# Association of State and Territorial Health Officials (ASTHO)

## Stroke System of Care Plan for

## North Carolina

## Summary of North Carolina's ASTHO Stroke System of Care

## Plan Development Process

**December 2010**

# Association of State and Territorial Health Officials (ASTHO)

## Stroke System of Care Plan for North Carolina

## Table of Contents

**Stroke System of Care Plan for North Carolina**

**Table of Contents**

# Association of State and Territorial Health Officials (ASTHO)

## Stroke System of Care Plan for North Carolina

### Summary of North Carolina's ASTHO Stroke System of Care Plan Development Process

North Carolina (NC) was one of two states that received $80,000 from the Association of State and Territorial Health Officials (ASTHO) to complete a stroke system of care (SSoC) plan for the state. NC has been engaged in a statewide SSoC planning initiative that builds on the infrastructure already in place through the work of the Stroke Advisory Council (SAC) of the Justus-Warren Heart Disease and Stroke Prevention (HDSP) Task Force. In 2005, the NC Legislature charged the SAC with developing a system of stroke care for NC. Thus, much was already in place to complete this initiative including a Steering Committee, an initial set of work groups, and a membership of physicians, legislators, public health professionals, and other key stakeholders and partners from across the state. There have been approximately 80 individuals working on the development of this plan since August 2010 (Appendix A, SAC/ASTHO SSoC Plan Planning Participants and Work Group Members Lists). They represent a range of expertise and diverse points of view along the continuum of stroke care. This large group has been further divided into five work groups including (Appendix A):

- Prevention/Public Awareness
- Pre-Hospital Care
- Acute/Subacute Care
- Recovery/Transitions of Care (which further broke into three subgroups to address the areas of Extending Registries/Quality Improvement into the Post-Hospital Phase; Managing Transitions of Care; and Reimbursement)
- Telestroke

Each work group was charged with developing specific recommendations for their topic area including:

- Examining the needs and gaps in services and resources for NC stroke patients and their families;
- Examining disparities related to their area;
- Identifying and prioritizing strategies to improve care through evidence-based interventions when possible and through best or promising practices when more thoroughly tested strategies are not available; and,
- Developing a comprehensive and integrated approach that addresses identified needs and reduces disparities.

# Prevention/Public Awareness Area Overview/Statement of Problem

Stroke is the fourth leading cause of death for North Carolina residents (NC State Center for Health Statistics). The number of stroke deaths actually increased slightly from 2007 to 2008 (Huston, 2010).[1] In 2008, stroke caused 4,477 deaths among North Carolinians, 5.8 percent of all deaths in that year. The state's 2006 age-adjusted stroke death rate is the 6th highest among the 50 states and Washington, DC. Stroke death rates in North Carolina declined only 8.2 percent between 1990 and 2000 (an average annual decline of less than one percent) but have since declined by 33.2 percent between 2000 and 2006, an average annual decline of 6.5 percent. Stroke death rates declined faster in North Carolina between 2000 and 2006 than they did in the United States overall. New data just released in December 2010 from the NC Department of Health and Human Services, Division of Public Health, Chronic Disease and Injury Section, State Center for Health Statistics shows that NC has met the Healthy People 2010 goal of an age-adjusted death rate of 61.0 deaths per 100,000 residents. The 2009 age-adjusted stroke mortality rate was 46.1 per 100,000 population (Appendix B, Heart Disease and Stroke Data Charts).

Stroke imposes a heavy burden on the state not just in terms of mortality but also in terms of morbidity as it relates to the economic costs of stroke. An analysis of the direct costs of initial hospitalization, subsequent hospitalizations, inpatient and outpatient physician costs, and drug costs estimated conservatively indicates that stroke costs North Carolina $1.05 billion each year (Huston, 2010). The average charge for *each* hospital stay for stroke in North Carolina exceeds $22,000 with Medicaid costs to the state due to stroke exceeding $279 million annually (Huston, 2010).

Preventing stroke makes sense from an economic and public health standpoint. From socio-economic factors to risky behaviors, stroke prevention efforts can encompass a very wide spectrum of interventions. In order to impact the burden of stroke in North Carolina, multiple strategies, including primordial prevention of risk factors, primary prevention of stroke, as well as secondary prevention for those who have already had a stroke are needed to sustain a decline in stroke mortality and morbidity. The American Heart Association/American Stroke Association (AHA/ASA) identifies several risk factors and separates them according to the type of risk[2] such as: Risk Factors That Can't Be Changed (e.g., age), Controllable Risk Factors (e.g., high blood pressure or cigarette smoking), and also lists Less Well-Documented Risk Factors such as socioeconomic factors.

Over the past few years, North Carolina has worked to identify action steps for the prevention of chronic diseases, including stroke. The NC Institute of Medicine (IOM) Prevention Action Plan released in October 2009 provides a road map to preventing disease in the state. Healthy North

[1] Visit www.startwithyourheart.com/Default.aspx?pn=CVDBurden.
[2] Visit: http://www.americanheart.org/presenter.jhtml?identifier=4716.

Carolina 2020 (HNC 2020) is an initiative that is developing North Carolina's Healthy People 2020[3] objectives, which include tobacco use, physical activity, nutrition, social determinants of health, and chronic disease reduction. The recommendations on stroke prevention in this plan are aligned, wherever possible, with these HNC 2020 objectives.

## Preventable Risk Factors for Stroke in NC

North Carolina has a high prevalence of *hypertension* compared to the rest of the US. In 2007, NC had the 14th highest rate of diagnosed hypertension in the nation. More than 28% of all NC adults have been diagnosed with hypertension by a health care professional.[4] These high rates of hypertension cost NC in lives lost, disability, and economically. The actual costs are likely higher due to the rate of undiagnosed hypertension. Estimates from the National Health and Nutrition Examination Survey (NHANES) show that, nationally, 22% of adult hypertensives were unaware of their condition. Since NC is in the stroke belt, and parts of the state are in the stroke buckle where stroke rates are historically highest, it is a reasonable assumption that at least 22% of NC's population is unaware that they have hypertension.

*Diabetes* dramatically increases the risk of suffering a stroke. The rate of diabetes in NC has been increasing steadily in recent years. The percentage of 2007 BRFSS North Carolina respondents reporting that they have diabetes was 9.1 percent. By race, the percentage with diabetes was 13.7 percent for African Americans and 12.8 percent for American Indians compared to 8.5 percent for whites (1.6 and 1.5 times higher, respectively).

*Cigarette smoking* is the leading cause of premature mortality and morbidity and is harmful not only to those who smoke but also to those exposed to secondhand smoke. Tobacco use and secondhand smoke are major risk factors for cardiovascular disease. Despite these facts, nearly two million or 20.9% of adults in NC smoke (2009 BRFSS).

*Obesity* is a key risk factor for stroke, hypertension and diabetes, among other ailments. The percentage of adults who reported being obese (from the 2007 BRFSS) was 38.9 for African Americans, 36.5 for American Indians, and 26.4 for whites.

*Atrial fibrillation* (AFib), an abnormal heart rhythm in which the two upper chambers of the heart (the atria) beat in a rapid and disorganized way, is a strong independent risk factor for stroke and other cardiovascular diseases. People with AFib have a risk of stroke that is five times that of people without AFib and it is responsible for at least 15 to 20 percent of all ischemic strokes.

[3] http://www.nciom.org/task-forces-and-projects/?healthy-nc-2020.
[4] Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System Survey Data, hypertension awareness; 2007, all states.

## Minority Populations, the Poor, and the Burden of Health Disparities

In NC, African Americans, the poor, and most ethnic populations suffer from higher rates and severity of stroke compared to white North Carolinians. Significant improvements in stroke prevention in these populations will significantly reduce the rates of stroke incidence and mortality in NC.

North Carolina is becoming increasingly diverse, with the 2000 US census data showing that NC had the fastest rate of growth of its Latino population compared to the rest of the country. Data from 2007 indicated that NC had a higher proportion of African Americans than the nation as a whole with 21.7% (12.8% for the US), and NC had the seventh highest proportion of African Americans compared to other states. The American Indian population in the state is one of the largest in the nation comprising 1.2% of the NC population.

A demographic shift in state population requires a public health response in order to better address the needs of the people it serves. Minority respondents are more likely to report that their health status is fair or poor compared to whites. Health outcomes, behaviors, and health care access are impacted by social and economic factors such as whether living environments are conducive to good health, whether communities have access to fresh food or opportunities to exercise, and access to quality education and a suitable living wage.

Passage of The Patient Protection and Affordable Care Act (2010) presents a major advancement in disease prevention by, for example, increasing access to clinical preventive health care services, eliminating several cost barriers, promoting worksite wellness, and encouraging community participation in disease prevention. However, reducing disparities in health involves more than increasing access to health services (Berkman & Epstein, 2008).

Low treatment adherence rates for modifiable risk factors contribute to stroke death and disability. The issue of treatment adherence is of particular importance to African American North Carolinians who suffer from disproportionately high rates of hypertension and stroke and poor North Carolinians who have a higher incidence of high blood cholesterol (Huston, 2010). There are also various factors that impact patient adherence to blood pressure medication such as cost, distrust of physicians and medications, and potential or perceived side effects. Older African Americans and those of lower socioeconomic status or of lower educational attainment are more likely to hold myths about hypertension (Wilson et. al., 2002). Studies suggest that specially tailored educational interventions and physician-patient communications developed for the African American population will improve treatment adherence to hypertension medication.

## The ABCS of Heart Disease and Stroke Prevention and Other Resources

The Centers for Disease Control and Prevention (CDC) have articulated to their funded state programs that the majority of resources and effort should be used to address the “ABCS” of heart disease and stroke prevention, with the main focus on preventing and controlling high blood

pressure and reducing sodium intake (CDC, 2010) (Appendix C, National Heart Disease and Stroke Prevention Program, Strategies to Address the "ABCS"). The ABCS are:

- **A**spirin: Increase low dose aspirin therapy according to recognized guidelines
- **B**lood pressure: Prevent and control high blood pressure; reduce sodium intake
- **C**holesterol: Prevent and control high cholesterol
- **S**moking Cessation: Increase the number of smokers counseled to quit and referred to quit lines; increase availability of no or low cost cessation products

Additional work and recommendations have come forward from the National Institute of Medicine (IOM), the Justus-Warren Heart Disease and Stroke Prevention Task Force (JWTF), the Joint Legislative Childhood Obesity Task Force, the Health and Wellness Trust Fund (HWTF) Fit Families, and Eat Smart Move More North Carolina.

