | |
| ≤30 (reference) | ---- | ---- |
| 31-40 | 2,431*** | (1,288 – 3,575) |
| 41-50 | 3,256*** | (1,928 – 4,584) |
| 51+ | 4,794*** | (2,862 – 6,725) |
| Enrollment Year | | |
| 2000 (reference) | ---- | ---- |
| 2001 | -2,421* | (-3,892 -- -948) |
| 2002 | -2,639* | (-4,204 -- -1,073) |
| 2003 | -5,338*** | (-6,995 -- -3,681) |
| 2004 | -6,611*** | (-8,245 -- -4,978) |
| 2005 | -10,180*** | (-11,872 -- -8,488) |
| 2006 | -10,173*** | (-11,959 -- -8,387) |
| Constant | 22,273 | |

Note: The analysis also included HIVRN site (results not shown).

*** $p<.001$

** $p < .01$

* $p < .05$

**Table 9. Linear Regression Analysis of HIV Treatment Costs per Active Observation Year (excluding Viral Load <=400)**

| Variable | Coefficient | 95% Confidence Interval |
|---|---|---|
| Late Entry | | |
| No (reference) | ---- | ---- |
| Yes | 16,325*** | (15,230 – 17,420) |
| Gender | | |
| Female (reference) | ---- | ---- |
| Male | -381 | (-1,725 -- 963) |
| Race/Ethnicity | | |
| White non-Hispanic (reference) | ---- | ---- |
| Black non-Hispanic | 2,963*** | (1,448 – 4,477) |
| Hispanic | 3,543*** | (1,866 – 5,220) |
| Other/Unknown | -3,615* | (-6,773 -- -458) |
| HIV Risk Factor | | |
| MSM (reference) | ---- | ---- |
| HET | 231 | (-1,241 – 1,703) |
| IDU | 4,248*** | (2,592 – 5,904) |
| Other/Unknown | 3,659*** | (1,663 – 5,655) |
| Age in 2000 | | |
| ≤30 (reference) | ---- | ---- |
| 31-40 | 2,249*** | (929 – 3,568) |
| 41-50 | 3,026*** | (1,461 – 4,591) |
| 51+ | 6,030*** | (3,679 – 8,382) |
| Enrollment Year | | |
| 2000 (reference) | ---- | ---- |
| 2001 | -2,593* | (-4,311 -- -876) |
| 2002 | -2,793* | (-4,615 -- -972) |
| 2003 | -5,159*** | (-7,110 -- -3,208) |
| 2004 | -6,370*** | (-8,303 -- -4,438) |
| 2005 | -10,598*** | (-12,611 -- -8,584) |
| 2006 | -9,711*** | (-11,818 -- -7,605) |
| Constant | 23,734 | |

Note: The analysis also included HIVRN site (results not shown). N = 10,122

*** $p<.001$

** $p < .01$

* $p < .05$

**Table 10. Linear Regression Analysis of HIV Treatment Costs per Active Observation Year (Patients Diagnosed with HIV and Enrolled in the Same Year)**

| Variable | Coefficient | 95% Confidence Interval |
|---|---|---|
| Late Entry | | |
| No (reference) | ---- | ---- |
| Yes | 8,149*** | (7,258 – 9,039) |
| Gender | | |
| Female (reference) | ---- | ---- |
| Male | 1,356* | (235 - 2,477) |
| Race/Ethnicity | | |
| White non-Hispanic (reference) | ---- | ---- |
| Black non-Hispanic | 677 | (-462 – 1,816) |
| Hispanic | 2,800*** | (1,542 – 4,058) |
| Other/Unknown | -2,033 | (-4,811 -- 746) |
| HIV Risk Factor | | |
| MSM (reference) | ---- | ---- |
| HET | 1,770** | (670 – 2,871) |
| IDU | 1,951* | (441 – 3,462) |
| Other/Unknown | 3,119** | (963 – 5,275) |
| Age in 2000 | | |
| <30 (reference) | ---- | ---- |
| 31-40 | 979 | (-34 – 1,993) |
| 41-50 | 1,935** | (687 – 3,183) |
| 51+ | 2,826** | (982 – 4,672) |
| Enrollment Year | | |
| 2000 (reference) | ---- | ---- |
| 2001 | 14 | (-1,608 -- 1,636) |
| 2002 | 978 | (-621 -- 2,578) |
| 2003 | 662 | (-981 -- 2,305) |
| 2004 | 46 | (-1,562 – 1,654) |
| 2005 | 419 | (-1,191 – 2,030) |
| 2006 | 1,191 | (-432 – 2,815) |
| Constant | 7,521 | |

Note: The analysis also included HIVRN site (results not shown). (N=3,441)

*** $p<.001$

** $p < .01$

* $p < .05$

U.S. Department of Health and Human Services
Agency for Healthcare Research and Quality
National Institutes of Health

# Report on Obligations, Expenditures, and Unobligated Balances for Comparative Effectiveness Research

Kathleen Sebelius
Secretary

Francis S. Collins, M.D., Ph.D.
Director
National Institutes of Health

Carolyn M. Clancy, M.D.
Director
Agency for Healthcare Research and Quality

October 30, 2009

**Report on Obligations, Expenditures, and Unobligated Balances for Comparative Effectiveness Research**

Period Covering through September 30, 2009

**H.R. 1, the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5 (Feb. 17, 2009), Page 145:**

> "Provided further, That the Secretary, jointly with the Directors of the Agency for Healthcare Research and Quality and the National Institutes of Health, shall provide to the Committees on Appropriations of the House of Representatives and the Senate a report on the actual obligations, expenditures, and unobligated balances for each activity funded under this heading not later than November 1, 2009, and every 6 months thereafter as long as funding provided under this heading is available for obligation or expenditure."

## Background

The American Recovery and Reinvestment Act (ARRA) appropriated $1.1 billion for comparative effectiveness research (CER), of which $300 million is for the Agency for Healthcare Research and Quality (AHRQ), $400 million is for the National Institutes of Health (NIH), and $400 million is for allocation at the discretion of the Secretary of the Department of Health and Human Services (HHS).

As requested by the House and Senate Appropriations Committees, this report is the first in a series of semi-annual reports on the actual obligations, expenditures, and unobligated balances for each activity funded by the $1,100,000,000 CER funding. This report includes a description of the AHRQ ($300 million), NIH ($400 million), and Office of the Secretary (OS) ($400 million) CER activities as well as the requested financial information. This report includes information and activities from May 14, 2009 to September 30, 2009.

## Description of Comparative Effectiveness Research Activities

The activities that comprise the $1,100 million CER activities are detailed below:

AHRQ's Comparative Effectiveness Research Activities ($300 million)
The ARRA appropriated $300 million to AHRQ for CER. AHRQ will use ARRA funds to expand and broaden CER activities through its Effective Health Care (EHC) program. These activities were initiated at the agency in response to the Medicare Prescription Drug, Improvement and Modernization Act of 2003.

AHRQ will use a process to generate and bolster CER that includes: **horizon scanning, evidence gap identification, evidence synthesis, evidence generation, dissemination and translation, and research training and career development.** AHRQ also requests ARRA

funding to expand and standardize public involvement in its EHC program by establishing a Citizens Forum. This comprehensive spending plan represents an investment in creating the integrated components of a national comparative effectiveness activity in the United States, including the first coordinated prospective pragmatic comparative effectiveness clinical studies program. Additional ARRA investments will support the infrastructure, methods, and capacity necessary to sustain a vigorous national CER enterprise in the United States. Proposals will focus initially on the14 priority conditions established by the Secretary of DHHS under Section 1013 of the 2003 Medicare Modernization Act. Priority will also be given to research focused on under-represented populations.

| Research | Type of Financial Award | FY 09 Funding (M) | FY 10 Funding (M) | Total Funding (M) |
|---|---|---|---|---|
| I. Identification of New and Emerging Issues for Comparative Effectiveness (Horizon Scanning) | Contracts | $0 M | $9.5 M | **$9.5 M** |
| II. Evidence Synthesis | Task Order Contract | $2.0M | $23 M | **$25 M** |
| III. Evidence Gap Identification | Task Order Contract | $0 M | $25 M | **$25 M** |
| IV. Evidence Generation | Grants<br>*CHOICE Studies*<br>*Request for Registries*<br>*Unfunded Meritorious Apps*<br><br>Task Order Contract<br>*DEcIDE Consortium Support* | $0.3 M<br>*0 M*<br>*0 M*<br>*0.3 M*<br><br>$0 M<br>*0 M* | $148.7 M<br>*100 M*<br>*48 M*<br>*0.7 M*<br><br>$24 M<br>*24 M* | **$149 *M***<br>***100 M***<br>***48 M***<br>***1 M***<br><br>**$24 M**<br>***24 M*** |
| V. Translation and Dissemination | Grants (R18)<br><br>Contract | $0 M<br><br>$2.5 M | $29.5 M<br><br>$2.5 M | **$29.5 M**<br><br>**$5 M** |
| VI. Training and Career Development | Grants (K12, T32) | $0 M | $20 M | **$20 M** |
| VII. Citizen Forum | Contract | $0 M | $10 M | **$10 M** |
| Salaries and Benefits for ARRA FTEs | Salary and Benefits | $0.1 M | $2.9 M | **$3 M** |
| **Total** | | **$4.9 M** | **$295.1 M** | **$300 M** |

To achieve the goals of CER, AHRQ will use a variety of funding mechanisms including grants, contracts and inter-agency agreements. Award recipients will include researchers, academic institutions, states, community-based organizations, national organizations, and federal agencies.

