

Emergency Cardiac and Stroke Care in Washington

September 2008



Emergency Cardiac and Stroke Work Group
Washington State Emergency Medical Services
and Trauma Steering Committee

Executive Summary



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Executive Summary

“Global Heart Efforts Pay Off,” was the headline for a *USA Today* article published May 2, 2007. The article cited an international study¹ showing a sharp drop in heart attack deaths that “coincides with global efforts to make sure patients received proven treatments.” Less than a month before, the *New York Times* reported many Americans still don’t receive optimal care for heart attacks in its article, “Lessons of Heart Disease, Learned and Ignored.”

‘Global
Heart Efforts
Pay Off’

Which is it? Have the lessons been learned, as suggested by the *USA Today* story, or have they been ignored? What about stroke? Are people getting the treatments proven to save lives and reduce disability? Apparently they are not. Several studies show that only about 4 percent of people admitted to the hospital for stroke receive the one medication shown to be effective in treating it.²

‘Lessons of
Heart Disease,
Learned and
Ignored’

To answer these questions in Washington, an Emergency Cardiac and Stroke (ECS) Work Group began meeting in 2006. The work group was formed by the state Emergency Medical Services (EMS) and Trauma Care Steering Committee, with support from the Washington State Department of Health. Members of the work group included representatives of 9-1-1 agencies, emergency medical services, hospital emergency departments, neurology and cardiology, professional and industry associations, and the American Heart Association/American Stroke Association.

To get a complete picture of emergency cardiac and stroke care in Washington, the work group examined disability and deaths from cardiac and stroke emergencies, surveyed all parts of the emergency response system to identify strengths and weaknesses, reviewed professional literature, and learned about the experiences of other states working to improve emergency cardiac and stroke care (see Appendix G). This report details the work group’s findings and offers recommendations to improve emergency response for Washingtonians experiencing stroke and acute cardiac events such as heart attack and sudden cardiac arrest.

¹ Fox KAA, Steg PG, Eagle KA, et al. Decline in rates of death and heart failure in acute coronary syndromes, 1999-2006. *JAMA* 2007; 297:1892-1900.

² The Paul Coverdell Prototype Registries Writing Group. *Stroke* 2005. 36: 1232-1240.

Findings

The ECS Work Group found that global heart efforts might indeed be paying off in Washington. The age-adjusted mortality rate for coronary heart disease fell from 291 deaths per 100,000 in 1980 to 125 deaths per 100,000 in 2005.³ Stroke mortality rates have also fallen from 94 deaths per 100,000 in 1980 to 52 deaths per 100,000 in 2005.⁴

34 percent of all deaths caused by cardiovascular diseases

Despite falling death rates, heart disease and stroke were still the second and third leading causes of death in 2005, after all cancers.⁵ There were 7,734 deaths due to coronary heart disease, 2,515 of which were heart attacks. Stroke caused 3,167 deaths. All cardiovascular diseases accounted for 34 percent of deaths, surpassing all other causes of death.⁶

Social and Economic Impact

Many survive heart disease or stroke with significant disability

Heart disease and stroke have a substantial social and economic impact on individuals and families, as well as the state's health and long-term care systems. Many people who survive acute heart disease or stroke have significant physical and cognitive disability, resulting in lost productivity, decreased quality of life and, often, significant burden on their families. Many need long-term care services. In 2007, two-thirds of people in nursing homes and one-third of people who received paid care at home had heart disease or had a stroke.

Costs of \$4 billion for hospital and long-term care

The economic impact is staggering. Heart disease and stroke are among the most costly medical conditions at nearly \$4 billion per year for hospitalization and long-term care.⁷ Costs for primary care, outpatient procedures, rehabilitation, and medication are not included in this figure.

Aging Population Nearly Doubles by 2030

The age group at highest risk for heart disease and stroke—people 65 and older—is projected to nearly double by 2030,⁸ potentially doubling the social and economic impact of heart disease and stroke in Washington.