In its 2010 report entitled *Strategies to Decrease Sodium Intake in the United States*, the IOM recommends that the Food and Drug Administration (FDA) set standards for the salt content of processed and restaurant foods. Other recommendations include strengthening collaboration between the Centers for Disease Control and Prevention (CDC) and related agencies to include hypertension among their lifestyle improvement efforts, monitoring and reducing sodium intake, improving the reporting of hypertension to determine general population and subgroup trends, and improving the quality of care and removing economic barriers to effective antihypertensive treatments. It is also recommended that the Division of Heart Disease and Stroke Prevention and related agencies focus on preventing hypertension by reducing overweight and obesity, increasing physical activity, reducing sodium intake, and increasing intake of fruits, vegetables, and whole grains, especially foods rich in potassium. At the policy level, recommendations urge state and local public health agencies to emphasize populationwide approaches and to integrate hypertension prevention into programs to influence obesity prevention, increase physical activity, and encourage healthy diets.

Mindful of gaps and existing resources within the state, the above documents, initiatives, milestones, and evidence-based interventions have been used as starting points to develop recommendations on stroke prevention for North Carolina. While some recommendations are at the policy or environmental level, others are specific steps, tools, or initiatives. The recommendations work together to address stroke-related disparities and resource gaps within NC.

## PREVENTION/PUBLIC AWARENESS RECOMMENDATIONS SECTION

The recommendations below were selected from a large number of potential interventions. Attempts were made to select the best recommendations at the time of writing, while leaving open the possibility that other initiatives may be identified and implemented within the plan period of five years. The prevention recommendations included have been selected because they are implementable within five years, impact the largest number of risk factors, are evidence-

based, address health inequities throughout the state, and are viewed as leveraging existing resources.

## MAJOR MODIFIABLE RISK FACTORS

Tobacco use, physical inactivity and poor nutrition (unhealthy diet) are the leading primary preventable risk factors for stroke. These are the underlying risky behaviors that directly contribute to other conditions including hypertension, high cholesterol, and diabetes. Evidence-based public policy interventions that contribute to positive behavior changes and promote healthy work and community environments will contribute to the prevention of stroke and other chronic diseases. Statewide policy change can positively impact the public's health. For example, with the implementation of House Bill 2, which prohibited smoking in bars and restaurants, 69% of NC's workforce is protected from secondhand smoke at their workplace, and business customers are protected from secondhand smoke exposure.

### A. Tobacco

The state of NC should partner with the NC Alliance for Health, American Heart Association, American Cancer Society, American Lung Association, Campaign for Tobacco Free Kids, NC Association of Public Health, and North Carolina Association of Local Health Directors to build upon the successful passage of House Bill 2 which prohibited smoking in bars and restaurants. Data shows that, with every 10% increase in the retail cost of a pack of cigarettes, there is a corresponding 7% decrease in the number of youth that start smoking and a 4% overall decrease in the number of smokers. Recommendations are:

1. **Increasing price as a reasonable cost-of-use fee and prevention measure**
   Support an increase in North Carolina's cigarette excise tax by at least $1.00 and an increase on other tobacco (non-cigarette) products to a tax rate equivalent with that of cigarettes.
2. **Protecting past success and expanding smoke-free regulations**
   Strongly defend the statewide smoke-free law, supporting local efforts to extend secondhand smoke protections to other public places and building support to make all workplaces and public places in NC smoke-free.
3. **Preventing new users and helping current smokers to stop**
   Advocate for funds to prevent tobacco use and for tobacco cessation programs.
4. **Encouraging tobacco cessation as an employee benefit**
   Encourage employers to offer evidence-based cessation coverage as a benefit to attract and retain employees, and promote the NC tobacco use quit line, QuitlineNC, as a cessation resource for their employees.

### B. Physical Activity and Nutrition

Many factors, including where people live, work and play, have a significant role in their ability to practice healthful behaviors. According to the Convergence Partners' *Promising Strategies for*

*Creating Healthy Eating and Active Living Environments*, "people need environments structured in ways that help them access healthy foods and easily incorporate physical activity into their daily routines."[5] Because physical inactivity and poor nutrition are leading primary preventable risk factors for stroke along with high blood pressure, creating healthy communities, schools and workplaces is essential to supporting good nutrition and physical activity behaviors to prevent stroke and other chronic diseases.

NC supports evidence-based public policy interventions that promote strong nutrition policies that are consistent with national guidelines and address calories, fats, sodium, sugar, as well as obesity diagnosis, prevention, and treatment. The nutrition-related recommendations below are consistent with the NC Institute of Medicine Prevention Action Plan[6], CDC's Recommended Community Strategies to Prevent Obesity in the United States[7], CDC's National Heart Disease and Stroke Prevention Program's Strategies to Address the "ABCS", and the Prevention Institute Promising Strategies for Creating Healthy Eating and Active Living Environments.

In collaboration with partners that include the NC Alliance for Health, American Heart Association, American Diabetes Association, American Cancer Society, NC Pediatric Society, and Eat Smart Move More North Carolina, recommendations include:

1. **Physical Activity**
   a) **Supporting policy that requires quality physical education**
   Advocate for local and statewide policy that requires quality physical education (PE) for students and includes minimum standards for elementary students of at least 150 minutes of PE during each school week and at least 225 minutes per week for middle school students.
   b) **Promoting physical activity by creating safe communities**
   Provide spaces for community members to engage in physical activity, and include places such as parks and green space, outdoor sports fields and facilities, walking and biking trails, public pools, and community playgrounds. Encourage local governments and schools to enter into joint use agreements that will allow the shared use of facilities.
   c) **Creating and/or implementing Complete Streets**
   Design safe and convenient means of travel for all roadway users including pedestrians, bicyclists, users of public transit, motorists, children, the elderly and people with disabilities.

[5] Prevention Institute, Healthy Eating Active Living Convergence Partnership. *Promising Strategies for Creating Healthy Eating and Active Living Environments*. Oakland, CA. Convergence Partnership, 2008.
[6] North Carolina Institute of Medicine Task Force on Prevention. Prevention for the Health of North Carolina: Prevention Action Plan. Morrisville, NC: North Carolina Institute of Medicine, 2009.
[7] Keener, D, Goodman, K., Lowry, A., Zaro, S., & Kettel Kahn, L. (2009). Recommended community strategies and measurements to prevent obesity in the United States: Implementation and measurement guide. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.

2. **Nutrition: Healthful Eating and Access to Healthy Foods**
   a) **Adopting Nutrition Standards for Children**
   The state and school systems should adopt child nutrition standards that are consistent with national guidelines[8] for competitive foods and beverages sold in schools, and ensure all foods and beverages in schools, child care, and worksites are healthy.
   b) **Increasing Healthy Food Access**
   Promote healthy foods and beverages in grocery and food stores, restaurants and entertainment venues.
   c) **Facilitating Informed Purchasing Decisions**
   Support menu labeling in restaurants that is consistent with federal law, and encourage menu labeling participation by non-obligated restaurants both to include information on sodium content and otherwise support informed food purchasing decisions.
   d) **Supporting Healthy Food Preparation**
   Promote the reduction in the use and consumption of industrially produced trans fats including partially hydrogenated oils in restaurants.
   e) **Enabling farmers markets at the workplace**
   f) **Building Support for Responsible Product Marketing - Marketing to Children**
   Support policies identified to reduce children's exposure to marketing and advertising of unhealthy foods.
   g) **Pursuing the establishment of procurement policies that encourage the reduction of sodium in prepared foods.**

## OTHER RISK, ENVIRONMENTAL AND SYSTEMS FACTORS

### A. Social Determinants of Health (SDOH)

By addressing the social determinants of health, the state and its partners can improve health outcomes in minority and high-risk-for-stroke populations**.** Based on a World Health Organization Commission's Principles of Action, NC should work to: **1)** Improve the conditions of daily life – the circumstances in which people are born, grow, live, work, and age; **2)** Tackle the inequitable distribution of power, money, and resources – the structural drivers of those conditions of daily life; and **3)** Measure the problem, evaluate action, expand the knowledge base, develop a workforce that is trained in the social determinants of health, and raise public awareness about the social determinants of health.[9] In order to address the SDOH, recommendations include:

1. **Supporting efforts to increase the High School Graduation Rate**
   Collaborate with the NC Department of Public Instruction, Healthy Carolinians and the HP 2020 initiative to increase the high school graduation rate.

[8] Guidelines promoted by the Alliance for a Healthier Generation, or the National Academies of Science's Institute of Medicine should be considered for NC.
[9] http://whqlibdoc.who.int/publications/2008/9789241563703_eng.pdf.

2. **Partnering with Physicians and Provider Organizations on Cultural Competency**
   Work with the NC Academy of Family Physicians on the NC Health Disparities Project to improve cultural competency in family medicine and primary care to improve health outcomes for minority populations.

3. **Participating in a Public Education Campaign to Help Residents Understand Relevant Provisions of the Patient Protection and Affordable Care Act**
   **i.** Collaborate with the Department of Insurance, NC Seniors' Health Insurance Information Program and American Association of Retired Persons to develop public awareness about: high risk insurance pools created under the Patient Protection and Affordable Care Act; eligibility requirements; and premium and cost-sharing obligation.
   **ii.** Partner with the state Division of Medical Assistance and other state entities to help with the transition to state-based Health Insurance Exchanges and Accountable Care Organizations.

**B. Public Education and Awareness**

Consistent messaging from all sources – mass media, health care providers, and community and faith-based organizations – is required to create a climate where awareness of stroke risks and symptoms is inherent in the population. To this end, from 2008-2010, the Justus-Warren Heart Disease and Stroke Prevention Task Force (Task Force) has aired a successful signs and symptoms/call 9-1-1 campaign on television that has been shown, through pre- and post-surveys, to raise awareness levels of the signs and symptoms of stroke in high risk communities. The television campaign is being extended, in 2011, with messaging on the need to reach the hospital quickly. In addition to the Task Force campaign, several ongoing programs from stakeholder groups and community organizations have shown promising results in raising awareness about stroke risks, stroke symptoms, and the need to call 9-1-1.

Further action is needed to cement the coalitions that have been forming across the state for primary prevention and awareness about stroke. A seamless process of statewide screenings using a model that partners hospitals, public health departments, and federally qualified health centers (FQHCs) with cardiovascular screening programs such as WiseWoman can achieve this kind of outreach. There are successful models in the state already underway such as the Stroke Risk Identification Program (SRIP) (Appendix D), which has been shown to increase timely treatment for stroke when combined with mass media campaigns and grassroots efforts by local public and private agencies. Through relationships and collaborations on stroke screening, education, outcome assessments, and advocacy, the SRIP can be leveraged into an evidence-based and cost-efficient intervention throughout the state. Recommendations include:

1. **Seeking funding to extend the proven stroke recognition and call 9-1-1 television campaign to more areas of the state.**
2. **Creating a coalition of public and private stakeholders in order to implement and extend the SRIP across the state.**

3. **Establishing screening programs with referral links to Chronic Disease Self-Management Programs (CDSMP) and referring identified high risk patients to a CDSMP.**

## C. Health Literacy/Public Awareness

The term "health literacy" encompasses not just the ability to read and understand words and numbers but also the ability to function within the modern medical system, to understand health-related information, and to take charge of one's own health. The problem of inadequate health literacy is especially pronounced in North Carolina. State level estimates place North Carolina 41st in terms of adequate adult literacy levels. Along with adverse social and economic factors, low health literacy contributes to poor health outcomes. People with low health literacy and chronic illnesses, such as stroke, are repeatedly hospitalized and often do not take medication correctly. They may also be unable to advocate for themselves or access care when they need it.