NIH's Comparative Effectiveness Research Activities ($400 million)

NIH will use the $400 million appropriated by ARRA for a NIH trans-agency research effort in CER. The goal of the program is to improve health outcomes by providing evidence to enhance medical decisions made by patients and their medical providers. In funding this arena of research, the NIH objective is to target dollars to support scientific research opportunities that

help support the goals of the Recovery Act and enhance patient and clinician decision-making and to improve "real world" health outcomes for the nation.

NIH's major role within the HHS CER framework is evidence generation through research, but the NIH anticipates funding training and data infrastructure as well as dissemination and translation. This funding will be coordinated and integrated with overall HHS efforts. Funds were transferred to the NIH Office of the Director, which has the flexibility to retain or further transfer funds to the Institutes and Centers. NIH plans to support scientific research opportunities that help achieve the goals of ARRA including: **previously peer-reviewed and approved projects, Challenge Grants, Grand Opportunity program (GO grants), supplements** (administrative supplements and competitive revisions), **and other activities** through contracts, Inter-Agency Agreements, RO1 grants and RC4s. In general, NIH will fund competitive awards based on peer review, scientific opportunity and the potential impact of the proposal on biomedical research and public health priorities related to CER. To avoid duplicative databases, each project that involves database establishment, expansion, and/or maintenance must detail the rationale and need for the database work proposed. Senior NIH and Science Implementation officials will continue to meet regularly with senior Department officials to ensure that projects are meeting their program goals, assessing and mitigating risks, ensuring transparency, and incorporating corrective actions.

*(Dollars in millions)*

| | | | FY 2009 | | | FY 2010 | | |
|---|---|---|---|---|---|---|---|---|
| Research | Type of Award | # of Awards Estimate | Original FY 2009 Estimate | # of Awards | FY 2009 Actuals | Original FY 2010 Estimate | Revised FY 2010 Estimate | Total |
| Previously Peer reviewed and Approved Projects | Grants | 9 | $20.0 | 8 | $16.9 | $20.0 | $19.0 | $35.9 |
| Challenge Grants | Grants | 83 | 62.5 | 81 | 38.2 | 62.5 | 37.4 | 75.6 |
| GO Grants | Grants | 31 | 62.5 | 31 | 76.5 | 62.5 | 67.7 | 144.2 |
| Administrative Supplements | Grants | 18 | | 28 | 18.1 | | 0.0 | 18.1 |
| Competing Revisions | Grants | 7 | | 7 | 7.2 | | 0.0 | 7.2 |
| Other Activities (IAAs,R01s, RC4s and Contracts) * | Grants/ Contracts | 50 | 55.0 | 7 | 34.9 | 55.0 | 84.1 | 119.0 |
| Total CER Recovery Act | | 174 | $200.0 | 162 | $191.8 | $200.0 | $208.2 | $400.0 |

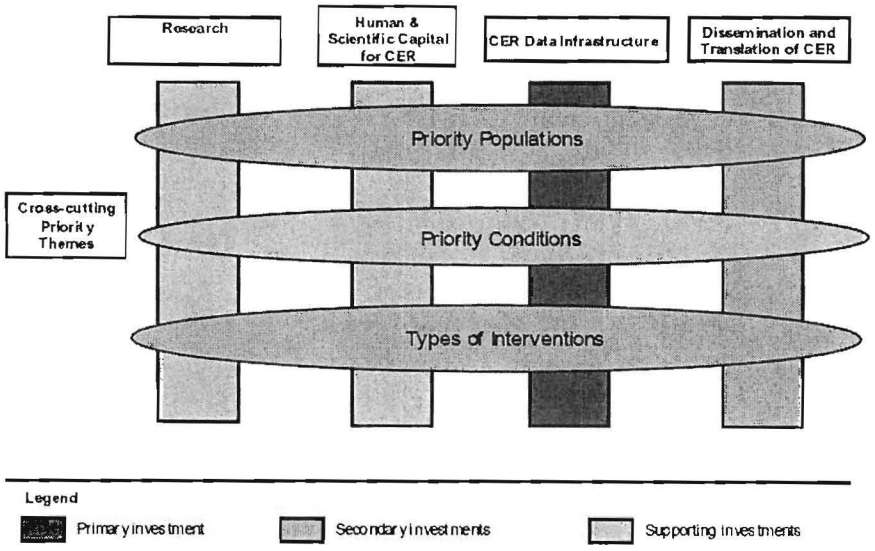
| *"Other": | FY 2009 | FY2010 |
|---|---|---|
| Contracts/IAA's | $24.6 | $13.1 |
| Competing RPG's | | $60.5 |
| Other Grants | $10.3 | $10.5 |
| TOTAL | $34.9 | $84.1 |

The Office of the Secretary (OS) Comparative Effectiveness Research ($400 million)
The HHS's overall goal for the investment in CER is to promote high quality care through broad availability of information that helps clinicians and patients match the best science to individual needs and preferences. Moreover, the investment can build a sustainable foundation for CER so that it will enable -- now and in the future -- the United States healthcare system to deliver the highest quality and best value care to all Americans.

ARRA established the Federal Coordinating Council (FCC) for CER to "foster optimum coordination of comparative effectiveness and related health services research conducted or supported by relevant Federal departments and agencies, with the goal of reducing duplicative efforts and encouraging coordinated and complementary use of resources."

The FCC, after significant public input from live listening sessions and the internet, produced a report to Congress and the President on recommended priorities for the OS funds on June 30, 2009. In addition, the Institute of Medicine of the National Academies (IOM), also after significant public and expert input, produced a report on recommended priorities for ARRA CER on June 30, 2009. These two reports, both mandated by ARRA, are highly complementary. The IOM report specifies 100 high priority research topics whereas the FCC's report created a strategic framework and recommended high level priorities for OS funds (below).

**Recommended High Level OS Investment Priorities**




In addition, AHRQ'S 14 priority conditions were identified by extensive input from public and private sector stakeholders. Together, these three inputs – the 100 IOM priority research topics, the FCC OS investment priorities, and AHRQ's 14 priority conditions – will frame HHS's priorities for the entire ARRA CER investment.

The ARRA funds represent a significant investment in CER, allowing many high-priority issues to be addressed in the short-term, but also strengthening and sustaining CER in the long-term. As such, if we are to realize the full potential of CER to improve health and health care, we must be equally strategic about CER's direction moving forward. To this end, and building upon the work of the FCC as well as AHRQ and NIH, HHS has developed a CER framework schematic that demonstrates the HHS approach for promoting and prioritizing future CER initiatives. Evidence needs for CER will be identified through syntheses of existing evidence as well as horizon scanning (which will include public outreach and consultation). These identified needs will inform development of priorities for evidence generation through CER across HHS operational and staff divisions. As appropriate, these priorities will incorporate cross-cutting needs relating to priority interventions, conditions and populations.

Findings from evidence generation will be disseminated to patients, providers and other stakeholder groups for eventual translation into health care improvement. Continued review of health care practices will inform evidence need identification, underscoring the dynamic nature of CER and the importance of providing meaningful support for each framework activity. Critical to the sustainability of the Comparative Effectiveness enterprise is the "Human and Scientific Capital for CER." To meet this need, AHRQ has proposed using ARRA funding appropriated to them for comparative effectiveness capacity building. AHRQ will provide institutional support to increase the intellectual and organizational capacity for larger scale programs in comparative effectiveness and allow fellowship training opportunities. Through grant mechanisms, funding will support the career development of clinicians and research doctorates focusing their research on the synthesis, generation and translation of new scientific evidence and analytic tools for CER. In particular, the goal will be to enhance the research and methodological capacity for conducting and improving the quality of systematic review, retrospective studies, and clinical trials in CER and the development of data sources and other aspects of the research infrastructure. Finally, for the CER enterprise to be successful, it must be built upon a strong research platform consisting of data infrastructure, methods development and a skilled workforce. The ARRA OS CER funds, in addition to support from both NIH and AHRQ, will play a critical role in strengthening the research platform, as well as accelerating the dissemination and translation of CER findings into health care practice improvement.

The OS ARRA CER funds complement the AHRQ and NIH ARRA investments in CER to create a balanced, high impact portfolio. The OS ARRA CER spend plan went through Departmental review and approval by the Department-wide ARRA implementation team. This portfolio will include both investments with potential short-term results, and investments that will lay the foundation for an ongoing CER enterprise that improves the quality and value of health care for all Americans. In order to coordinate and optimize the overall ARRA CER investment, enhance synergy across ARRA CER and related (e.g., HIT) investments, and eliminate inappropriate duplication of effort, the Department has established the ARRA CER Coordination and Implementation Team (CER-CIT). This senior team will be responsible for ensuring that the CER funding priorities and gaps are addressed. This team, comprised of senior leadership from OS, NIH, and AHRQ, will ensure coordination and execution of ARRA CER investments. Although AHRQ will staff the overall execution, implementation and oversight of the OS CER funding, ASPE will set up meetings for the CER-CIT and staff CER-CIT meetings. The CER-CIT will review proposals, discuss recommendations for changes, if any, with the HHS

operational and staff divisions responsible for execution. If the CER-CIT team reaches an impasse on an issue, the Deputy Secretary, in consultation with the Secretary as needed, would make the final decision.