³ Washington State Department of Health. Health of Washington State, Chronic Disease, Coronary Heart Disease. Olympia, WA, 2007. Available from <http://www.doh.wa.gov/HWS/CD2007.shtm>

⁴ Washington State Department of Health. Health of Washington State, Chronic Disease, Stroke. Olympia, WA, 2007. Available from <http://www.doh.wa.gov/HWS/CD2007.shtm>

⁵ Washington State Department of Health. Health of Washington State, General Health Status, Mortality and Life Expectancy. Olympia, WA, 2007. Available from <http://www.doh.wa.gov/HWS/GHS2007.shtm>

⁶ Washington State Department of Health Death Files, 2003-2005; Center for Health Statistics Annual Summary Tables, Washington State Department of Health, 12/2005.

⁷ Total \$3.96 billion: Comprehensive Hospital Abstract Reporting System: \$2.3 billion for hospitalizations including a diagnosis of coronary heart disease at discharge, \$707 million for stroke-related hospitalizations; long-term care costs estimated from Aging and Disability Services data: \$953 million estimated for nursing home care and Medicaid-paid home care.

⁸ Washington State Office of Financial Management, Forecasting Division, 2005.

Many Not Getting Proven Treatments

The work group found that too many people are not getting the treatments proven to save lives and reduce disability.

- Only 2.4 percent⁹ of ischemic strokes in 2003-2005 were treated with tissue plasminogen activator (t-PA), the most beneficial treatment for this type of stroke.¹⁰
- This rate increased to 4.3 percent in hospitals certified as primary stroke centers by the Joint Commission.
- Only 43 percent of 95 hospitals administered t-PA for stroke from 2003-2005; of these 43 hospitals, 28 of them administered t-PA for stroke less than ten times.¹¹
- It is estimated that primary percutaneous coronary intervention (PCI),¹² the most effective treatment for most heart attacks,¹³ is performed in 39 percent of cases.¹⁴
- Only 42 percent of hospitals had a catheterization lab enabling them to do primary PCI.

Too much time passes between onset of stroke or heart attack and treatment

These low treatment rates are due to many factors. One of the most significant is too much time passing between the onset of stroke or heart attack and treatment. Both t-PA and PCI are most effective within a short window of time. Death and disability may be significantly reduced if treatment for stroke begins within three hours of onset of symptoms, and treatment for heart attack within one hour of symptom onset.¹⁵ But patients often delay seeking treatment for heart attack and stroke, anywhere from 90 minutes to six hours.¹⁶ When they do seek treatment, many of them don't call 9-1-1, opting to get to the hospital on their own. By doing so, they forgo the benefits of emergency medical services: speed, basic medical care, and priority attention at the emergency department.

⁹ Derived from procedure code 99.10 for any first hospitalization for each unique patient, Comprehensive Hospital Abstract Reporting System (CHARS), 2003-2005.

¹⁰ Harold Adams, Robert Adams, Gregory Del Zoppo and Larry B. Goldstein. Guidelines for the Early Management of Adults With Ischemic Stroke. *Stroke* 2005; 36: 916-923.

¹¹ Comprehensive Abstract Reporting System, 2003-2005.

¹² Primary PCI, also called angioplasty, is a procedure where a balloon-tipped tube is inserted into an artery of the heart and inflated, widening the artery so that blood can flow more easily. It is often accompanied by insertion of an expandable metal stent.

¹³ Keeley EC, Boura JA, Grines CL. Primary angioplasty versus intravenous thrombolytic therapy for acute myocardial infarction: a quantitative review of 23 randomized trials. *Lancet* 2003; 361:13-20.

¹⁴ A crude but indicative measure derived from the total number of hospitalizations for acute myocardial infarction reported to CHARS (all WA hospitals are required to report) in 2005 and the total number of primary PCIs reported to the Clinical Outcomes Assessment Program registry (all WA hospitals that perform PCI are required to report) in 2005: 3786 PCI's performed in 2005/9737 AMI hospitalizations in 2005=38.9%.