In 2007, the Cecil G. Sheps Center for Health Services Research at the University of North Carolina (UNC-CH) established the Program on Health Literacy to promote collaboration on and dissemination of the subject across the UNC-CH campus and with community organizations and neighboring universities. Researchers with the program have created an evidence-based training toolkit[10] for clinical personnel that can be used to provide better care to all patients. Recommendations include:

1. **Funding the strategic dissemination of the health literacy toolkit**
   Use a portion of the recurring state funding for health care provider education and training on stroke administered through the HDSP Branch to disseminate this toolkit through provider training workshops across the state.

## D. Federally Qualified Health Centers (FQHC)

The NC Community Health Centers are the Federally Qualified Health Centers (FQHC) in the state. The mission of the FQHC is to provide access to quality primary health care regardless of ability to pay, and federal regulations require that these centers be located in Medically Underserved Areas (MUA). FQHCs provide comprehensive care through all life cycles, ages and stages. The scope of primary care includes medical and dental care, pharmacy, and behavioral health, enabling services including translation, vision, transportation, and outreach.

FQHCs are an important resource to achieve and maintain wellness among NC's medically underserved populations. FQHCs use health indicators such as hemoglobin A1c, blood pressure (BP) control, immunization rates, and screening tests to demonstrate quality of care. Federal grants are intended to cover the cost of providing care for uninsured, under-insured and under-served populations. Recommendations include:

[10] Tool found at http://nchealthliteracy.org/toolkit/.

1. **Encouraging and supporting all NC physicians practicing in FQHCs to become certified by the American Society of Hypertension (ASH) as Hypertension Specialists.**
2. **Working with the network of FQHCs to enhance cardiovascular risk detection and treatment, and expanding links to state resources to achieve measurable improvements for otherwise under-served populations as an important strategy for stroke prevention.**
3. **Promoting the NC tobacco use quit line, QuitlineNC, as an evidence-based cessation resource for patients who use tobacco.**
4. **Encouraging healthcare/dental professionals to offer 5A cessation counseling for their patients who use tobacco.**
5. **Working with the network of FQHCs to increase the availability of obesity screening and obesity counseling.**

## E. Environment and Individual Action

Prevention requires both environments that are conducive to healthy behaviors and action by individuals toward more healthful living. An informed population is more likely to engage in prevention efforts compared to the uninformed. Informed patients are likely to understand and adhere to treatment and may be more empowered to manage their condition. Recommendations include:

1. **Expanding public awareness efforts that encourage healthy behaviors and educate individuals about the risk factors/warning signs for stroke**
   Expand work that has been successfully done in Eastern NC to a statewide effort. Funding is required, and estimates can be based on current costs.
2. **Maximizing worksite wellness initiatives through partnering by Regional Heart Disease and Stroke Prevention (HDSP) Coordinators**
   NC Prevention Partners (WorkHealthy America), AHA (START!), Eat Smart Move More North Carolina.
3. **Collaborating with the American Heart Association (AHA) to encourage participation in the My Life Check program**
   In collaboration with the AHA, encourage individual participation in the My Life Check program, which provides an individualized action plan for healthy living.
4. **Expanding the use of HEART 360**
   Heart 360[11] is a program designed to help patients and physicians better manage high blood pressure by actively engaging patients. NC should explore the "Check it, Change it" program model piloting in Durham, NC.
5. **Expanding the use of the Starting the Conversation Tools**
   Examine ways to utilize NC Prevention Partner's Starting the Conversation tools (developed under contract to the state HDSP and Tobacco Control programs) to assist healthcare providers in engaging patients to adopt healthy behavior changes.

[11] www.heart360.org for free tour.

## F. Atrial Fibrillation

In 2007, 13,281 North Carolinians were hospitalized due to Atrial Fibrillation (AFib). In 2008, AFib was the underlying cause of death of 664 North Carolinians and was listed as a contributing cause of death for 140 of the 4,477 North Carolinians who died of stroke. Treatments are available to manage AFib and lower the risk of stroke. Recommendations include:

1. **Collaborating with healthcare providers to improve detection, diagnosis and management of AFib as an important strategy for stroke prevention and control**

   As part of the A-Fib STAT national campaign, the Justus-Warren Task Force invited Jerry West to a meeting to educate members about living with A-Fib.

## G. Surveillance

Data is essential to developing and evaluating public health interventions. North Carolina does not have hypertension incidence data based upon actual physical measurements of blood pressure, which is the leading risk factor for stroke. For dyslipidemia/lipid disorders, another leading risk factor in cardiovascular disease, there are no data on prevalence or screening based upon actual clinical measurements of blood lipids among North Carolinians (Huston, 2010).

Data from clinical measurements is essential to combat the disparities in hypertension rates. Diagnosed hypertension prevalence rates are significantly higher for African Americans than whites in North Carolina (39.8 percent vs. 28.2 percent). African American women have the highest prevalence of diagnosed hypertension (42.8 percent), followed by African American men (36.5 percent), white men (28.5 percent), and white women (27.9 percent) (Huston, 2010).

Diagnosed hypertension prevalence rates are highest in the lowest education groups and decrease with increasing education. Among those in the “less than high school” education group, 33.9 percent have high blood pressure, and the diagnosed hypertension prevalence rate decreases to 23.4 percent among those in the “college graduate” education group. Similarly, diagnosed hypertension prevalence rates are highest in the lowest income groups and decrease with increasing income (Huston, 2010).

Since there are serious gaps in our surveillance systems and knowledge of the epidemiology of cardiovascular disease in the state, recommendations include:

1. **Promoting surveillance systems for cardiovascular disease risk factors**
   a. Promote surveillance systems that include data collection of incidence and management of high blood pressure, high blood cholesterol, Type II diabetes, as well as other risk factors for stroke such as atrial fibrillation.
   b. Work to ensure that this information will be a part of any statewide health information exchange and is transmittable between other data collection systems in order to monitor continuous quality improvement in risk factor management.

## CONCLUSION

By making prevention a top priority with a combination of effective strong public health policy and individual behavior change, North Carolina can successfully improve its stroke statistics. A commitment to prevention creates the strong foundation of statewide systems of stroke care. The ultimate goal is to dramatically reduce strokes occurring in the first place. But when strokes do occur, outcomes are optimized through coordinated statewide systems of care that result in more lives saved and higher level quality of life retained or regained. The state plan for coordinated statewide systems of stroke care begins with strategies for primary prevention and management of risk factors and with secondary prevention efforts for stroke survivors.

## REFERENCES

Berkman, L., Epstein, A.M. Beyond health care-socioeconomic status and health. *N Engl J Med*. 2008 Jun 5; 358(23):2509-10.

CDC (2010). National Heart Disease and Stroke Prevention Program's Strategies to Address the "ABCS". Program Guidance, November 2010.

CSDH (2008). Closing the gap in a generation: health equity through action on the social determinants of health. Final Report of the Commission on Social Determinants of Health. Geneva, World Health Organization.

Huston, S.L. *Burden of Cardiovascular Disease in North Carolina – July, 2010*. Raleigh, NC: N.C. Department of Health and Human Services; 2010. Available at: www.startwithyourheart.com/Default.aspx?pn=CVDBurden.

Ostchega, Y., Yoon, S.S., Hughes, J., Louis, T. Hypertension awareness, treatment, and control-continued disparities in adults: United States, 2005-2006.

The Patient Protection and Affordable Care Act, P.L. 111-148, 23 March 2010.

Wilson, R.P., Freeman, A., Kazda, M.J., Andrews, T.C., Berry, L., Vaeth, P.A., et. al. Lay beliefs about high blood pressure in a low- to middle-income urban African-American community: an opportunity for improving hypertension control. *Am J Med 2002; 112*(1):26–30.

## APPENDICES

- National Heart Disease and Stroke Prevention Program's Strategies to Address the "ABCS". Program Guidance, November 2010
- Stroke Risk Identification Program (SRIP)

# Pre-Hospital Area Overview/Statement of Problem

Emergency Medical Services (EMS) in North Carolina has benefited from strong collaborative partnerships among NC government agencies, leading stroke advocacy groups, and the NC Office of EMS which oversees the administrative and medical operation of EMS in the state. While there is much work yet to be done, a strong beginning has laid a remarkable foundation from which to work.

EMS is, by nature, a collaborative enterprise at every level of service provision. Field personnel must work with law enforcement, fire departments, and medical personnel both within and outside of the hospital to deliver excellent patient care. Local EMS administrators must work with numerous other service providers including local politicians, vendors, medical leaders from both hospital and community practices, regulatory agencies, and the public to ensure the efficient management of the agency. The NC OEMS must actively engage state politicians, the governor, federal regulatory partners, thought leaders, national leadership groups for both fire and 9-1-1 services, health advocacy groups, and the general public in order to effectively manage and lead EMS services in North Carolina. Because EMS is skilled and practiced in the active engagement of a diverse set of external partners, working collaboratively to improve stroke care in North Carolina has proceeded without many interagency or interpersonal barriers or hurdles.

NC OEMS has taken a proactive leadership stance to improve stroke care. Utilizing a statewide EMS electronic medical record (capturing 1.6 million EMS patient reports per year), the EMS Performance Improvement Center (EMSPIC), through the NC OEMS and with funding from the state HDSP program, has developed a performance improvement tool kit for use by each of the one hundred EMS systems in the state. The Acute Stroke Care Toolkit provides focused agency-specific feedback on the care of stroke patients within an EMS system allowing systems to benchmark their performance against other EMS systems of similar population, similar geographic size, and the state as a whole. Included within the toolkit are suggestions for performance improvement, enabling agencies to measure their performance, initiate performance improvement activities, and assess their progress by generating a follow-up toolkit.