## Actual Obligations, Expenditures, and Unobligated Balances

The table below shows the total appropriation, as well as obligations, unobligated balances and outlays for these funds through September 30, 2009, the end of Fiscal Year 2009. Note that Federal outlays are reported in place of expenditures.

Table: *FY 2009 Recovery Act AHRQ, NIH and OS Comparative Effectiveness Research: Obligations and Outlays*

(dollars in millions)

| Program | Amount Appropriated | Obligations | Unobligated Balance | Outlays |
|---|---|---|---|---|
| AHRQ Comparative Effectiveness Research /1 | $300.0 | $4.9 | $295.1 | $0.09 |
| NIH Comparative Effectiveness Research | $400.0 | $191.8 | $208.2 | $6.0 |
| Office of the Secretary Comparative Effectiveness Research /1 | $400.0 | $1.6 | $398.4 | $0.4 |
| | | | | |
| **Total, AHRQ and OS** | **$1,100.0** | **$198.3** | **$901.7** | **$6.5** |

/1 Please note: The amounts reported for AHRQ and OS CER Obligations and Outlays do not tie to the Treasury Reports as of September 30, 2009. One OS CER Inter-Departmental Delegation of Authority (with an obligation $599,458 and an outlay of $190,747) was mistakenly included in AHRQ's totals. The error has been corrected in subsequent reports.

THE SECRETARY OF HEALTH AND HUMAN SERVICES
WASHINGTON, D.C. 20201

The Honorable Todd Tiahrt
Ranking Member, Subcommittee on Labor,
Health and Human Services,
Education, and Related Agencies
Committee on Appropriations
House of Representatives
Washington, D.C. 20515

JUL 30 2009

Dear Mr. Tihart:

The American Recovery and Reinvestment Act (Recovery Act) appropriated $1.1 billion for comparative effectiveness research, of which $300 million is for the Agency for Healthcare Research and Quality (AHRQ), $400 million is for the National Institutes of Health (NIH), and $400 million is for allocation at the discretion of the Secretary of the Department of Health and Human Services (HHS). I am writing to notify you of the planned use of the $300 million made available to AHRQ for comparative effectiveness research.

In addition to the activities described in the attached operating plan, HHS has established a team to promote and support ongoing policy coordination of comparative effectiveness research. This team includes a senior advisor from the Office of the Secretary, the Director of AHRQ, and the Director of NIH. This team will meet regularly to review policy issues related to comparative effectiveness research, including strategies to effectively oversee and promote alignment with priority areas of all Recovery Act CER resources allocated to the Department, including AHRQ, NIH and OS; assure that they are synergistic with investments made with AHRQ and NIH regularly appropriated funds; and finally, assure related scientific issues across the Department are addressed. In addition, the team will ensure that all HHS Recovery Act CER funds are allocated based on a unified set of priority areas. There will be a consultative review process by the coordinating team to ensure: 1) CER gaps, needs, and priorities are being addressed, and 2) duplication is avoided to the extent possible. More details on the HHS CER framework and the coordination and priority-setting process will be included in the OS plan.

I would be happy to answer any questions you or your staff may have and appreciate your support of the Department's programs.

Sincerely,

Kathleen Sebelius
Secretary

Carolyn M. Clancy, M.D.
Director
Agency for Healthcare Research and Quality

Raynard S. Kington, M.D., Ph.D.
Acting Director
National Institutes of Health

Enclosure

THE SECRETARY OF HEALTH AND HUMAN SERVICES
WASHINGTON, D.C. 20201

July 30, 2009

The Honorable Thad Cochran
Ranking Member, Subcommittee on Labor,
Health and Human Services,
Education, and Related Agencies
Committee on Appropriations
United States Senate
Washington, D.C. 20510

Dear Senator Cochran:

The American Recovery and Reinvestment Act (Recovery Act) appropriated $1.1 billion for comparative effectiveness research, of which $300 million is for the Agency for Healthcare Research and Quality (AHRQ), $400 million is for the National Institutes of Health (NIH), and $400 million is for allocation at the discretion of the Secretary of the Department of Health and Human Services (HHS). I am writing to notify you of the planned use of the $300 million made available to AHRQ for comparative effectiveness research.

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I would be happy to answer any questions you or your staff may have and appreciate your support of the Department's programs.

Sincerely,

Kathleen Sebelius
Secretary

For

Raynard S. Kington, M.D., Ph.D.
Acting Director
National Institutes of Health

MD

Carolyn M. Clancy, M.D.
Director
Agency for Healthcare Research and Quality

Enclosure

THE SECRETARY OF HEALTH AND HUMAN SERVICES
WASHINGTON, D.C. 20201

The Honorable Tom Harkin
Chairman, Subcommittee on Labor,
Health and Human Services,
Education, and Related Agencies
Committee on Appropriations
United States Senate
Washington, D.C. 20510

JUL 30 2009

Dear Mr. Chairman:

The American Recovery and Reinvestment Act (Recovery Act) appropriated $1.1 billion for comparative effectiveness research, of which $300 million is for the Agency for Healthcare Research and Quality (AHRQ), $400 million is for the National Institutes of Health (NIH), and $400 million is for allocation at the discretion of the Secretary of the Department of Health and Human Services (HHS). I am writing to notify you of the planned use of the $300 million made available to AHRQ for comparative effectiveness research.

In addition to the activities described in the attached operating plan, HHS has established a team to promote and support ongoing policy coordination of comparative effectiveness research. This team includes a senior advisor from the Office of the Secretary, the Director of AHRQ, and the Director of NIH. This team will meet regularly to review policy issues related to comparative effectiveness research, including strategies to effectively oversee and promote alignment with priority areas of all Recovery Act CER resources allocated to the Department, including AHRQ, NIH and OS; assure that they are synergistic with investments made with AHRQ and NIH regularly appropriated funds; and finally, assure related scientific issues across the Department are addressed. In addition, the team will ensure that all HHS Recovery Act CER funds are allocated based on a unified set of priority areas. There will be a consultative review process by the coordinating team to ensure: 1) CER gaps, needs, and priorities are being addressed, and 2) duplication is avoided to the extent possible. More details on the HHS CER framework and the coordination and priority-setting process will be included in the OS plan.

I would be happy to answer any questions you or your staff may have and appreciate your support of the Department's programs.

Sincerely,

Kathleen Sebelius
Secretary

Carolyn M. Clancy, M.D.
Director
Agency for Healthcare Research and Quality

Raynard S. Kington, M.D., Ph.D.
Acting Director
National Institutes of Health

Enclosure

THE SECRETARY OF HEALTH AND HUMAN SERVICES
WASHINGTON, D.C. 20201

The Honorable David R. Obey
Chairman, Subcommittee on Labor,
Health and Human Services,
Education, and Related Agencies
Committee on Appropriations
House of Representatives
Washington, D.C. 20515

JUL 30 2009

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Enclosure

**Operating Plan for American Recovery and Reinvestment Act Funds for Comparative Effectiveness Research at the Agency for Healthcare Research and Quality**

1. Purpose of funding

The American Recovery and Reinvestment Act (ARRA) appropriated $1.1 billion for comparative effectiveness research (CER), of which $300 million is for the Agency for Healthcare Research and Quality (AHRQ), $400 million is for the National Institutes of Health (NIH), and $400 million is for allocation at the discretion of the Secretary of the Department of Health and Human Services.

The overarching goal of comparative effectiveness research is to improve health outcomes by providing evidence to enhance medical decisions made by patients and their medical providers. The Department of Health and Human Services uses the definition of comparative effectiveness research as set forth by the Federal Coordinating Council for CER:

> Comparative effectiveness research is the conduct and synthesis of research comparing the benefits and harms of different interventions and strategies to prevent, diagnose, treat and monitor health conditions in "real world" settings. The purpose of this research is to improve health outcomes by developing and disseminating evidence-based information to patients, clinicians, and other decision-makers, responding to their expressed needs, about which interventions are most effective for which patients under specific circumstances. To provide this information, comparative effectiveness research must assess a comprehensive array of health-related outcomes for diverse patient populations and sub-groups. Defined interventions compared may include medications, procedures, medical and assistive devices and technologies, diagnostic testing, behavioral change, and delivery system strategies. This research necessitates the development, expansion, and use of a variety of data sources and methods to assess comparative effectiveness and actively disseminate the results.