¹⁵ Moser, DK, et al. Reducing Delay in Seeking Treatment by Patients With Acute Coronary Syndrome and Stroke: A Scientific Statement From the American Heart Association Council on Cardiovascular Nursing and Stroke Council. *Circulation* 2006; 114; 168-182. <http://circ.ahajournals.org/cgi/content/full/114/2/168>.

¹⁶ Ibid.

There are additional delays along the “chain of survival”—from dispatch of emergency medical services, to transport, to the emergency room—that increase the critical time to treatment. For example, if patients arrive at a hospital that does not have the resources or expertise to diagnose and treat a heart attack or stroke, they are often transferred to another hospital. In the survey conducted for this report, 78 percent of hospitals reported transferring stroke patients to another acute hospital. For acute myocardial infarction (AMI), 33 percent of patients admitted to hospitals without a cardiologist were transferred to another hospital, compared with 7 percent of patients admitted to hospitals with a cardiologist.

Care, Resources, and Outcomes Vary Widely

The ECS Work Group also found that care, resources, and outcomes vary significantly across the state. Specific findings include:

Hospital

Outcomes for Heart Attack

The following findings were statistically significant:

Heart attack patients more likely to die in hospitals with no cardiologist available

- Heart attack patients were more likely to die in hospitals without a cardiologist available than in hospitals with a cardiologist available, 9 percent versus 7 percent, respectively. If hospitals without cardiologists had the same case-fatality rate* as the hospitals with cardiologists, only 83 deaths would have occurred versus the 109 experienced.
- In hospitals that did not perform open heart surgeries, patients were less likely to die of a heart attack if a cardiac team was present - 10 percent versus 8 percent for hospitals without cardiac teams. If hospitals without a cardiac team had the same case-fatality rate as the hospitals with a cardiac team, only 281 deaths would have occurred versus the 355 experienced.
- Fewer heart attack patients die in hospitals that treat a large number of heart attack patients - 6 percent compared with 10 percent in hospitals with lower numbers of heart attack patients. If low-volume hospitals had the same case-fatality rate as the high volume hospitals, only 348 deaths would have occurred versus the 565 experienced.
- Heart attack patients younger than 65 who used Medicaid or charity as a primary payer, or were self-pay, were more likely to die than similar patients using other forms of insurance or payment.

*Case-fatality rate is the proportion of people who die from a disease or condition among all the people who have that disease or condition. For example, in 2005, 500 people were admitted to Hospital A for a heart attack; 80 of them died from the heart attack. The case-fatality rate would be 80 out of 500 or 16 percent.

Outcomes for Stroke

- The case-fatality rate for hospitals with or without a neurologist was similar – 11 percent and 9 percent, respectively. This finding may be surprising because we would expect that expertise in treating a certain condition would result in better outcomes. It is likely due to the fact that 78 percent of hospitals transfer stroke patients to another hospital, usually a larger hospital with a neurologist.

The following findings were statistically significant:

- Patients in hospitals without a neurologist were less likely to be discharged to rehabilitation than hospitals with a neurologist, 2 percent and 10 percent, respectively.
- Stroke patients younger than 65 who used Medicaid or charity as a primary payer or were self-pay were more likely to die than similar patients using other forms of insurance or payment.

Stroke patients in hospitals without a neurologist were less likely to be discharged to rehabilitation

Treatment Protocols and Resources

A survey of hospitals showed:

- 20 percent of hospitals had a cardiac team.
- 2 percent had a cardiologist on staff, 24 hours a day, seven days a week (24/7).
- 44 percent had a cardiologist on call, 24/7.
- 59 percent had cardiac protocols.
- 1 percent had a neurologist on staff, 24/7.
- 37 percent had a neurologist on call, 24/7.
- 21 percent of hospitals had a stroke team.
- 62 percent had stroke protocols for ischemic stroke (most common type).
- 26 percent had protocols for hemorrhagic stroke.
- 29 percent of hospitals had the ability to perform and read CT-scan images to diagnose stroke in-house, 24/7.
- 24 percent had on call ability to perform and read CT scans.