Additionally, the NC OEMS has developed triage destination plans for time-critical illnesses such as stroke, myocardial infarction, and trauma and mandated their use in January 2010 (Appendix E, Stroke EMS Triage and Destination Plan). These triage destination plans provide a common definition of patients who require the highest level of medical service and provide a planning mechanism and standardized approach to transport destination decisions. In the past, EMS personnel made these transport destination decisions based on patient preference or their own experience with a medical facility. If “Somewhere General”, an example of an anonymous hospital, had been nice to them, swiftly receiving their patient and providing them with feedback,

then perhaps they might have decided to take their stroke patient to that hospital without adequate information about the level of stroke care delivery available. It is very difficult for a field provider to know which facilities are actually delivering the best stroke care based on experiential or anecdotal information. The triage destination plan requires EMS systems to sit down with hospital facilities' staff to ascertain their capabilities for stroke care and their willingness to accept and effectively care for acute stroke patients. Based on this more comprehensive knowledge, EMS systems are then required to make decisions about where their personnel will be directed to transport acute stroke patients for care. These triage destination plans are then filed with the NC OEMS and revised annually. Now, EMS field personnel know where to take acute stroke patients to receive timely acute stroke care. Not only have triage destination plans allowed field personnel to have informed knowledge of where to transport their patients, the plans have facilitated communication and understanding between EMS systems and the hospitals to which they transport patients.

Finally, the NC OEMS has established a standardized set of treatment protocols and required its use for every EMS system in the state. While conceptually simple, the enactment of statewide standardized treatment protocols is a huge step forward in ensuring that every acute stroke patient in the state receives state-of-the-art care.

Such overarching mandates and standardization may appear to reduce the ability of each EMS system to work within its own unique local climate. This is not the case. Each of these mandates requires EMS systems to rise to a common standard of care but allows them to customize the standard to fit local circumstances and variances. Thus, each EMS system has a "home grown", locally developed plan of care that fits the needs of its citizens without compromising the standard of excellence required by the NC OEMS.

EMS is a willing, engaged, and eager partner at the table of those seeking excellence in stroke care delivery. In the past three to five years, EMS has benefited from a heightened awareness of timely and effective delivery of pre-hospital care to acute stroke patients and has secured a seat at the decision-making table.

While tremendous progress has been made, gaps remain. In discussing these gaps, it is useful to consider them in the chronological order in which they occur during the course of EMS response to an acute stroke patient. First, overarching gaps in the system of care will be considered, followed by gaps in 9-1-1 service, first responders, EMS personnel, EMS transport capabilities, and finally gaps in the transitions of care between EMS and emergency departments.

## A. General Gaps

For the most part, the role of EMS in stroke care delivery has been confined to a small box. The emphasis for EMS has been on patients who fall within the narrow treatment window (currently four and one-half hours) for acute strokes. EMS can do so much more in terms of primary

prevention, community stroke awareness, and community after-care of stroke patients who have recently been discharged from the hospital or rehabilitation center. Integrating EMS into the entire continuum of care for stroke patients may create manpower resources for community partners that are often scarce.

In the world of time-critical illnesses, a major emphasis has recently been placed on regionalization of care – centralizing resources and taking the right patient to the facility best equipped to expeditiously manage the incident. EMS needs to be built into plans for regionalization of stroke. In small, resource-poor communities, it is difficult to rationalize sending one of the only two ambulances in the county an hour away to a primary stroke center. The ambulance will be out of service and "lost" to the community for at least two hours and probably more. Additional resource capability needs to be built into EMS system designs and into regionalization plans.

EMS systems in North Carolina are predominantly funded locally through tax revenue and through fee for service charges. The purse strings are held by local politicians who may not understand or appreciate EMS services and resource constraints. It is critical to educate local elected officials and to integrate these important decision makers into EMS planning efforts both locally and regionally.

### B. 9-1-1 Gaps

9-1-1 centers are critical to the infrastructure of EMS services. These essential partners are frequently left completely out of both EMS planning and regionalization efforts. While the care of a stroke patient begins with the 9-1-1 call, in North Carolina, 9-1-1 centers are often not part of the EMS system. They are managed by law enforcement agencies with little medical oversight or direction. Approximately one-third of North Carolina 9-1-1 centers are fully staffed by personnel certified in Emergency Medical Dispatch. The rest are staffed by personnel with little or no formal emergency medical dispatch training. Callers with a medical emergency expect to talk with a trained 9-1-1 professional, and this is often not the case in North Carolina. Additionally, many 9-1-1 centers do not operate from standardized and validated emergency medical dispatch protocols.

### C. First Responders Gaps

First responders are personnel trained at a basic level who are dispatched with and arrive prior to the ambulance. Commonly members of local professional or volunteer fire departments, these personnel are critical to the provision of timely and life-saving treatment, such as defibrillation and CPR. Despite their essential position in the overall system of care, they are often not included in medical planning at the local or state level.

Because first responders operate at a basic level of service, they have a small number of continuing education requirements. Ensuring that first responders are trained to the standard of care for a large number of disease processes requires prioritization of continuing education topics. The continuing education curriculum is established at the local level and may be inconsistent and unfocused. In addition, many small first responder agencies do not consistently participate in quality assurance activities nor are they included in many performance feedback loops. Finally, the approved skill set for first responders does not include important stroke assessment elements such as glucose assessment and stroke screening.

### D. Transport Personnel Gaps

In North Carolina, ambulances must be staffed by a minimum of two Emergency Medical Technicians. The state recognizes five levels of pre-hospital certification: Emergency Medical Dispatch (EMD) (for 9-1-1 telecommunicators), Medical Responder (for first responders), Emergency Medical Technician-Basic (EMT), EMT-Intermediate, and EMT-Paramedic. Each of the last four certification levels is ordinal in nature, meaning that each succeeding one implies a higher level of knowledge, skill, and responsibility. The majority of North Carolina's citizens are served at the highest level of skill, EMT-Paramedic; but a few counties (at last count seven) are only able to provide service at the EMT-Intermediate or EMT-Basic level. In several other counties, paramedic services are only available for portions of the duty hours (for example, EMT-Paramedics are only available during the daytime hours and not at night).

Large portions of rural North Carolina are served by volunteer rescue squads and ambulance companies. Many counties have a mix of paid and volunteer staff. For some counties, there is a lack of consistency between the medical services (and care) provided by career versus volunteer personnel. Not only is the level of service and training inconsistent but there is no standardization in the ratio of service resources to population need. Some states (e.g., Wisconsin) have mandated service standards to ensure a consistent level of service statewide and to provide local governments with guidelines for EMS service provision. North Carolina has many counties with insufficient EMS services to meet the population needs. Whether this is due to insufficient local financial resources or poor understanding of the needs for EMS services at the local government level is not clear.

While the NC OEMS has developed quality performance tools for acute stroke care, local EMS systems seem to have little understanding of their powers and of how to use them. Few EMS systems consistently generate toolkits. The EMSPIC has deployed a quality assurance expert to each and every system to assist them in generating a toolkit and reviewing with them the elements of quality assurance and how to develop a performance improvement loop. Nevertheless, EMS has historically not understood quality assurance nor do EMS systems have experience in developing performance improvement initiatives. Most are simply trying to survive and keep ambulances on the road. Planning for improvement and measuring performance are

relatively new concepts for EMS. This is not unique to North Carolina and is an EMS culture problem that will take time and patience to change.

Delivery of stroke care could benefit from standardization across the state. There is a need for agreement on a common EMS stroke screening tool. Some systems use the Cincinnati Pre-hospital Stroke Scale; some use the Los Angeles Stroke Screen; and some use home grown unvalidated screens. Standardization of assessment tools would allow for more effective EMS-hospital communication. Finally, there are no statewide continuing education standards for stroke in terms of number of recommended hours or content.

### E. Transport Gaps

The only realistic hospital destination for stroke patients in rural areas is the local community hospital. Initial transport to a primary stroke center is not feasible for smaller communities as it could take a local unit out of service for six or more hours depending on the distance traveled. Once assessed and stabilized, these patients frequently require transportation to a higher level of care or a primary stroke center. Local EMS systems are not staffed for interfacility transports, leaving specialty care services as the logical option for transportation services.

Getting patients to the most appropriate facility for stroke care is often onerous and confusing. There is a lack of support for secondary transport to tertiary care centers as well as confusion over who is responsible for transport from critical access hospitals to tertiary care facilities. While the NC OEMS has developed and mandated use of triage destination plans, there is no state designation for stroke capable hospitals. The NC OEMS has provided a definition of stroke capable hospitals, but, at present, there is no mechanism for verifying the self-defined capability.

### F. Transitions of Care Gaps

Transitions of care is an area of particular concern for patient safety and consistent delivery of care. The intersection between EMS and the emergency department (ED) is particularly difficult. The emergency department is a busy and often chaotic place. EMS should provide EDs with ample lead time through pre-notification to allow appropriate resources to be assembled to provide timely care. EMS may prove to be a valuable resource for EDs in planning for efficient and effective stroke system of care plans. Additionally, EMS is not integrated into the wider range of stroke planning such as public stroke education, primary prevention, and post-stroke discharge services in the community. Finally, the Health Information Portability and Accountability Act, which limits the amount of information that can be shared between health care providers, limits the ability of health care facilities to provide focused and directed feedback to EMS services.

### G. Why Do These Gaps Exist? What are the Barriers?

It is important to begin with an understanding that these gaps in care do not exist from a lack of passion or desire to deliver excellent patient care. The funding of EMS systems is a primary reason for many of the identified gaps in the Pre-Hospital section of this plan. EMS systems are funded from fee-for-service revenue collections and tax dollars. Many fire departments are funded from fire taxes. EMS systems are funded out of the general tax revenue and must compete with other essential services such as schools, libraries, and law enforcement for funding.

Stroke is a subtle disease process in many instances. Many other medical events, such as hypoglycemia, can masquerade as a stroke, making recognition difficult. There is a lack of common tools and language across specialties. Stroke outcomes are not dramatic or concrete. It is hard to demonstrate that EMS made a real difference and/or contributed to a positive outcome. Finally, stroke is not as common as other events such as chest pain or trauma.

## H. Recommendations

The following recommendations will move North Carolina's system of stroke care forward. Several of these recommendations are directed at infrastructure needs and funding. While these recommendations are not stroke-specific, they are essential to managing this time-critical illness that causes so much morbidity and mortality in North Carolina.

1. **Mandate that 9-1-1 centers:**
   a. Be staffed by personnel certified in Emergency Medical Dispatch;
   b. Operate from standardized and validated Emergency Medical Dispatch protocols;
   c. Be integrated into EMS Systems; and
   d. Have medical direction and oversight from a physician certified in Emergency Medicine or Emergency Medical Services.
2. **For first responders, provide:**
   a. Statewide standardization of the stroke continuing education curriculum;
   b. A place for first responders at the planning table for stroke systems of care;
   c. Additional stroke skill sets including glucose check and administration of stroke screens; and
   d. Quality assurance mechanisms including closure of the feedback loop for stroke.
3. **Transport personnel should be:**
   a. Certified at the highest level of service possible;
   b. Provided with consistent, standardized stroke continuing education;
   c. Educated in quality assurance and performance improvement activities; and
   d. Utilize a consistent stroke assessment tool and common language that all can understand.
4. **The ratio of EMS service resources to population needs should be standardized across the state.**
5. **Fund EMS at a level consistent with their mission.**
6. **Build capacity across the state for secondary transport of stroke patients from critical access hospitals to stroke capable facilities.**
7. **Identify stroke centers and stroke capable hospitals utilizing standard definitions and validated designations.**

8. **Integrate EMS into planning for stroke systems of care and regionalization planning.**

## REFERENCES

None

## APPENDICES

Stroke EMS Triage and Destination Plan

## Acute/Subacute Area Overview/Statement of Problem

Stroke is a medical emergency, and medical attention and specialized evaluation must be provided rapidly in order to minimize disability. Optimal stroke care requires that a patient receives this evaluation and treatment within a few hours of stroke onset. Patients who come to medical attention outside of this window for treatment still require specialized care to maximize recovery (rehabilitation) and to minimize the chance of a future stroke (secondary prevention).