With the $300 million made available through the American Recovery and Reinvestment Act (ARRA), the Agency for Healthcare Research and Quality (AHRQ) will conduct and support comparative effectiveness research, consistent with Titles III and IX of the Public Health Services Act; Part A of title XI of the Social Security Act; and Section 1013 of the Medicare Prescription Drug, Improvement, and Modernization Act of 2003. AHRQ will employ grants and contracts, to undertake this research

AHRQ will use ARRA funds to expand and broaden pre-existing comparative effectiveness research activities initiated at the Agency in response to Section 1013 of the Medicare Prescription Drug, Improvement, and Modernization Act of 2003, legislation designed to increase the availability of research that would inform the real-world decisions facing patients and clinicians. AHRQ's investments using ARRA funds will expand its Effective Health Care (EHC) Program. This effort will increase the national output of comparative effectiveness research; in addition, it will build research infrastructure and capacity, allowing future studies to address questions where data are currently not sufficient to provide guidance about competing

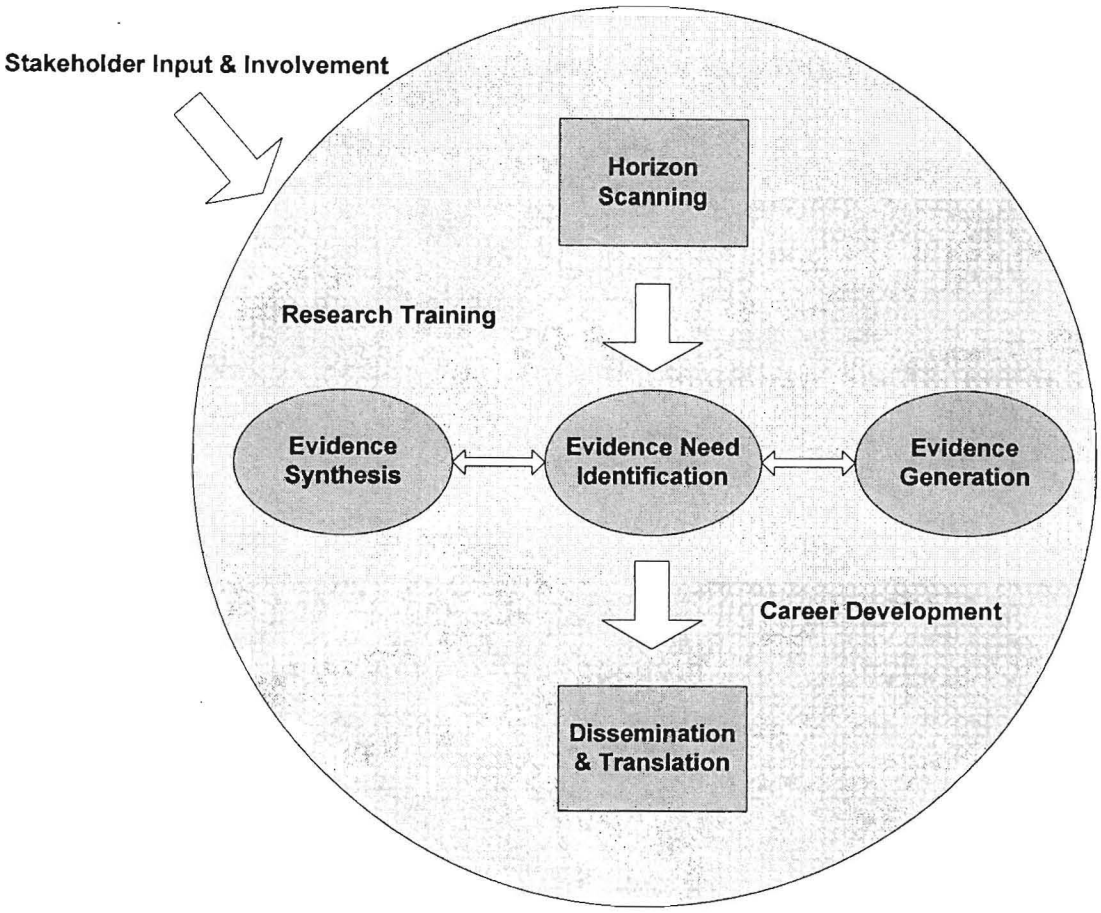
alternatives and to improve the efficiency with which the research infrastructure is able to respond to pressing health care questions. Research activities will be performed using rigorous scientific methods within a previously-established process that emphasizes stakeholder involvement and transparency, that was designed to prioritize among pressing health issues, and whose products are designed for maximum usefulness for health care decision makers.

*Overview of Funding Proposals*

AHRQ conceptualizes the process of generating comparative effectiveness research as shown in Figure 1. Stakeholder input occurs through all steps of this process to ensure the relevance of the research to decision makers. ARRA funds will be allocated to all steps of the comparative effectiveness research process.

The process starts with **horizon scanning**, the identification of current or emerging medical interventions available to diagnose, treat, or otherwise manage a particular condition. Horizon scanning activities are vital for understanding the relevant healthcare context and landscape, as a basis for identifying and beginning to prioritize among research needs. Once options are identified, **evidence synthesis** focuses on the review and synthesis of current medical research, to provide rigorous evaluation of what is known on the basis of existing research about the comparative effectiveness of alternative approaches to the given clinical problem. Evidence synthesis involves the distillation of a body of evidence generally comprised of multiple studies and often including a combination of trials and non-experimental studies, to provide the most relevant information possible for clinicians and other decision makers.

To increase the impact of comparative effectiveness research in the U.S., it is vital to rigorously and systematically **identify evidence needs and gaps,** areas where new research conducted within a comparative effectiveness framework would contribute to bridging the gap between existing medical research and clinical practice. EPCs have been charged with identifying evidence gaps in their systematic reviews of the literature. ARRA funding will allow HHS to put greater emphasis on the identification of evidence needs in the systematic review process, which begins with the identification of evidence gaps that has been the purview of the EPCs. This effort will be designed to produce recommendations that further consider the timing, value and feasibility of research that would fill these gaps and will include coordination with other funders as well researchers able to conduct needed research.




**Evidence generation**, the conduct of new comparative effectiveness research, is essential to meeting the needs of clinical and health policy decision makers. It will include both efforts to build the infrastructure for conducting comparative effectiveness studies, and underwriting rigorous research with dedicated study designs and data collection to definitively address knowledge gaps that could not otherwise be addressed.

**Dissemination and translation** efforts will comprise the final link, ensuring that knowledge synthesized or generated within the comparative effectiveness research program is available to decision makers to better inform their decisions. AHRQ will increase efforts in this area, expanding the number of clinician- and consumer-oriented summaries of findings produced by the John M. Eisenberg Clinical Decisions and Communications Science Center (currently operated by Baylor College of Medicine). As the translation and dissemination component of the comparative effectiveness research initiative, the Eisenberg Center will continue to produce these products in partnership with specific stakeholder groups, including the general public, patients, providers, payers, and policy-makers, to generate information tailored to their circumstances. ARRA funds will also enable new investments in innovative research on incorporating comparative effectiveness research into decision making, such as integrating

clinical decision support tools into health information technologies, as health care system reforms are planned and implemented.

Finally, essential to the goal of building a comparative effectiveness program that will be capable of engendering real change in the healthcare system, is strengthening and capacity building within the research infrastructure. **Research training and career development** of researchers and clinicians will strengthen the research infrastructure and build the research infrastructure's capacity through ensuring a sufficient pool of research expertise for national efforts in comparative effectiveness research.

ARRA funding will focus initially on 14 priority conditions established by the Secretary of the Department of Health and Human Services under Section 1013 of the Medicare Modernization Act. These priority conditions were identified through a process involving discussion with and extensive input from the public and Federal agencies and include conditions relevant to the Medicare, Medicaid and SCHIP programs. AHRQ will continue to review the currency of the priority list and make recommendations to the Secretary regarding updates. As additional priorities are identified through ongoing research at AHRQ and using recommendations from the Federal Coordinating Council and Institute of Medicine reports, funds will be allocated accordingly.

1. Arthritis and nontraumatic joint disorders
2. Cancer
3. Cardiovascular disease, including stroke and hypertension
4. Dementia, including Alzheimer's Disease
5. Depression and other mental health disorders
6. Developmental delays, attention-deficit hyperactivity disorder, and autism
7. Diabetes mellitus
8. Functional limitations and disability
9. Infectious diseases including HIV/AIDS
10. Obesity
11. Peptic ulcer disease and dyspepsia
12. Pregnancy including preterm birth
13. Pulmonary disease/asthma
14. Substance abuse

HHS has established a team to promote and support ongoing policy coordination of comparative effectiveness research. This team includes a senior advisor from the Office of the Secretary, the Director of AHRQ, and the Director of NIH. This team will meet regularly to review policy issues related to comparative effectiveness research, including strategies to

effectively oversee and promote alignment with priority areas of all Recovery Act CER resources allocated to the Department, including AHRQ, NIH and OS; assure that they are synergistic with investments made with AHRQ and NIH regularly appropriated funds; and finally, assure related scientific issues across the Department are addressed. In addition, the team will ensure that all HHS Recovery Act CER funds are allocated based on a unified set of priority areas. There will be a consultative review process by the coordinating team to ensure: 1) CER gaps, needs, and priorities are being addressed, and 2) duplication is avoided to the extent possible. More details on the HHS CER framework and the coordination and priority-setting process will be included in the OS plan.