2 percent of hospitals had a cardiologist on staff, 24/7

1 percent of hospitals had a neurologist on staff, 24/7

Patient Admissions

- Among the 36 hospitals without a neurologist, 77 percent admitted stroke patients.
- Among the 35 hospitals without a cardiologist, 57 percent admitted patients with acute coronary syndrome (ACS).¹⁷

Transfers

- Most hospitals (78 percent) transferred patients with acute stroke to another hospital. This rate increased to 97 percent for hospitals without a neurologist.
- Among hospitals without a cardiologist, 33 percent of AMI (heart attack) patients were admitted and later transferred to another hospital. Only 7 percent of AMI patients at hospitals with a cardiologist were transferred to another hospital.

¹⁷ Acute coronary syndrome is an umbrella term used to cover any group of clinical symptoms compatible with acute myocardial ischemia (heart attack), which is chest pain due to insufficient blood supply to the heart muscle that results from coronary artery disease (also called coronary heart disease).

Alerting the hospital about incoming stroke or heart attack is not a protocol in most areas

Emergency Medical Services

There are three levels of emergency medical services (EMS) in Washington: basic life support (BLS), intermediate life support (ILS), and advanced life support (ALS). Only ALS can perform an electrocardiogram (ECG), which can help EMS personnel determine, while in transport, whether a person is having a heart attack, and then notify the hospital in advance. Advanced life support (ALS)¹⁸ is not available everywhere in the state.

The assessment of emergency medical services (EMS) indicated that at least one-third of EMS protocols did not include specific stroke and cardiac protocols.¹⁹ Well over half did not include stroke assessment or a high-risk checklist for acute coronary syndrome in their protocols, and most did not include pre-arrival notification of incoming stroke or heart attack. Alerting the hospital before an ambulance arrives gives staff time to prepare, which can get a patient to treatment faster.

Less than half of the protocols for BLS included giving patients aspirin or the patient's own nitroglycerin, despite changes in policy and guidelines that allow these treatments. Some medical program directors (MPD) reported that their ALS treatment protocols also did not include giving patients aspirin or nitroglycerin.

One-third of MPDs reported not having *local* operating procedures directing ambulances to the nearest hospital with the appropriate level of care for emergency cardiac and stroke care. Less than half reported having *regional* procedures, which can be critical in situations where the only qualified hospital is in another county.

EMS response could be improved by:

- Establishing uniform protocols for heart attack and stroke assessment
- Requiring prehospital notification
- Establishing local and regional EMS procedures to transport patients to hospitals that are able to provide advanced treatments

Dispatch (9-1-1)

The ECS Work Group surveyed dispatch services to learn more about existing protocols and training for cardiac and stroke care. In Washington, there are 39 independently operated dispatch centers. Three-quarters of dispatch coordinators responded to the survey. Standards are not uniform for training, continuing education, protocols, or quality improvement for emergency medical dispatch services. Nor is there a single agency responsible for oversight. It should be noted that Washington is no different than most of the country in this regard.

¹⁸ ALS gives the highest level of emergency care. Ambulances are staffed by paramedics, who are trained to provide more sophisticated services to diagnose and treat patients than emergency medical technicians (EMT) and volunteers who staff intermediate life support (ILS) or basic life support (BLS).

¹⁹ Anecdotal information reported subsequent to the survey indicated that all 37 medical program directors currently have protocols addressing cardiac and stroke care. This was not verified but worthy of noting. It may be that at the time of the survey in late 2006, some MPDs did not have these protocols.