In 2006, the NC Department of Health and Human Services (DHHS) Division of Public Health (DPH) Heart Disease and Stroke Prevention (HDSP) Branch spearheaded the formation of the Stroke Advisory Council (SAC), a group that was tasked with working toward improving stroke care in NC. The SAC defined their long term goal to be the establishment of regionally determined, quality driven systems for delivering acute stroke care. Two of the prerequisites determined by the SAC were: 1) An accounting of the stroke capabilities of facilities in the state; and 2) Identification of systems of stroke care already present.

In 2009, the SAC commissioned the North Carolina Stroke Prevention and Treatment Facilities Survey (Goldstein, 2010) which found that only 41 percent of the state's population resides in a county with a Joint Commission certified Primary Stroke Center (PSC). Sixteen hospitals in thirteen counties were classified as PSCs at the time of the survey, which was a dramatic increase from previous surveys. Facilities in an additional 19 counties routinely used remote (telephone/telemedicine) support for the management of patients with acute stroke, and facilities in 54 counties had a policy or plan to transfer acute stroke patients outside of their capabilities to another appropriate facility. A total of 77% of the state's population resides either in a county with a PSC or in a county with a transfer plan.

However, significant gaps in stroke care still exist. The facilities survey noted that there are 25 counties without around-the-clock acute stroke care capabilities – 18 counties without hospitals and an additional 7 counties without 24/7/365 CT scanning (a prerequisite for acute stroke care). In summary, nearly 20 percent of the state's population resided in counties without an acute stroke care facility, without any facility that used remote acute stroke care support, or without EMS transfer plans/policies to take stroke patients to a secondary or tertiary stroke capable facility. The greatest lack of stroke care resources is found in rural portions of the state, primarily in the east and southeast (Appendix F, NC Maps for Telestroke). Providing access to acute stroke care for all citizens of North Carolina must remain a top priority for state leadership.

Effective January 2010, the North Carolina Office of EMS (NC OEMS) implemented an EMS Stroke Triage and Destination Plan requirement for all EMS providers (Appendix D). The Destination Plan designates where stroke patients should be taken, based on availability of stroke

care services. Hospitals that are not PSCs are evaluated by local EMS providers and categorized as either a Stroke Capable Hospital, a Community Hospital, or a Specialty Care Transport Program (Appendix F, Map of Primary Stroke Centers). At this point, there is no centralized state mechanism for verifying the stated capabilities of hospitals nor do the designations address the actual quality of stroke care during the hospitalization. In addition, the Destination Plan does not have guidelines for connecting hospitals for rapid secondary referrals to PSCs as secondary referrals are determined by hospitals and emergency rooms. Finally, the hospital designations are not widely available to the general public for review and commentary. Although the NC OEMS EMS Stroke Triage and Destination Plan makes great strides in minimizing treatment delays, research has demonstrated that less than 40% of stroke patients are brought to emergency departments via EMS. As such, the possibility remains that acute stroke patients may be brought to those hospitals that are not equipped to provide appropriate acute care for stroke.

A number of "stroke networks" have been identified in NC. Some of the networks are defined by geography, such as the Western North Carolina Health Network (a collaboration of 17 hospitals) and the Eastern North Carolina Stroke Network (www.encsn.org) (comprised of hospitals supporting a 30-county area). These networks are seen more as resource networks, helping each other to develop stroke programs along with conducting Advanced Stroke Life Support (ASLS) classes, stroke screening, and prevention and awareness efforts. While these two groups support a large portion of the rural and geographically challenged counties, they do not meet the criteria for formal integrated systems of stroke care. Other networks identified by the SAC are organized within private health care systems or around academic centers. Such hospital system networks are fairly exclusive, leaving certain hospitals in the same region without access to network resources. Overall, stroke care in NC remains fragmented.

Emergency evaluation and treatment of stroke patients is only a portion of the care provided during the acute hospitalization. Equally important are the efforts taken to reduce stroke-related complications, to begin secondary stroke prevention, and to provide stroke rehabilitation services. Primary stroke centers must demonstrate certain standards in these care areas, but such expectations are not generally applied to non-PSC hospitals. Organizations including the Joint Commission, the American Heart Association, and the National Quality Forum (NQF) have advocated for the use of core measures in determining the quality of stroke care delivered by hospitals.[12] Importantly, the Center for Medicare and Medicaid Services (CMS) has announced the inclusion of the eight NQF-endorsed stroke measures as part of the Reporting Hospital Quality Data for Annual Payment Update initiative (CMS 2010). As such, all hospitals in North Carolina will soon be required to participate in reporting quality measures for stroke care. It is difficult to determine each hospital's state of preparedness as the Facilities Survey was reported by county, not by hospital.

[12] www.jointcommision.org/stroke/.

In conclusion, there have been many advances in North Carolina's efforts to provide timely and appropriate acute stroke care to all of its citizens. However, many gaps still exist, as one in five North Carolinians still have little or no access to such care. Clearly, coordinated systems of care will help to fill in the gaps, but perhaps instituting more basic measures should be the goal during the first phase of future efforts. The following recommendations are ones that the Acute/Subacute Work Group feels are necessary as the foundation for establishment of regionally determined, quality driven systems for delivering acute stroke care.

## Recommendations

Stroke is a medical emergency. Medical professional guidelines dictate that stroke treatment should be provided in the timeliest manner possible. To that end, health departments and hospitals should have plans in place to provide timely and efficient stroke care. Recommendations include:

1. Every hospital in NC should have stroke plans that are comprehensive in scope. These plans should be designed to minimize delays and uncertainties concerning appropriate treatments:
    a. Acute stroke plans should include:
        i. Emergency Department evaluation to determine candidacy for treatment with IV tPA
        ii. Protocols for transferring patients to facilities providing higher levels of care, if needed. Examples of higher level needs include:
            a) Interventional stroke care
            b) ICU stroke care
            c) Neurosurgery
    b. Once a stroke patient is admitted to the hospital, care plans should include strategies to reduce stroke-related complications, to begin secondary stroke prevention, and to provide stroke rehabilitation services.
    c. For those hospitals that do not have all of the resources needed to treat acute stroke patients, plans should include emergent transfer protocols to hospitals with higher capabilities. These transfers should take place with minimal delays. Such hospitals should ensure that EMS agencies serving their region know that the NC OEMS categorizes their hospital as a "community hospital" for purposes of following the EMS Stroke Triage and Destination Plan.
    d. For facilities with CT capabilities but lacking medical expertise, plans should include telephone, televideo, or teleradiography consultation with higher level stroke centers to facilitate treatment with IV tPA prior to transfer.
2. Each county government should have knowledge of the acute stroke plans of the county's EMS providers and hospitals and should know which NC OEMS definition each hospital meets within the EMS Stroke Triage and Destination Plan. Such information should be made available to all citizens in the county:

   a. The current Facilities Survey reports stroke care capabilities by county, not by individual hospital. It is recommended that a new survey system be instituted whereby hospitals report their acute stroke capabilities to the NC Hospital Association (NCHA) and NC Department of Health and Human Services, Division of Public Health, Heart Disease and Stroke Prevention Branch (DHHS/DPH/HDSP), and the information for each hospital is publicly available. This system will require assistance from the NCHA to garner support and cooperation from hospitals.

3. The state should adopt a designation standard for determining the stroke care capabilities of each hospital that is not a PSC. Adopting such a standard will help the state determine which hospitals require additional resources. Such a standard will also help hospitals perform needs assessments to ensure that they are providing stroke care according to accepted guidelines. Any statement of stroke capability must include elements of rehabilitation and secondary prevention:
   a. Determine the process for defining NC's hospital designation standards for stroke capabilities. For example, the state could convene an expert panel to provide recommendations. As part of the process, the panel should review definitions that currently exist, including those from the Brain Attack Coalition, the Joint Commission, and the American Heart Association. In addition, the panel should review definitions used by other states.
   b. The state should work with the NCHA to garner support from hospitals to support the definitions/designations.
4. All collected information from state surveys should be utilized by the SAC and DHHS/DPH/HDSP to continue to identify and target specific regions in need of additional resources. The SAC should evaluate this information to develop strategies to target underserved regions.
5. The state should work to identify strategies to improve the hospitals in underserved areas:
   a. Stroke referral networks should be used as resources for hospitals in underserved areas.
   b. Regional HDSP-driven stroke support networks should be used to provide education.
   c. The state and academic stroke centers should provide assistance with stroke care protocols to improve stroke hospitalizations.
6. Efforts should be made to work with all hospitals in the state to improve the quality of stroke care within the framework of the new NQF/CMS requirements:
   a. The state should work with the NCHA to inform hospitals of these measures as all hospitals will be expected to comply with reporting requirements for them.
   b. The state and the NCHA should provide resources to help hospitals prepare for reporting of these measures.
   c. The NCSCC and the AHA/ASA Get With the Guidelines – Stroke programs should be used as resources to assist hospitals in this regard.
7. A Governor's Stroke Summit (Appendix G, Proposal for Governor's Summit on Coordinated Stroke Care) is currently in the planning phase. This Summit seeks to bring together representatives from all hospitals in the state to discuss ways to improve stroke care for the citizens of North Carolina:
   a. The Acute/Subacute Work Group supports this Summit as a means of endorsing and establishing the above recommendations.

8. Endorsement by the NCHA and medical professional societies are necessary for successful implementation of the recommendations. It is recommended that the state seek endorsement by the following stakeholders:
   a. NCHA
   b. Academic medical centers
   c. AHA/ASA
   d. NC Medical Society (NCMS)
   e. NC Neurological Society
   f. NC College of Emergency Physicians

## REFERENCES

Centers for Medicare and Medicaid Services. Possible new quality measures for the FY 2010 payment determination. Fed Reg. 2009; 74: 43873.

Goldstein, L.B., Statewide Hospital-based Stroke Services in NC: Changes over 10 years. Stroke 41(4):778-783, 2010.

NC Office of Emergency Medical Services. EMS Stroke Triage and Destination Plan 2010.