2. Specific Budget Proposals -

The proposal for ARRA funds is summarized in the table and the sections below. The AHRQ ARRA funding proposal represents an investment in creating the integrated components of a national comparative effectiveness activity in the United States, including the first coordinated prospective pragmatic comparative effectiveness clinical studies program. Additional ARRA investments will support the infrastructure, methods, and capacity necessary to sustain a vigorous national comparative effectiveness research enterprise in the United States.

| Research | Type of Financial Award | FY 09 Funding (M) | FY 10 Funding (M) | Total Funding (M) |
|---|---|---|---|---|
| I. Identification of New and Emerging Issues for Comparative Effectiveness (Horizon Scanning) | Contracts | $0 M | $9.5 M | **$9.5 M** |
| II. Evidence Synthesis | Task Order Contract | $25 M | $0 M | **$25 M** |
| III. Evidence Gap Identification | Task Order Contract | $25 M | $0 M | **$25 M** |
| IV. Evidence Generation | Grants<br>*CHOICE Studies*<br>*Request for Registries*<br>*Unfunded Meritorious Apps*<br><br>Task Order Contract<br>*DEcIDE Consortium Support* | $1 M<br>*0 M*<br>*0 M*<br>*1 M*<br><br>$0 M<br>*0 M* | $148 M<br>*100 M*<br>*48 M*<br>*0 M*<br><br>$24 M<br>*24 M* | **$149 *M***<br>***100 M***<br>***48 M***<br>***1 M***<br><br>**$24 M**<br>***24 M*** |
| V. Translation and Dissemination | Grants (R18)<br><br>Contract | $0 M<br><br>$2.5 M | $29.5 M<br><br>$2.5 M | **$29.5 M**<br><br>**$5 M** |
| VI. Training and Career Development | Grants (K12, T32) | $0 M | $20 M | **$20 M** |
| VII. Citizen Forum | Contract | $0 M | $10 M | **$10 M** |
| Salaries and Benefits for ARRA FTEs | Salary and Benefits | $0.5 M | $2.5 M | **$3 M** |
| **Total** | | **$54 M** | **$246 M** | **$300 M** |

## I. Identification of New and Emerging Issues for Comparative Effectiveness (Horizon Scanning): Total Expenditure $9.5 million (FY 09 - $0 M; FY 10 - $9.5 M)*

AHRQ proposes to use ARRA funding to establish an infrastructure to identify new and/or emerging issues for comparative effectiveness review investments. This investment will also address emerging technologies and their contextual role in health care.

* AHRQ scientific staff used its best judgment based on years of experience conducting related work to determine the funding amounts for each activity. In addition, the funding amounts are based on best government cost estimates for the type of work and tasks to be performed as well as the level of effort expected.

This horizon scanning approach is vital to understanding the relevant healthcare context and landscape, as a basis for identifying and beginning to prioritize among research needs. It will establish and use an efficient approach to investigate and prioritize areas for investigation relevant to the 14 priority conditions that guide AHRQ's Effective Health Care Program and can be scaled for a national investment in comparative effectiveness research. AHRQ will work with stakeholders, including clinicians, to identify particularly valuable areas of research where the value of additional information is great; for example, stakeholders may be asked to provide input on emerging interventions and new technologies and how these new interventions fit/are likely to fit into current care pathways.

This new activity will track emerging clinical interventions and investigate key issues related to the intervention. Technical briefs will be produced to provide an overview of key issues related to the intervention -- for example, current indications for the intervention, relevant patient population and subgroups of interest, outcomes measured, and contextual factors that may affect decisions by reviewing the current literature regarding the intervention. Technical briefs generally focus on interventions for which there are limited published data (not enough to conduct a full systematic review) and too few completed protocol-driven studies to support definitive conclusions.

Some of the richest topics for comparative effectiveness research will likely be found at the frontier of new therapies, where there may be great promise but uncertain population benefits and risks. Priority setting activities will gather and present information for decisions on investments in the areas of impact on different populations, value of information, level and impact of uncertainty, and potential impact of the information. AHRQ will initiate a program dedicated to tracking emerging interventions and investigating ways in which these new interventions are likely to fit into current care pathways. This new effort will employ technical briefs, described above, that will provide a public framework of pertinent issues and identify significant or controversial questions of effectiveness that may be addressed by undertaking new evidence synthesis or generation and will be presented in formats conducive to priority setting activities.

In FY 2009, AHRQ will write the request for contract for Identification of New and Emerging Issues for Comparative Effectiveness (Horizon Scanning). Funds for this horizon scanning activity will be obligated in FY 2010 through a new, competitive, cost-based reimbursement contract. AHRQ plans to award one contract to establish an infrastructure for identifying new and/or emerging issues for comparative effectiveness review investments as opposed to making multiple awards to ensure consistency in the processes for horizon scanning and to prevent duplicative efforts and redundancy which may occur if multiple groups were to work on this activity. The information gathered from this program will help to inform the other processes for generating comparative effectiveness research as shown in figure 1 and described below.

The amount of staff time that will be used to administer the activity will vary. Key factors that will impact the amount of FTE on this activity include the availability and

expertise of staff and the phase of the project. An approximate FTE allocation to administer this activity is 1 FTE based on our current experience. Actual FTE utilization will not be available until all projects are solicited, reviewed approved and completed.

- **Activity: Establish an Entity for Identification of New and Emerging Issues for Comparative Effectiveness**

  - Mechanisms:
    - Contracts: One new competitive cost-based reimbursement contract in the amount of $9.5 million (performance incentives, either positive or negative or both, shall be incorporated into the cost-based reimbursement contract to encourage contractors to increase efficiency and maximize performance)

    - Project Length: Two years funded with ARRA funds with three option years (possible funding with annual appropriations based on availability of funds)

## II. Evidence Synthesis: Total Expenditure $25 M (FY 09 - $25 M; FY 10 - $0 M)*

Evidence syntheses include the review and synthesis of current medical research to provide rigorous evaluation of what is known on the basis of existing research about the comparative effectiveness of alternative approaches to the given clinical problem.

Working with lists of priority topics developed within the Effective Health Care Program, topics generated through the increased horizon scanning and priority setting efforts, and other lists of priority topics such as those to be recommended by the Institute of Medicine through their project on Priority Setting for Comparative Effectiveness Research, AHRQ will use ARRA funds to increase support for comparative effectiveness reviews. The goal of this effort will be to increase the number of comparative effectiveness reviews conducted through AHRQ's Evidence-based Practice Centers (EPC) Program, thereby increasing the information base of research synthesis available to support decisions in the clinical and other health care decision settings. The EPCs are 14 institutions that critically examine existing scientific evidence on a clinical topic and summarize what is known and not known from the current science base. Comparative effectiveness reviews range in cost from $500,000 to $2 million since there is wide variability in scope and applicability of evidence. Approximately 10 to 30 comparative effectiveness reviews are expected to be funded with ARRA funds, depending on the research to be pursued.

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The increase in ARRA funding for evidence synthesis will also allow AHRQ to strategically build upon the existing strengths of the EPC Program to include a focus on capacity-building to create a larger and stronger pool of expertise in systematic review and to advance the scientific methods of systematic review. To build capacity and expertise, EPCs may hire additional researchers and/or provide additional training. This will strengthen the research infrastructure to conduct systematic reviews and will allow the application of sophisticated techniques in systematic review such as individual patient level data analysis, increased use of transparent decision modeling, and sophisticated gap analysis. It will also allow for continued and enhanced investments in research methods for conducting systematic reviews to answer comparative effectiveness research questions. New methodological research may focus meta-analysis, decision analysis[1], assessing and interpreting evidence, identifying clinically diverse populations in which treatment effectiveness may be different than the general population, methods for risk stratification[2], and methods to evaluate medical tests.

Results of this methods research will be documents and tools that will serve as a resource for our EPCs as well as for other investigators interested in conducting comparative effectiveness reviews. Dissemination of methods guidance will require active engagement with stakeholders include researchers. This may be conducted through publication of monographs, active engagement with specific stakeholder groups, organization of meetings with presentation of methods guidance and discussion of implications for research community, and follow-up publication of stakeholder response

The comparative effectiveness reviews will contribute to the identification of comparative effectiveness research needs and knowledge gaps. Identification of evidence gaps has been a component of evidence syntheses conducted through AHRQ's EPC program – the expectation is that researchers steeped in the literature relevant to a research question gain an important perspective on areas where evidence is needed and what study designs are most appropriate. With ARRA funding, this component of evidence synthesis will be built upon as described in the "Evidence Gap Identification" section, below.

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[1] Decision analysis: an approach to decision making under conditions of uncertainty that involves modeling of the sequences or pathways of multiple possible strategies (e.g., of diagnosis and treatment for a particular clinical problem) to determine which is optimal. It is based upon available estimates (drawn from the literature or from experts) of the probabilities that certain events and outcomes will occur and the values of the outcomes that would result from each strategy. (www.nlm.nih.gov/nichsr/hta101/ta101014.html)

[2] Risk stratification: arranging patients according to the severity of their illness. Implicit in this definition is the ability to predict outcomes from a given intervention based on preexisting illness or the severity of intervention. Risk stratification is therefore defined as the ability to predict outcomes from a given intervention by arranging patients according to the severity of their illness.
(http://cardiacsurgery.ctsnetbooks.org/cgi/content/full/2/2003/187?ck=nck#Risk_Stratification)

The amount of staff time that will be used to administer the activity will vary. Key factors that will impact the amount of FTE on this activity include the availability and expertise of staff and the phase of the project. An approximate FTE allocation to administer this activity is 2 FTE based on our current experience. Actual FTE utilization will not be available until all projects are solicited, reviewed, approved and completed.

- **Activity: Enhancing the Current Evidence-based Practice Centers**
  - Mechanisms:
    - Contracts: Eight Request for Task Orders (RFTOs) competed among the EPC's located in the United States ranging from $2 to $4 million each for a total of $25 million
    - Project Length: Three years with ARRA funds

**III. Evidence Gap Identification: Total Expenditure $25 M (FY 09 - $25 M; FY 10 - $0 M)***

With ARRA funds, AHRQ proposes to initiate an enhanced capacity for identifying and prioritizing evidence needs. A formal process will be developed that will involve stakeholders, including clinicians, funding agencies and researchers to consider the gaps identified in systematic reviews to shape future research agendas and to set priorities for a national investment in new research based on the findings. This process will involve bringing together the researchers that worked on the individual review, as well as stakeholders with interest in the topic, clinicians with expertise in the topic area, agencies with funds for potential future research, and researchers with expertise in the clinical area and study design to identify evidence needs and to develop new research based on the findings of the comparative effectiveness review. Funding will be used to develop this formal approach to ensure it is transparent, systematic, strategic and rigorous.