Summary of Findings

In summary, the assessment of emergency cardiac and stroke care found:

- Many people are not getting evidence-based treatments.
- Access to diagnostic and treatment resources varies greatly, especially for rural parts of the state.
- Training, protocols, procedures, and resources in dispatch services, emergency medical services, and hospitals vary significantly.
- Care and outcomes vary widely.
- Advances in technology and new approaches to care have been made in recent years that can significantly improve emergency cardiac and stroke care.

Time is critical all along the chain of survival for heart attack and stroke patients. The more delays, the more brain or heart tissue dies. Timely treatment can mean the difference between returning to work or becoming permanently disabled, living at home or living in a nursing home. It can be the difference between life and death.

Time is critical for heart attack and stroke

Getting “the right patient to the right place in time” is key to saving lives and reducing disability from heart disease and stroke, just as it is for trauma. It can save money too – fewer days in the hospital, shorter rehabilitation time, and fewer people in need of long-term care in nursing homes or at home. Indeed, “time is brain” for stroke and “time is muscle” for heart, but “time is money” is equally true.

The more delays, the more brain or heart tissue dies

Many other states have improved systems of care to respond to and treat acute cardiac and stroke events, similar to improvements in trauma care in Washington (see Appendix G). Strategies include the use of telehealth to connect rural emergency staff to specialists at larger, urban hospitals who can help diagnose and recommend treatments; uniform training and treatment protocols specifically for stroke and cardiac care for EMS and hospitals; and authorizing EMS to transport patients to hospitals with the resources to provide evidence-based care.

Several national organizations, such as the American Heart Association, American Stroke Association, and the American College of Cardiology, have published recommendations for improving cardiac and stroke systems of care. These organizations have also developed initiatives to reduce time to treatment, increase the use of evidence-based treatments, and educate the public on the importance of calling 9-1-1 immediately upon experiencing symptoms (see Appendix H).

Here in Washington, some hospitals are taking the lead in improving emergency stroke care. As of January 2008, 12 hospitals had voluntarily undergone the rigorous Joint Commission certification process to become Primary Stroke Centers. Some are exploring roles to support and consult with rural hospitals, and some have quality improvement programs in place.

However, as the report shows, there is significant room for improvement. The ECS Work Group proposed the following recommendations to improve emergency care to reduce death and disability from heart disease and stroke in Washington.

Recommendations*

A systems approach to improve emergency cardiac and stroke care

The ECS Work Group recognized that equipping and staffing every Washington hospital to treat acute heart disease and stroke is not feasible. Instead, they recommended a systems approach to improve emergency cardiac and stroke care, much like the state’s excellent trauma-care system.

To develop the recommendations, the ECS Work Group studied data from several sources:

- Analyses of dispatch, medical program director, and hospital surveys
- State hospitalization and death data.
- National emergency care guidelines.
- Recommendations developed by the American Heart Association, American College of Cardiology, the American Stroke Association, and the Brain Attack Coalition.
- Models from other states.

Department of Health staff from the Heart Disease and Stroke Prevention Program and the Office of Emergency Services and Trauma System convened meetings, conducted surveys, analyzed and presented data, and drafted documents, including this report.

Guiding Principles

The following principles guided the work group in developing recommendations:

- Prevention is the first line of defense against heart disease and stroke.
- Care is provided based on what is in the best interest of the patient.
- All Washington residents have a right to optimal care: timely identification, transport, treatment, and rehabilitation by emergency response and health care professionals trained according to best practice standards.
- Racial, ethnic, geographic, age, and socioeconomic disparities are addressed. Market share is balanced by policies and strategies such as telemedicine that promote broad provider participation.
- Regional differences are recognized, but basic standards are met statewide.
- All components of the system participate in planning and quality improvement.
- Patient outcomes are valued, and data collection, analysis, and quality improvement practices demonstrate the quality that the system claims to provide.
- Cost-savings are achieved where possible.

All Washington residents have a right to optimal care

* This is a summary of the recommendations. See the “Recommendations” section of the complete report.