## APPENDICES

NC Maps for Telestroke
Proposal for Governor's Summit on Coordinated Stroke Care

## Recovery and Transitions of Care Area Overview/Statement of Problem

In August 2006, the North Carolina Legislature directed the Justus-Warren Heart Disease and Stroke Prevention Task Force (JWTF) to establish a Stroke Advisory Council (SAC) and charged that group with developing a stroke system of care for North Carolina. A report and recommendations were due and delivered to the General Assembly in February of 2007 on the occasion of the Task Force's biennial Legislative Heart Health Day.

Due to the extreme time constraints, the first year's work focused on the acute phase of the stroke continuum of care and built on a number of key partnerships and existing accomplishments, including the NC Collaborative Stroke Registry, now known as the NC Stroke Care Collaborative (NCSCC). In recognition of the importance of NC's efforts to improve the quality of acute stroke care, the General Assembly appropriated funding to support the recommendations of the SAC and to continue its operations in order to address both pre- and post-hospital aspects of stroke care.

In reviewing the charge to determine what should be addressed in year two, the Council decided to focus on stroke prevention and rehabilitation. Two new work groups were established, and new expertise was recruited to advise in these areas. This input was used to develop recommendations to be brought before the Council and the Task Force for approval before being reported to the 2008 Legislative Session.

The Council adopted a recommendation from the Rehabilitation Work Group to identify and publish an inventory of stroke services and resources by county. The Rehabilitation Work Group (Appendix H, SAC Stroke Rehabilitation Work Group) decided that addressing public and provider awareness of post-acute stroke services in the community would be a practical first step and objective for the short term. The Work Group believed that identifying and disseminating information about available resources for stroke recovery would result in a number of advantages in moving toward development of a system of stroke care for the state. These advantages would include: (1) Providing a public service for stroke patients, their providers, and families; (2) Establishing a baseline for stroke services and identifying gaps; (3) Aligning with one of the American Heart Association/American Stroke Association's recommended rehabilitation progress markers identified in the Ideal Stroke System of Care; and (4) Assisting with addressing identified problems with transitions in care from the acute to the post-acute stage.

The importance of increasing the public's awareness of available community services was supported by the NCSCC's[13] discharge destination data which showed that 43% of all stroke

[13] The NCSCC assesses the use of best practice guidelines for stroke treatment by conducting real-time data collection on stroke treatment within North Carolina hospitals. The NCSCC's website can be accessed at http://www.ncstrokeregistry.com.

cases (excluding transient ischemic attacks) were being discharged to home care or self care. This finding supported the need for providers and families to be aware of, and have ready access to, information about services available in and around their community. The Rehabilitation Work Group found an invaluable partner in the state-funded NCcareLINK[14] health information portal. This partnership provided a way to disseminate information to providers and the public about post-acute stroke services that are available in each county. In addition to utilizing NCcareLINK as a searchable online resource, a printed guide was developed to provide a snapshot in time of available resources for recovery. (Appendix H, List of Members of the Rehabilitation Advisory Group that oversaw development of the printed guide). NCcareLINK continues to provide up-to-date information about new programs and changes to existing programs. Every effort was made to widely distribute the published guides and to publicize the availability of the on-line database.

Beyond the development of the database and the printed guide, the Rehabilitation work group investigated issues related to transitions of care and found that:

- Programs are needed which integrate primary care, rehabilitation, and community settings.
- Providing care consistent with guidelines improves functional outcomes at six months and increases the probability of being discharged home.
- Based on stroke survivor accounts and the opinions of SAC members, stroke patients and their families generally do not receive adequate information to meaningfully assist them through the recovery phase of their experience.
- Some of the observed recurrent strokes might have been avoided through improved patient/caregiver education.
- There is a need to provide hospitals and providers with resources to assist with improving stroke education to reduce the recurrence of stroke and to assist patients and their families in coping with life after stroke.
- There is also a need to identify programs and resources to assist hospitals in improving patient and caregiver education and to better transition patients back into their communities and physicians' care.

Many members of the original Rehabilitation Work Group participated in the August 30, 2010 meeting of the SAC/ASTHO group to begin the development of recommendations for the Stroke Systems of Care Plan. They returned to participate in the newly named Recovery/Transitions of Care Work Group and identified additional members with the needed expertise (Appendix I, SAC/ASTHO SSoC Recovery/Transitions of Care Work Group). That group identified a number of strengths, along with gaps and opportunities for improvement, of the stroke system of care in NC. Existing assets to build upon included: stroke coalitions; stroke networks; stroke coordinators; primary stroke centers; the NCSCC and its participating hospitals; Get With the Guidelines – Stroke; leading inpatient rehabilitation centers; CARF-accredited centers (Appendix J, NC CARF Accredited Facilities with a Stroke Specialty Program); evidence-based rehabilitation guidelines; Rehabilitation Resource Guide and NCcareLink on-line database; NC Stroke Association and its "Beyond the Hospital" Program; national research; Transitions of

[14] NCcareLINK is a state health information portal. It can be accessed at https://www.nccarelink.gov.

Care Association; Continuing Care Hospital Concept (bundled payment); abundant tools and literature available; NC Division of Aging; and Area Agencies on Aging.

The Recovery/Transitions of Care Work Group also listed gaps and barriers including: reimbursement issues; NCSCC quality improvement (QI) efforts ending at hospital discharge; key indicators needed for the post-acute stage; primary care providers and rehabilitation professionals are in short supply, especially in rural areas; long term care (LTC) workforce issues; prescription management/health literacy; rehabilitation is frequently delivered at skilled nursing facilities or LTC facilities; quality initiatives are not in place; gaps between research and practice; younger stroke patients (frequently African American) are not eligible for Division of Aging services; and lack of opportunity for reintegration into the community.

The Work Group then condensed the list of gaps and barriers into three main areas for development of initial recommendations. Three subgroups were formed and have worked to develop recommendations related to their respective topic areas as follows:

- Extending Registries/Quality Improvement (QI) into the Post-hospital Phase
- Managing Transitions of Care
- Reimbursement

**Recommendations**

**A. Extending Registries/QI into the Post-Hospital Phase**

Despite progress in acute stroke care management, the majority of stroke survivors are discharged home with persistent neurological symptoms and significant disability. Follow up on these patients has revealed recurrent stroke, high rates of rehospitalizations, multiple falls, high risk of fractures, and decline in functional abilities. State systems of stroke care must develop strategies to enhance post-acute stroke management and quality of life for stroke survivors. Better management of stroke recovery will require liaisons between hospitals, communities, programs and services.

To develop effective stroke systems of care, three initiatives are recommended:

1. **Pursue funding to carry out a preliminary study modeled after the EMS Data Linkage Project that demonstrated the feasibility of linking PREMIS data with NCSCC hospital data (Mears et. al., 2010). The objective of the study would be to examine patterns of care for stroke patients who have been discharged from hospitals participating in the NCSCC. It is proposed to utilize medical claims data on provider and patient services available from CMS Medicare records for the purpose of evaluating the continuum of care for NCSSC patients following their discharge from the hospital. The goal is to provide a comprehensive description of the patterns of outpatient care, use of rehabilitation services, and hospital**

**readmissions and evaluate contributing factors to help inform future alignment of health care resources for the care of stroke patients.**

Specific aims of this study are to:

a. Establish the feasibility of linking the NCSCC data with CMS Medicare data.
b. Describe, using the linked NCSCC/CMS Medicare data, patterns of care for stroke patients discharged from NCSCC hospitals following a stroke-related hospitalization.
c. Conduct a prospective pilot follow-up study to examine trajectories of functional status, quality of life, and medication adherence among the NCSCC patients.

It is envisioned that initial funding for this project will support a pilot study aimed at establishing the parameters (positive predictive value) of the linkage of the CMS data with the NCSCC data. Funding for this portion of the study will be sought from the North Carolina Translational and Clinical Sciences Institute (NCTraCS) at UNC-CH. The pilot study will then serve as the basis for an R01 proposal to the National Institute of Neurological Disorders and Stroke (NINDS). Partners in the study will include the funders, the NCSCC, the UNC-Chapel Hill Department of Cardiovascular Epidemiology (specifically, Professor Wayne Rosamond and Dr. Anna Kucharska-Newton), the Duke University Doctor of Physical Therapy Program (specifically, Professor Pamela Duncan), the Carolinas Center for Medical Excellence (CCME), and participating hospitals.

2. **Once feasibility is established, pursue funding to create a recovery phase registry that would link this registry to the NCSCC registry in order to track survivor outcomes at least one year post-acute hospital discharge. An outside agency should be identified and contracted with in order to perform the data tracking for this linkage project.**

3. **Stroke performance measures have been developed to monitor and improve the quality of care related primarily to the acute hospital component of stroke systems of care. There are very few stroke quality measures that address the care provided in the post-hospital recovery period or for the transitions that occur for patients moving from hospital to home. The best management of stroke will require care coordination between health care facilities, providers, and the community and measures of quality outcomes that span the entire continuum.**

   In an effort to improve care, the National Quality Forum (NQF) has recently published a proposed draft of Preferred Practices and Performance Measures for Measuring and Reporting Care Coordination (Appendix K, NQF Preferred Practices and Performance Measures for Measuring and Reporting Care Coordination). Although developed for

cardiovascular disease, many of these practices and measures lend themselves to supporting stroke recovery and could be modified to address the delivery of care over the stroke recovery period. In addition, the Commission on Accreditation of Rehabilitation Facilities (CARF) has revised stroke specialty standards to include gathering of information post discharge on the following measures:

a. Aspiration pneumonia
b. Falls
c. Falls with injuries
d. Rehospitalization
e. Unplanned medical visits/encounters

CARF will also require that accredited stroke rehabilitation programs have indicators to measure the percentage of individuals recovering from stroke who, at discharge and during the transition phase, are in compliance with evidence-based guidelines to manage:

a. Diabetes
b. Hyperlipidemia
c. Hypertension
d. Stroke prophylaxis

**Recommendation: Develop measures for the recovery phase of stroke systems of care in NC, and consider the NQF measures and the CARF Stroke Specialty Standards as the foundation for focusing on health outcomes at one, three, six and twelve months post-discharge from the acute care hospital.**

The development and implementation of such measures will require a work group with representatives of many partner organizations including but not limited to the NCSCC and its participating hospitals, NQF, CARF and NC's accredited rehab facilities, and academic centers.

## B. Managing Transitions of Care

### 1. Develop projects and programs to educate primary care physicians about stroke patient recovery opportunities.

These education programs should be developed in collaboration with partners such as the NC Medical Society's Medical Education Committee, NC Academy of Family Physicians, NC Chapter of the American College of Physicians, Community Care of NC, NC Community Health Center Association, NC Association of Free Clinics, NC Stroke Association, American Heart Association/American Stroke Association Mid-Atlantic Affiliate, NC Area Health Education Center (AHEC), NC Division of Public Health, local health departments, NC Stroke Advisory Council, NC HDSP Branch, and

universities. The costs that are associated with this recommendation include the funding needed for developing, disseminating, and evaluating the impact of the educational programs on physician knowledge and/or patient outcomes. For example, the educational courses may need funding for CME credits, for publicizing course availability, and for any class materials. Also, consideration should be given to indirect costs of the time that must be sacrificed by providers who would benefit from this program and the individuals who would be providing the education.