Stakeholders will be asked to review completed systematic reviews and what is known about a medical therapy, and to identify gaps where existing research is insufficient to address key questions. They will be asked to help identify which gaps should have the highest priority for new research to be completed. (Systematic reviews synthesize knowledge – what is known about a medical therapy – but also identify gaps, where existing research is insufficient to address key questions. Based on AHRQ's significant experience in producing comparative effectiveness reviews, it has identified a critical need for new funding to systematically expand the use of these reviews in the identification and prioritization of research needs.)

This activity will build on and expand current AHRQ Effective Health Care Program efforts to involve stakeholders in the research (e.g. submitting suggestions for research

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topics, commenting on draft key questions before research has begun, commenting on draft comparative effectiveness reviews) by bringing together stakeholders, including clinicians, funding agencies and researchers around a given topic to discuss and provide input on potential future research to fill the gaps identified in the comparative effectiveness review.

Funding will be used to invest in the initial development of this approach to assure that it is systematic, transparent, strategic, and methodologically rigorous. This effort will be designed to produce recommendations that consider the timing, cost, and feasibility of research that would address key questions, in addition to the predicted value of the information generated. Inputs to the process will include stakeholder nominations and recommendations from sources such as the Federal Coordination Council for Comparative Effectiveness Research or the Institute of Medicine's project on Priority Setting for Comparative Effectiveness Research, as well as AHRQ's systematic review process.

The amount of staff time that will be used to administer the activity will vary. Key factors that will impact the amount of FTE on this activity include the availability and expertise of staff and the phase of the project. An approximate FTE allocation to administer this activity is 2 FTE based on our current experience. Actual FTE utilization will not be available until all projects are solicited, reviewed, approved and completed.

- **Activity: Produce Research Gap Reports**
  - Mechanisms:
    - Contracts: Eight RFTOs competed among the existing EPCs located in the United States ranging from $2 to $4 million each for a total of $25 million
    - Project Length: Three years with ARRA funds

## IV. Evidence Generation: Total Expenditure $173 M (FY 09 - $1 M; FY 10 - $172 M)*

This proposal is the largest investment in ARRA funds and is intended to establish a coordinated national investment in practical/pragmatic comparative effectiveness research that is focused on important research questions for the health care system and its users with a concentration in under-represented populations.

The amount of staff time that will be used to administer each activity will vary. Key factors that will impact the amount of FTE on each activity include the availability and expertise of staff and the phase of the project. An approximate FTE allocation to administer this activity is 5 FTE based on our current experience. Actual FTE

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utilization will not be available until all projects are solicited, reviewed, approved and completed.

- **Activity: CHOICE Studies ($100 million)**
  **Request for Registries ($48 million)**
  **DEcIDE Consortium Support ($24 million)**
  **Unfunded Meritorious Applications ($1 million)**

a) **CHOICE Studies ($100 million -- FY 09 - $0 M; FY 10 - $100 M):** The Clinical and Health Outcomes Initiative in Comparative Effectiveness (CHOICE) will represent the first coordinated national effort to establish a series of pragmatic clinical comparative effectiveness studies in the United States. These pragmatic studies will measure effectiveness – the benefit the treatment produces in routine clinical practice – and will include novel study designs focusing on real-world populations. Each CHOICE study will address at least one of the 14 priority health conditions. This initiative will concentrate on under-represented populations (children, elderly, racial and ethnic minorities and other under studied populations) and oversample or deliberately obtaining information on under-represented populations, to make sure that this effort achieves the goals of understanding treatment effects in under-represented populations.

- Mechanisms:
  - Grants: CHOICE: RFA (R01) up to ten awards up to $10 million each depending on the scope of the study for a total of $100 million

  - Project Length: CHOICE: Three years with ARRA funds with competitive option years (up to five years total, possible funding with annual appropriations based on availability of funds)

b) **Request for Registries ($48 million -- FY 09 - $0 M; FY 10 - $48 M):** Disease registries are databases that collect clinical data on patients with a specific disease or keep track of specific medical tests, devices, or surgical procedures (joint replacements, heart valve replacements, etc.). AHRQ will make up to five awards for the establishment or enhancement of national patient registries that can be used for researching the longitudinal effects of different interventions and collect data on under-represented populations. Clinical areas within the 14 priority conditions will be targeted. Ongoing and completed projects on patient registries for studying outcomes in real work practice settings funded by AHRQ will inform all future investments in registries by AHRQ. AHRQ will also continue to consult with other agencies across the Department of Health and Human Services on existing registries, registries in need of expansion, and areas where registries are needed but do not exist. It is expected that grantees will develop registries that are sustainable such that the registries will continue once AHRQ funding has ended.

- Mechanisms:

    - Grants: Request for Registries: RFA (R01) up to five awards up to $10 million each depending on the scope of the project for a total of $48 million

    - Project Length: Request for Registries: Four years with ARRA funds

c) **DEcIDE Consortium Support ($24 million – FY 09 - $0 M; FY 10 - $24 M):** The DEcIDE (Developing Evidence to Inform Decisions about Effectiveness) Network conducts accelerated practical studies about the outcomes, comparative clinical effectiveness, safety, and appropriateness of health care items and services. The network is comprised of research-based health organizations with access to electronic health information databases and the capacity to conduct rapid turnaround research. AHRQ will enhance its investments in establishing a learning health care system by funding the DEcIDE Network to expand multi-center research consortia, comprised of academic, clinic, and practice-based centers, to study diabetes, cancer, cardiovascular disease, and other priority conditions, and by funding distributed data network models utilizing clinically rich data from electronic health records. Consortium were developed in diabetes, cancer, and cardiovascular disease because they are among the priority conditions established by the Secretary, they are three leading causes of the burden of disease in the United States, and they represent areas with potential impact for reducing clinically significant variations in the prevention, diagnosis, treatment, or management of a disease or condition, or in the use of a procedure or technology.

The DEcIDE Network also conducts research in methods for comparative effectiveness. AHRQ will use ARRA investment to funds to continue support for the development of a research framework that organizes the major methods topics and prioritizes critical areas for new research on methods, including validation. New areas for research will include:

- development and dissemination of methods for collecting, analyzing, understanding, and interpreting health data for studies of treatment effectiveness;
- methods for analyzing data submitted as part of coverage with evidence development programs;
- methods for prospective comparative effectiveness studies;
- methods for studies conducted across distributed data networks;
- methods for observational comparative effectiveness studies in selected thematic area like marginal structure models;
- studies that aim at better understanding heterogeneity in treatment effects and the development and validation of clinically informative risk stratification and classification models in different clinical domains; and

- additional research on the design, implementation, analysis, interpretation, and evaluation of the quality of a registry for understanding patient outcomes.

For DEcIDE research with a methodological emphasis, the goals will be to advance study designs and methods to fill specific knowledge gaps and to enhance the consistency, applicability, and generalizability of the comparative effectiveness studies.

- Mechanisms:
  - Contracts: DEcIDE Consortium Support: Five to Eight Request for Task Orders (RFTOs) competed among the existing DEcIDE Centers up to $5 million each for a total of $24 million

  - Project Length: DEcIDE Consortium Support: Two to three years with ARRA funds

d) **Unfunded Meritorious Applications ($1 million – FY 09 - $1 M; FY 10 - $0 M):** AHRQ will use the ARRA investment to fund meritorious grant applications that were not funded in previous cycles due to limited funding. Research projects selected for funding may have either a clinical or methodological emphasis, but will focus tightly on the study and/or the use of comparative effectiveness research. Studies with a methodological emphasis may advance study designs and methods to fill specific knowledge gaps and to enhance the consistency, applicability, and generalizability of comparative effectiveness studies. Studies with a clinical emphasis may develop new scientific evidence that fills important knowledge gaps and generates critical insights on the clinical effectiveness and comparative clinical effectiveness of health care interventions.

- Mechanisms:
  - Grants: Unfunded Meritorious Applications: Multiple grant mechanism - $1 million

  - Project Length: Unfunded Meritorious Applications: Two to three years with ARRA funds

**V. Translation and Dissemination: Total Expenditure $34.5 M (FY 09 - $2.5 M; FY 10 - $32 M)***

AHRQ has a strong and long-term commitment to bridging the gap between research and practice by translating findings on the comparative effectiveness of interventions for

* AHRQ scientific staff used its best judgment based on years of experience conducting related work to determine the funding amounts for each activity. In addition, the funding amounts are based on best government cost estimates for the type of work and tasks to be performed as well as the level of effort expected.

different audiences including consumers, clinicians and policymakers, and disseminating these findings. This proposal will use ARRA funds to expand AHRQ's translation and dissemination activities (and thereby strengthen the infrastructure supporting these activities), including the John M. Eisenberg Clinical Decisions and Communications Science Center whose workload will substantially increase. The Eisenberg Center contract modification will expand their scope of work to include additional translation and dissemination activities (e.g. additional summary guides and decision support tools, development of dissemination channels, etc.). Approximately 15 to 45 tools including summary guides for consumers, clinicians and policymakers are expected to be funded with ARRA funds, depending on the number of comparative effectiveness reviews produced and the scope of those reports.