The overarching recommendations of ECS Work Group endorsed by EMS and Trauma Care Steering Committee:

- Adopt the American Heart Association’s Guidelines for Emergency Cardiovascular Care.
- Establish a statewide comprehensive and coordinated system of cardiac and stroke care that includes prevention and public education, data collection, standards for prehospital, hospital and rehabilitative care, and verification of hospital capabilities.
- Form a Technical Advisory Committee under the state EMS and Trauma Care Steering Committee to oversee implementation of these recommendations.

Prevention

- Educate the public on heart disease and stroke risk factors and behavior modifications that to reduce the risk of heart disease and stroke. Education should be provided in collaboration with emergency medical services, hospitals, physicians, nurses, regional councils, the Department of Health, the American Heart Association/American Stroke Association, worksites, schools, senior services, and other organizations involved in prevention and health education, or that have access to high-risk and priority populations.

**Prevention –
first line of
defense
against heart
disease and
stroke**

Early Recognition and Treatment

- Develop and implement educational strategies to improve early recognition of heart attack and stroke, the importance of calling 9-1-1, and getting immediate treatment.
- Develop and implement strategies to increase the number of people who are able to provide high quality cardiopulmonary resuscitation (CPR).

Data and Quality Improvement

- Develop a comprehensive data system to demonstrate effectiveness and improve performance through quality improvement. Data collection should include dispatch, EMS and hospitals, and should maximize and integrate existing data systems to avoid duplicate data entry and analysis. Outcome data should be shared between hospital and prehospital providers.
- Monitor disease-specific incidence, morbidity, long-term care trends, and mortality.

Prehospital – Dispatch and EMS

- Implement the American Heart Association’s guidelines for prehospital cardiovascular care as the state standard to facilitate rapid patient assessment, early hospital notification, pre-arrival activation of specialty teams, and transport to the appropriate hospital. Prehospital response time goals, training, protocols, and patient care procedures should be standardized (regionally, where necessary).

Hospital

Acute Coronary Syndrome

- Implement the American Heart Association and American College of Cardiology guidelines for hospital emergency care as the state standard, including fibrinolytic (clot-busting) therapy within 30 minutes of arrival, when appropriate, and balloon inflation within 90 minutes of arrival, when appropriate.
- Develop and implement chest pain protocols, including activation of specialized teams, as appropriate. These protocols should assure rapid assessment of chest pain patients with no ST-segment elevation.²⁰

Acute Stroke

- Implement the American Stroke Association/Brain Attack Coalition guidelines for acute stroke as the state standard.
- Develop and implement stroke protocols, including activation of specialized teams, as appropriate. These protocols should assure rapid assessment of all stroke patients and expedite decisions about treatment and administration of thrombolytic (clot-busting) or other proven therapies within the necessary time frames.
- Explore telemedicine as a means to increase hospital capability to provide care according to the guidelines. (Telemedicine, or telehealth, is a method of providing real-time healthcare from a distance, using telephones, videoconferencing, digital imaging and other technology.)

Through a voluntary, inclusive program, verify that hospitals meet state standards for cardiac and stroke facilities. These standards would be based on the American Heart Association's 2005 Guidelines for Emergency Cardiovascular Care, American Stroke Association, and Brain Attack Coalition recommendations, or the most current, scientific standards that exist at the time.

Hospital verification program for cardiac and stroke care

Verified facilities should not be required to maintain minimum caseloads. Regions would be able to develop patient care procedures that direct certain patients to hospitals with higher levels of verification in order to assure care is provided in the best interest of the patient, and that all Washington residents have access to optimal care.

Rehabilitation

- Assure access to accredited rehabilitation services for cardiac and stroke patients.
- Develop guidelines or standards for rehabilitation care of cardiac and stroke patients. These standards should include requirements to modify risk factors.
- Advocate for insurance coverage for cardiac and stroke rehabilitation.

²⁰ ST-segment elevated myocardial infarction is a heart attack indicated by a particular result of an electrocardiogram that usually indicates artery blockage.

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