2. **Create a NC post-acute stroke resource center with the purpose of empowering caregivers and families.**

   This resource center would be developed in collaboration with partners such as the NC Hospital Association, NC Stroke Advisory Council, NC AHEC, NC Division of Public Health, local health departments, National Stroke Association, NC Stroke Association, American Heart Association/American Stroke Association (AHA/ASA), AHA/ASA Mid-Atlantic Affiliate, NC Office of Citizen Services, NC Division of Aging and Adult Services, local Area Agencies on Aging, NC Agricultural Extension Program, NC System of Community Colleges, National Consortium of Stroke Coordinators, National Family Caregivers Association, the National Alliance for Caregiving, the Family Caregiver Alliance, NC Chapter of the American Case Management Association, the NC Chapter of the National Association of Social Workers, NC Council of Churches and other faith-based institutions, NC Department of Commerce and local businesses, senior centers, public libraries, universities, and the media. The cost of creating and evaluating educational resources would be the initial cost. In addition, the stroke resource center would require funding for the center's infrastructure and staff to support it. Other costs to consider would be the costs assumed by agencies that may lose and/or gain a particular segment of the market for their resources as a result of supporting the center's creation.

3. **Acknowledge the importance of addressing caregiver health, and design interventions to deal with this issue.**

   National, state, and local agencies should collaborate on strategies to increase public awareness of the importance of addressing caregiver health. The Recovery/Transitions of Care Workgroup should cooperate with the Prevention/Public Awareness Work Group to identify stakeholders to increase awareness of this issue. In addition, interventions should be created that include detailed caregiver assessments and individualized caregiver education on secondary stroke prevention (risk factor management), medication compliance, depression, social isolation, and coping strategies that emphasize the caregiver's understanding of stroke survivors' learning capabilities. Interventions should be developed in collaboration with agencies such as the NC Hospital Association; NC Medical Society; NC Division of Aging and Adult Services' Chronic Disease Self-Management Program; NC Division of Public Health; local health departments; NC Division of Mental Health, Substance Abuse, and Developmental Disabilities; NC

Division of Health Service Regulation; NC Council of Churches and other faith-based institutions; NC Alliance for Healthy Communities; Community Care of NC; NC Community Health Center Association; NC Association of Free Clinics; NC Chapter of the National Association of Social Workers; National Stroke Association; NC Stroke Association; American Heart Association/American Stroke Association; AHA/ASA Mid-Atlantic Affiliate; NC Department of Commerce and local businesses; home health agencies; senior centers; public libraries; universities; and the media. The main cost associated with this strategy would be the funding needed to initiate the public awareness campaign, caregiver assessments, interventions, and referral pathways.

4. **Enhance stroke recovery care coordination by providing consistent patient information to health care providers at various points of care which would include the providers' ability to share patients' medical records across a variety of care environments.**

   Upon identifying these points of care by examining national and state algorithms such as Dr. Vu Nguyen's Healthcare Interface, state and local resources should be surveyed in order to discover potential ways to link survivors, caregivers, and families with appropriate state and local programs across NC. This linkage should take into account the growing number of young stroke survivors across NC that face unique social challenges. Partner agencies are the same as those in Recommendation 3. In the end, there would be funding needed to create a state transitions of care database along with the potential that additional funding would be needed to improve the linkage of acute care and community facilities with state programs.

5. **Telehealth should be incorporated into stroke recovery transitions of care.** Telehealth is the delivery of health-related services and information via telecommunications technologies. Telehealth encompasses preventive, promotive and therapeutic aspects of health care. Telehealth activities have demonstrated the removal of time and distance barriers for the delivery of health care services or related health care activities which potentially can improve quality and reduce health care costs. Telerehabilitation is the judicious application of telehealth technology to services long provided by rehabilitation professionals. Research and reports to date confirm that telerehabilitation can significantly overcome barriers to access for needed services caused by distance, unavailability of specialists and/or subspecialists, and impaired mobility.

   **Introduction of a bill in the North Carolina Legislature is recommended, within the next five years, mandating that health insurers, health care subscription plans and health maintenance organizations (HMO) fully cover the cost of all telerehabilitation services that are routinely reimbursed in a typical rehabilitation provider in-person intervention. Also, the development of language in North Carolina state licensure statutes supporting providers' adoption of telerehabilitation for all rehabilitation service providers, much like the language established by the**

**North Carolina Board of Examiners for Speech and Language Pathologists and Audiologists is recommended.**

The Recovery/Transitions of Care Work Group will collaborate with the Telemedicine Work Group on this recommendation. To that end, it is recommended that support be requested from licensure boards to move this initiative forward. Furthermore, it is recommended that support be sought from research institutions in NC in contributing to the evidence that telerehabilitation provides a quality service for the citizens of NC and helps to reduce overall health care costs. These institutions would be asked to show that telerehabilitation provides the same quality of service that a person would receive from a provider in person. There will be costs associated with telerehabilitation research as well as advocacy/lobbying for a bill and state licensure.

6. **Broader telehealth strategies adoption is recommended. Existing telehealth networks should be examined in order to identify opportunities for them to expand their value to members and the community by connecting rural and remote providers to the Internet across existing infrastructures.**

   While telehealth and health information technology (IT) have historically operated on relatively separate tracks with limited crossover, it is recognized that their goals and activities are complementary and synergistic. This is especially true of the broader systems-based approach needed to deliver effective and efficient care in NC. For example, telehealth networks provide the infrastructure that enables Internet access and drives health information exchange (HIE) in areas where commercial broadband is lacking or cost prohibitive. Likewise, health IT offers enabling components for remote care and provides complementary tools and systems, such as electronic health records (EHRs) and digital data/information sharing (Thielst, 2010). Individuals who serve on the North Carolina Health Information Exchange (NCHIE) Board and the North Carolina Healthcare Information & Communications Alliance, Inc. (NCHICA) should be identified. These individuals would work to ensure interoperability and a blended vision for both health IT and telehealth. It is desired and anticipated that these partners would become champions for efforts to link telehealth, which would include telestroke, telerehabilitation, and chronic disease prevention/management education via similar technologies, with that of the advancing health information technology and electronic health record infrastructure. Initial costs of this strategy appear to be non-monetary, given that the first step would involve connecting key stakeholders. However, there may be costs associated with the time needed on behalf of all stakeholders in order to reach consensus about individual and organizational visions of the future of telehealth in NC. Potentially, monetary costs would arise in the long term as possible changes to the developing state health information technology infrastructure are discussed.

## C. Reimbursement

When transitioning stroke patients from one level of care to another, the goal should be to obtain the right level of care for the patient at the time he/she most needs it. In looking at

reimbursement issues related to the transitioning of stroke patients, one would expect that reimbursement would reflect optimal care as well. However, reimbursement issues often pose a barrier to stroke patients being transitioned appropriately. Stroke patients are at high risk for bouncing back, with 20% of acute stroke patients experiencing at least one bounce-back and 16% experiencing two or more bounce-backs within 30 days of hospital discharge (Kind et. al., 2008). Improper transitions can be costly to not only the patient and his/her family but also can lead to readmissions. To complicate this issue further, the new health care reform law will have unforeseen effects on the treatment and rehabilitation of stroke patients and on reimbursement.

In order to successfully implement the recovery/transitions of care recommendations, the Stroke Advisory Council (SAC) needs to recognize the costs of inappropriate care transitions. These include not only costs related to poor outcomes but costs to the health care system as well. In NC, there are an estimated 37,763 Medicaid recipients. Total annual cost to Medicaid for stroke treatment is $279,781,000 or $7,410 per Medicaid beneficiary (Chronic Disease Cost Calculator). To completely understand reimbursement issues in relation to rehabilitation, obtaining the most useful, accurate and current data will be critical.

To develop effective stroke systems of care, three initiatives are recommended:

1. **Collect data from all willing and available sources on discharge destinations, length-of-stay, readmission rates, readmission primary diagnoses, availability of beds by payor, and information on patients who have maximized their recovery dollars who still require treatment. It is recommended that the proposed Recovery Phase Registry could be designed to track these data.**

2. **Include experts, when making decisions, who understand reimbursement at each level of care, since different payment structures and regulations govern each.**

   Partnerships with the Division of Medical Assistance, Department of Insurance, Blue Cross and Blue Shield, and Carolinas Centers for Medical Excellence should be developed and maintained. The Reimbursement Sub Work Group should also seek information from experts who can speak to how the new health care reform legislation is likely to affect reimbursement for stroke patients. Utilizing such specialty knowledge, along with the appropriate data, will allow for the development of model pathways for patient flow with the goal of optimizing outpatient therapy.

3. **Identify opportunities for funding demonstration projects or other similar programs.**

   There are several existing recommendations for demonstration projects, including partnering with health care systems on establishing model pathways for transitions. This would require the development of a document which could be used as a resource across

the state. In difficult economic times, acquiring funding would be essential to successful implementation. Locating outside funding would provide momentum for the NC stroke system of care and might provide other unanticipated benefits as well.

## REFERENCES

*Chronic disease calculator.* Centers for Disease Control and Prevention. Retrieved from http://www.cdc.gov/chronicdisease/resources/calculator/index.htm on November 3, 2010.

Kind, A.J., Smith, M.A., Liou, J., Pandhi, N., Frytak, J.R., & Finch, M.D. (2008). The price of bouncing back: One-year mortality and payments for acute stroke patients with 30-day bounce-backs. *Journal of American Geriatric Society 56*:999-1005. doi: 10.1111/j.1532-5415.2008.01693.x.

Mears, G.D., Rosamond, W.D., Lohmeier, C., Murphy, C., O'Brien, E., Asimos, A.W., & Brice, J.H. (2010). A successful linkage between a statewide emergency medical services data system and a stroke registry. *Academic Emergency Medicine, 17,* 1-7.

Thielst, C.B. (2010). *The crossroads of telehealth, electronic health records & health information exchange: Planning for rural communities.* The Northwest Regional Telehealth Resource Center. Retrieved from http://www.nrtrc.org.

## APPENDICES

Stroke Advisory Council Stroke Rehabilitation Work Group

Stroke Advisory Council/Association of State and Territorial Health Officials Stroke System of Care Recovery/Transitions of Care Work Group

NC CARF Accredited Facilities with a Stroke Specialty Program

NQF Preferred Practices and Performance Measures for Measuring and Reporting Care Coordination

# Telestroke Area Overview/Statement of Problem

The burden of stroke in North Carolina is one of the highest in the nation. From 2003-2007, there were 27,927 stroke hospitalizations in the state (Huston, 2010). The number and high costs of stroke have made it incumbent to improve the number of patients receiving appropriate treatment. Unfortunately, there are barriers for treatment of acute stroke, namely time and access.