The ARRA funds will primarily be used to support grantees in developing and implementing innovative approaches to integrating comparative effectiveness research findings into clinical practice and health care decision making. Investments will be in multiple geographically dispersed translation, implementation, and evaluation projects to be carried out by local organizations such as medical societies, state institutions of higher learning, patients, community advocacy organizations and others to promote education, dissemination and application of comparative effectiveness research.

The amount of staff time that will be used to administer each activity will vary. Key factors that will impact the amount of FTE on each activity include the availability and expertise of staff and the phase of the project. An approximate FTE allocation to administer this activity is 2 FTE based on our current experience. Actual FTE utilization will not be available until all projects are solicited, reviewed, approved and completed.

- **Activity: CE Dissemination and Translation Innovation Grants ($29.5 million)**
  **Eisenberg Center Modification ($5 million)**

  - Mechanisms:
    - Grants: RFA (R18) up to 20-25 awards ranging from $1 to $2 million each for a total of $29.5 million
    - Contracts: Modification of Eisenberg Center Contract - $5 million
    - Project Length: Grants – two to three years with ARRA funds
      Eisenberg Center Modification – three years with ARRA funds

***CROSS-CUTTING INVESTMENTS:***

**VI. Training and Career Development: Total Expenditure $20 M (FY 09 - $0 M; FY 10 - $20 M)***

AHRQ proposes using ARRA funding for comparative effectiveness capacity building. AHRQ will provide institutional support to increase the intellectual and organizational capacity for larger scale programs in comparative effectiveness and allow fellowship training opportunities. Through grant mechanisms, funding will support the career development of clinicians and research doctorates focusing their research on the synthesis, generation and translation of new scientific evidence and analytic tools for comparative effectiveness research. In particular, the goal will be to enhance the research and methodological capacity for conducting and improving the quality of systematic review, retrospective studies, and clinical trials in comparative effectiveness research and the development of data sources and other aspects of the research infrastructure. Two grant mechanisms to be used are:

- **Mentored Clinical Scientist Development Program Award (K12),** which provides support to an institution for the development of independent scientists. Most, but not all, K12 programs are focused on enhancing the careers of physician scientists.

- **Institutional Research Training Grants (T32),** which are used by eligible institutions as the primary means of supporting predoctoral and postdoctoral research training to help ensure that a diverse and highly trained workforce is available to assume leadership roles related to the Nation's biomedical, behavioral and clinical research agenda. The primary objective of the T32 program is to prepare qualified individuals for careers that have a significant impact on the health-related research needs of the Nation. This program supports predoctoral, postdoctoral and short term research training programs at domestic institutions of higher education with the T32 funding mechanism. Awards for T32 institutional NRSA research training grants may be for project periods up to five years in duration and are renewable. Because the nature and scope of the proposed research training will vary from application to application, it is anticipated that the size and duration of each award will also vary. The total amount awarded and the number of awards will depend upon the number, quality, duration, and costs of the applications received.

The amount of staff time that will be used to administer the activity will vary. Key factors that will impact the amount of FTE on this activity include the availability and expertise of staff and the phase of the project. An approximate FTE allocation to administer this activity is 1 FTE based on our current experience. Actual FTE utilization will not be available until all projects are solicited, reviewed, approved and completed.

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- **Activity: Institutional Training Awards and Comparative Effectiveness Fellowship**

    - Mechanisms:

        - Grants: K12, five-six awards - $15 million
          T32, multiple - $5 million

        - Project Length: K12 – three years with ARRA funds
          T32 – remaining 4 years of performance period with ARRA funds

## VII. Citizen Forum: Total Expenditure $10 M (FY 09 - $0 M; FY 10 - $10 M)*

AHRQ proposes using ARRA funds to establish and support a Citizen Forum on Effective Health Care to formally engage stakeholders in the entire Effective Health Care enterprise and to continue to open up and make the program inclusive and transparent. This initiative will build on the smaller initiative that has guided AHRQ's Effective Health Care Program until now and will be an important component for a larger and more sustained national initiative in comparative effectiveness research, translation, and use.

AHRQ requests ARRA funding to expand and standardize public involvement in its Effective Healthcare Program by establishing a Citizens Forum. The goal of this request is to ensure consistent and comprehensive public involvement in all aspects of AHRQ's expanded program in Comparative Effectiveness Research. The Citizens Forum on Effective Healthcare will formally engage stakeholders at the critical stages of identifying research needs, study design, interpretation of results, development of products, and research dissemination through a variety of mechanisms that are both inclusive and transparent. Funds will be used to develop formal processes for input, convene citizen panels in accordance with the processes that are developed, and convene a Workgroup on Comparative Effectiveness to provide formal advice and guidance to the Program. Funds will also support programs in citizen awareness addressing the use of comparative effectiveness evidence in health care decision-making. These programs, developed under the guidance of the Citizens Forum, may include town hall meetings, web-based information exchange, and community-based grassroots awareness efforts.

The amount of staff time that will be used to administer the activity will vary. Key factors that will impact the amount of FTE on this activity include the availability and expertise of staff and the phase of the project. An approximate FTE allocation to administer this activity is 2 FTE based on our current experience. Actual FTE

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utilization will not be available until all projects are solicited, reviewed, approved and completed.

- **Activity: Citizen Forum on Effective Health Care**
  - Mechanisms:
    - Contract: New competitive, cost-based reimbursement contract - $10 million
    - Project Length: Five years with ARRA funds

3. FTE - $3 million (FY 09 - $0.5 M; FY 10 - $2.5 M)

AHRQ Personnel: We expect the amount of staff time used to administer the programs proposed above to be approximately 15 temporary FTE not to exceed a two-year period. AHRQ will administer the proposed activities in subsequent years using non-ARRA FTEs. The additional FTEs provided with ARRA funds are essential in the initial development phase where funding opportunities need to be written and reviewed, risk and monitoring plans needed to be developed and reporting requirements needed to be fully developed and operationalized.

4. Means of execution

To achieve the goals of comparative effectiveness research, AHRQ will use a variety of funding mechanisms including grants, contracts, and inter-agency agreements.

Expansion of extramural grant funds for research and infrastructure for additional research capacities through RFAs for comparative effectiveness and supporting methodological research is anticipated.

Means of execution will also include support for additional activities to be conducted within current AHRQ program such as the DEcIDE (Developing Evidence to Inform Decision about Effectiveness) Research Network[3], the Evidence-based Practice Centers (EPC) Program[4], and the Eisenberg Center[5]. All activities will be coordinated with other AHRQ research networks as well as other research networks and program across the Department of Health and Human Services.

[3] DEcIDE Research Network generates new scientific evidence and analytic tools in an accelerated and practical format.
[4] Evidence-based Practice Centers perform comprehensive reviews of existing evidence.
[5] John M. Eisenberg Clinical Decisions and Communications Science Center compiles the research results into a variety of useful formats

5. Intended award recipients

AHRQ anticipates that award recipients will include a combination of researchers, academic institutions, states, community-based organizations, national organizations, and federal agencies.

6. Fiscal year of expenditure

In FY 2009, approximately $54 million of the total funds available (18%) will be obligated. In FY 2010, approximately $246 million (82%) will be obligated.

7. Timing of milestones

AHRQ is developing a schedule with milestones and planned delivery dates for major phases of the program's activities. AHRQ anticipates making the initial CER awards no later than September 2009.

| | |
|---|---|
| July 2009 | Begin publishing Recovery Act specific requests for task order contracts. |
| August 2009 | Review proposals. |
| September 2009 | Award FY 2009 task order contracts; award FY 2009 contract modification; award meritorious grant applications that were not funded in prior cycles. |
| Ongoing after September 2010 | Begin publishing Recovery Act specific requests for contracts and funding announcements, conducting reviews and making awards for FY 2010 contracts and grants. |

8. Congressionally-required spend plan

The FY2009 congressionally-required spend plan is required for submission to Congress by July 30, 2009.

9. Designation of funding by organizational structure

AHRQ will have the primary responsibility for providing funds control and for carrying out the activities described above.

10. Accountability measures

AHRQ will use current internal controls in accordance with the both the Federal Managers' Financial Integrity Act (FMFIA) and Appendix A of OMB Circular A-123 to protect these funds from misappropriation, mismanagement, waste, and abuse. In addition, during the A-123 review AHRQ will provide additional testing of key controls (if necessary) to ensure ARRA funds are included in AHRQ's testing sample. Finally, AHRQ is in the process of drafting a comprehensive Risk Management Plan to identify, prioritize, and mitigate Agency/program specific-risks. AHRQ consulted with the Office of the Inspector General (OIG) regarding our spend plan. The OIG suggested that AHRQ provide additional discussion of the oversight of recipients, especially new or high risk recipients. We have included this discussion below.

Historically, most of AHRQ's grant awards are made to institutions that have had prior Federal funding and have demonstrated their ability to administer Federal funds. In accordance with HHS policy, for recipients that have not received prior Federal funding, non-profit status will be confirmed and a cursory assessment of the organization's financial status will be made by AHRQ staff. Subsequent to funding, AHRQ will request that the OIG perform an audit to assess the recipients' ability to properly expend and monitor grant funds where there are concerns. AHRQ anticipates that a large majority of large grants will be awarded to institutions that have had prior Federal funding and have demonstrated their ability to administer Federal funds.

Contract awards are made to organizations that must demonstrate that they have an adequate accounting system that has been approved by a Federal agency. This accounting system must allow the organization to track Federal obligations, expenses, and reimbursements for each project funded. The adequacy of the accounting system is verified prior to award. AHRQ also provides a two level review of each invoice received to ensure that the expenses are both allowable and allocable.

In terms of program review, AHRQ will use ARRA funds for comparative effectiveness to conduct and support research that will result in current, unbiased, evidence on health care interventions that will aid patients, health care providers, and policymakers in decision making. AHRQ will hold itself accountable to effectively spending the funds by continuing to measure the following:

- Amount of evidence available to clinicians, policymakers and patients to make health care decisions;
- Number of organizations disseminating evidence to their constituents;
- Amount of evidence used as a foundation for population-based policies, performance measures, and other strategies to improve decision making related to the effectiveness and appropriateness of health care interventions, technologies and services;

One potential risk for ineffective spending is funding projects that do no meet the needs of stakeholders. To minimize this risk, AHRQ will continue to increase the transparency and explicit process for comparative effectiveness research and will continue to engage stakeholders throughout the research process. Currently, there are many ways for stakeholders to get involved in AHRQ's comparative effectiveness research, including:

- Submitting suggestions for research topics.
- Commenting on draft key questions before research has begun.
- Commenting on draft Research Reviews and Comparative Effectiveness Reviews.
- Providing expert input / scientific information to inform a report.
- Participating in a listening session. These sessions allow participants to provide focused comments on issues important to the EHC Program, such as research topics, program structure, and scientific methods.

Another potential risk for ineffective spending or waste is through non-performance of funded projects. To minimize this risk, AHRQ will carefully review and select projects for funding. The following criteria may be reviewed for each proposed project: understanding of the purpose and objectives of AHRQ's comparative effectiveness research programs, technical approach, management plan, organizational experience, key personnel, stakeholder engagement, and facilities and database characteristics. AHRQ will also continue to standardize training required for program officials at the Agency working on contracts and grants. This will ensure effective oversight and management of contracts and grants and will decrease the risk of non-performance.

## APPENDIX A

### AHRQ's Current Approach to Topic Selection for Comparative Effectiveness Research

The Agency for Healthcare Research and Quality (AHRQ) firmly believes that involving all stakeholders in the research enterprise from the beginning improves the end product and facilitates the diffusion and implementation of the findings by getting early buy in from users. Involving all stakeholders also helps to ensure that the research reflects the various needs of all diverse users.

AHRQ's approach to involving stakeholders in comparative effectiveness research includes requesting topic nominations and interacting with stakeholder groups to elicit topic nominations. AHRQ encourages research suggestions from all sources and all topic nominations are posted online on the Effective Health Care Program Web site, http://effectivehealthcare.ahrq.gov.

Once an interested person or group suggests a topic for research, AHRQ determines whether enough information is included in the topic nomination. The minimum amount of information needed to define a topic as a nomination includes the population of interest, interventions of interest, comparators of interest, outcomes of interest, and the policy and/or clinical context. If more information is needed, AHRQ will request additional information from the nominator if the nominator's contact information is clearly identified. Once a topic is determined to have enough information, AHRQ evaluates how the topic nomination meets specific selection criteria.

Factors considered in the selection of topic nominations for AHRQ comparative effectiveness research and reports include:

- Burden of disease, including severity, incidence and/or prevalence, or relevance of organizational/financial suggestions of research to the general population and/or AHRQ's priority populations, which include:
    - Low-income groups
    - Minority groups
    - Women

- Children
- The elderly
- Individuals with special health care needs, such as those with disabilities, those who need chronic care or end-of-life care, or those who live in inner-city and rural areas.

- Controversy or uncertainty about the topic and availability of scientific data to support the systematic review and analysis.
- Total costs associated with a condition, procedure, treatment, or technology, or organization/financial topic, whether due to the number of people needing care, the unit cost of care, or indirect costs.
- Potential impact for reducing clinically significant variations in the prevention, diagnosis, treatment, or management of a disease or condition, or in the use of a procedure or technology.
- Potential impact for informing and for improving patient and/or professional decision-making, improving health outcomes, and/or reducing costs.
- Relevance to the needs of the Medicare, Medicaid, and other Federal health care programs.

AHRQ provides justifications to nominators when topic suggestions are accepted or denied. These justifications will soon be available on the Effective Health Care Web site.

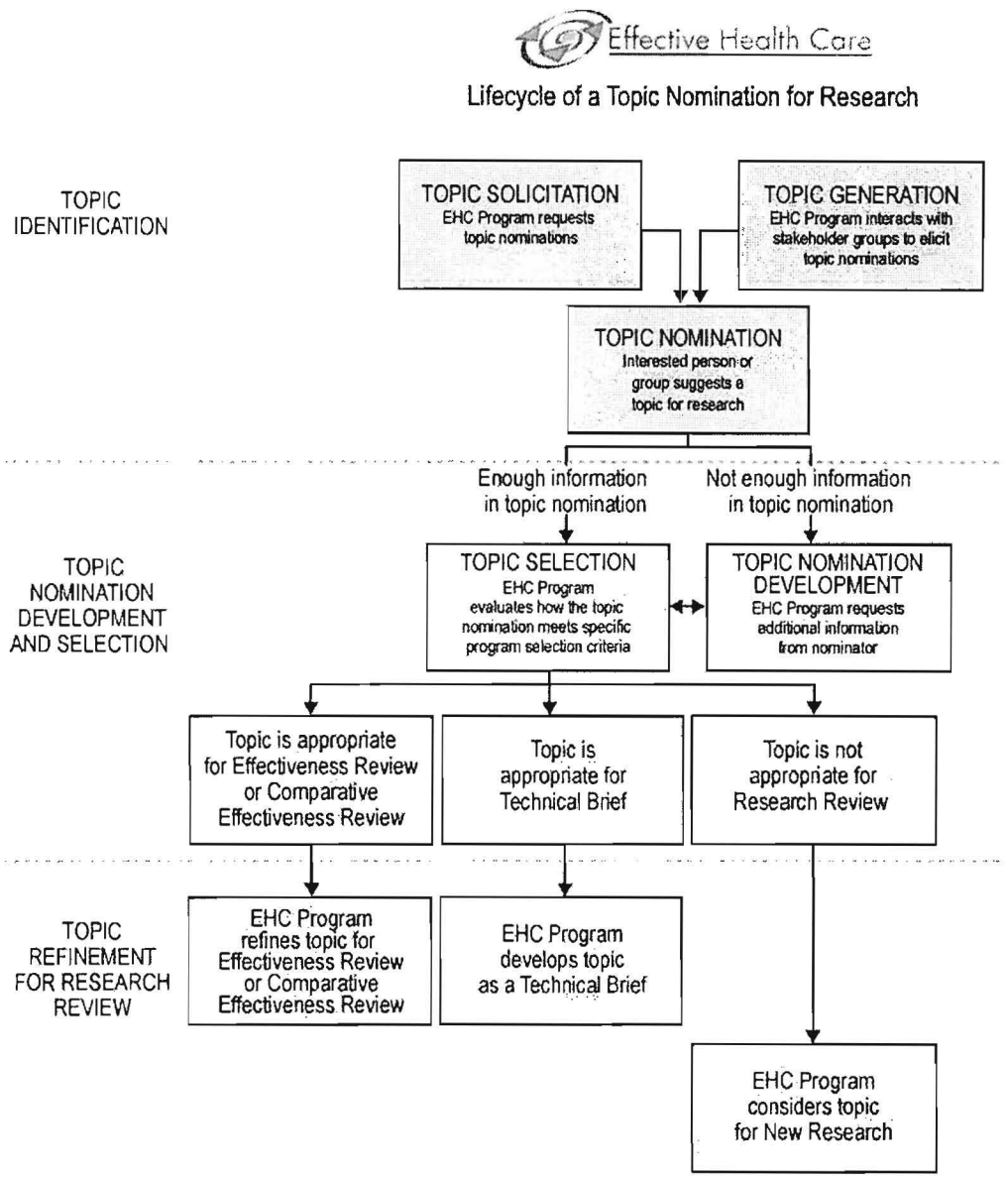
Accepted suggestions are refined and forwarded to research teams to conduct either a research review (a synthesis of existing evidence such as a Effectiveness Review, Comparative Effectiveness Review or Technical Brief) or new research. New research is conducted if evidence does not support a full research review. A diagram showing the lifecycle of a topic nomination for research up to this stage is shown below.

If a research review is initiated, a set of key questions is posted for public comment. Key questions guide the review process and facilitate the extraction of relevant information. If new research is initiated, an abstract is posted online.

Upon completion of a research review, a draft report is produced. The draft report is available online for public comment for approximately 4 weeks. Comments are considered for incorporation into the final report.

Both final research reviews and new research final reports are published on the Effective Health Care Program Web site. Research review executive summaries are also posted online. Some report findings are also published in professional journal articles.

Research reviews are condensed and converted into plain language summary guides. Guides are tailored to different audiences – patients, clinicians and/or policymakers. Guides are developed and revised based on audience feedback and external review.




1.22.09

Agency for Healthcare Research and Quality. Effective Health Care (EHC) Program Lifecycle of a Topic Nomination for Research. Online graphic. January 2009. Available at: http://effectivehealthcare.ahrq.gov/aboutUs.cfm?abouttype=program#Topic