The only FDA approved medical treatment for ischemic stroke, Tissue Plasminogen Activator (tPA), has an accepted time window of three hours (National Institute of Neurological Disorders [NINDS], 1995) which has recently been expanded to four and one-half hours. A new science advisory in 2009 from the American Heart Association/American Stroke Association (AHA/ASA) recommends use of tPA between three and four and one-half hours to treat acute ischemic stroke. The advisory updated the previous guidelines of three hours mainly on the basis of findings from the European Cooperative Acute Stroke Study 3 (ECASS 3) which showed a benefit from thrombolytic therapy in patients treated between three and four and one-half hours after symptom onset. Therefore, it is not only vital that patients or witnesses identify the symptoms of stroke promptly, but they must quickly arrive at a facility capable of providing the appropriate treatment. To truly understand this barrier, one must consider the issue of access to care as it relates to geographical constraints across North Carolina. Recent research has revealed that only 83 counties out of the state's 100 have a hospital that provides general acute care (Goldstein, 2010). Looking more specifically at access to stroke specialists in North Carolina, only 54% of the population has access to an acute care hospital with a neurologist on staff 24/7 (Goldstein, 2010). Access to specialists is an important factor in obtaining the best treatment for stroke patients. Also, research has shown that even patients who have not been administered thrombolytics have better outcomes if a neurologist is involved in their treatment (Schwamm, 2009a). Thus, increasing the number of patients who receive early treatment by neurologists is a key to realizing the best patient outcomes.

As new reforms in health care are enacted, there is increased interest in improving the quality of care provided to patients. Additionally, improvements in technology have made telemedicine a viable option for increasing access for patients. Therefore, it is not surprising that telestroke would be a recommended model for improving stroke care in North Carolina, given the aforementioned difficulties experienced in the treatment of acute stroke patients.

**Telemedicine** is "the use of telecommunications technologies to provide medical information and services" (Perednia, 1995). The more specific term regarding such technologies for treating acute stroke is **"telestroke". Telestroke,** for the purposes of this report, is defined as: "the process by which electronic, visual, and audio communications (including the telephone) are

used to provide diagnostic and consultation support to practitioners at distant sites, assist in or directly deliver medical care to patients at distant sites, and enhance the skills and knowledge of distant medical care providers" (Deshpande, 2008).

Several large scientific reviews supporting the use of telestroke services to enhance the quality of acute stroke care have been published, and their main findings are summarized in the following text. The American Stroke Association published *A Review of the Evidence for the Use of Telemedicine Within Stroke Systems of Care* in 2009 (Schwamm, 2009a). This comprehensive review details the high level of evidence that supports the use of telemedicine in the setting of acute stroke. In this review, the team of investigators provided recommendations based upon the quality of the scientific studies. The highest level recommendations (Class 1) are listed below, the other recommendations and details of this review can be found in the original article located in Appendix L. Importantly, their specific evidence-based recommendations refer to high quality video teleconferencing (HQ-VTC) as the preferred modality of patient interaction for performing the NIHSS assessment or providing medical opinions regarding the use of tPA as part of telestroke services.

## A. Class 1 Recommendations Summary

1. **Regarding the quality of performing an appropriate assessment of a stroke patient by telemedicine technologies:**

   Class 1, Level A Recommendation: The NIHSS-telestroke examination, when administered by a stroke specialist using High-Quality Videoconferencing (HQ-VTC)[15] is recommended when a NIHSS-bedside assessment by a stroke specialist is not immediately available for patients in the acute stroke setting. This assessment is comparable to a NIHSS-bedside assessment.

2. **Regarding the use of telemedicine to consult on the administration of tPA:**

   Class 1, Level B Recommendation: It is recommended that a stroke specialist using the HQ-VTC provide a medical option in favor of or against the use of intravenous tPA in patients with suspected acute ischemic stroke when on site stroke expertise is not immediately available.

3. **Regarding the use of teleradiology systems to make CT Scan images available for review by consultants involved in caring for the acute stroke patient:**

   Class 1, Level A Recommendation: 1) Teleradiology systems approved by the FDA (or equivalent organization) are recommended for timely review of brain CT scans in patients with suspected acute stroke; and 2) Review of brain CT scans by stroke

[15] HQ-VTC is characterized by the use of dedicated, high-quality, interactive, bidirectional audiovisual systems, coupled with the use of teleradiology for remote review of brain images.

specialists or radiologists using teleradiology systems approved by the FDA (or equivalent) is useful for identifying exclusions for thrombolytic therapy in acute stroke patients.

Class 1 Level B Recommendation: When implemented within a telestroke network, teleradiology systems approved by the FDA (or equivalent) can be effective in supporting rapid imaging interpretation in time for thrombolysis decision making.

Other published work which supports the use of telemedicine systems for acute stroke include the *Guidelines for the Early Management of Adults with Ischemic Stroke* and the *Recommendations for the Establishment of Stroke Systems of Care* which, collectively, call for the use and implementation of telestroke systems to expand access to stroke expertise in resource-limited geographic areas (Schwamm, 2005; Adams, 2007). The scientific evidence supporting these guidelines and ideal care models are well detailed in the American Heart Association's Policy Statement titled "*Recommendations for the Implementation of Telemedicine within Stroke Systems of Care"* (Schwamm, 2009b). This document provides the evidence supporting that: 1) The number of acute stroke patients who received tPA has significantly increased due to the existence of telestroke systems; 2) Performing stroke severity scales via videoconferencing is both reliable and feasible; 3) Remote supervision of tPA administration is reliable and feasible; and 4) Functional outcomes and mortality measures among those treated with the assistance of remote consultations are equivalent to those among patients treated with on-site consultants (Schwamm, 2009b). In addition, telestroke systems have been shown in a randomized controlled trial to enhance the accuracy of decision making regarding tPA administration compared to traditional phone only communications systems (Meyer, 2008).

The supportive evidence and the likely continued improvements in existing technologies have the potential to increase the availability of the stroke care experts needed to guide the safe initiation of thrombolytic therapy as well as other existing and forthcoming therapies for acute stroke patients. Policy makers, members of the health care work force, and patient advocacy groups should support strategies to develop IT infrastructure and reimbursement for these necessary systems of care.

Although more widely deployed in other parts of the country, telestroke services for acute stroke in North Carolina are currently limited to two networks, a hospital unaffiliated with either established network which is utilizing third party telestroke services as part of their acute stroke care, as well as another health system engaging in a single site telestroke pilot project (Appendix M, NC Telestroke Networks). Wake Forest University Baptist Medical Center (WFUBMC) and Forsyth Medical Center (FMC), both in Winston-Salem, NC, created telestroke networks in November 2009. WFUBMC currently has six affiliated network hospitals, and FMC has three. These telestroke networks use different technologies and approaches to provide 24/7 telestroke services. The main difference between their approaches is that WFUBMC utilizes a robotic technology (In Touch, Santa Barbara, CA) to accomplish the HQ-VTC link and uses Vascular Neurologists on the faculty at Wake Forest University Health System (WFUHS) to perform the

consultations. FMC utilizes a cart-based HQ-VTC system (Specialists On Call (SOC), Westlake Village, CA), and consultations are out-sourced to neurologists provided by their vendor (SOC).

Besides the two telestroke networks, Carolina East Hospital in New Bern, NC utilizes equipment and consultative services offered by Specialists on Call to obtain telestroke consultations. There is also a single site pilot project underway between Carolinas Medical Center (CMC) and one of their affiliated hospitals, Cleveland Regional Medical Center, in Shelby, NC. A staff neurologist will be providing the hospital with telestroke consultations using a cart-based HQ-VTC system weekdays from 8:00 AM to 5:00 PM. Many other hospitals and health systems have indicated plans to develop telestroke networks or to access such services, and there are indications that there may be six to eight telestroke networks deployed across North Carolina within one to two years.

There are many options for accessing and implementing telestroke services in North Carolina. As above, the use of HQ-VTC is considered the standard for acute stroke services. Many commercial vendors provide such equipment, including In Touch, Specialists on Call, and Reach, among others. It is also possible to develop "home-grown" systems. There are a variety of choices or options to be considered when creating a telestroke network, or seeking telestroke services, such as whether the consultative service will be provided by local/in-house physicians, outsourced to a third party, or a combination of the two, as well as the credentials of the consultant (Vascular Neurology vs. General Neurology).

Telestroke is a market-driven service in North Carolina which has influenced the current deployment as well as financial considerations related to this service. As a result, the costs to hospitals for telestroke services depend on many factors and range from virtually no cost to a monthly or annual fee paid to a hub hospital or to a third party provider.

Telestroke consultations are currently included with other telemedicine services in regard to reimbursement by Centers for Medicare and Medicaid Services (CMS). Telestroke consultations are reimbursable by CMS if, as for other telemedicine services, it is provided in a rural county as defined by the US Office of Management and Budget. Those counties considered as metropolitan are not eligible for reimbursement of telemedicine, and thus telestroke, services. This dichotomy serves to greatly limit the geographical areas where telestroke is a reimbursable service in North Carolina.

Outside of telestroke for acute stroke care, there are several projects across North Carolina that address other areas of the stroke systems of care. These primarily focus on the rehabilitation and recovery of stroke patients. First, in 2009, the University of North Carolina at Chapel Hill (UNC) partnered with Southeastern Regional Medical Center and Native Angels Home Care and Hospice to form the Stroke Telemedicine Access Recovery (STAR) Project, a three-year research project in Robeson County which is providing treatment for stroke patients in post-stroke rehabilitation. Additionally, the University of North Carolina at Greensboro (UNC-G) has developed a telerehabilitation program for speech-language patients including stroke survivors. Telemedicine is also being used elsewhere to provide outpatient care and consultations, which could also have great value in the prevention and management of stroke.

Many states have developed telemedicine systems. These include, but are not limited to, Georgia, Maine, Massachusetts, New York, and Virginia. Some of the most recent legislation is from Virginia. Their state legislature passed Va. Code §38.2-3418.16 April 7, 2010. This legislation focused on reimbursement as a means of improving the use of telemedicine (Appendix N, Virginia Acts of Assembly – 2010 Session); however, Virginia evaluated the effects of this mandate prior to its passage and determined that it was supported widely, would not significantly affect premiums, and would serve to remove one of the larger barriers to using telemedicine (Joint Legislative Audit and Review Commission of the Virginia General Assembly [JLARC], 2009) (Appendix O). In addition, Maryland created a task force in order to establish a statewide telemedicine system this year. Thus, many states have either enacted legislation for telemedicine or are in the initial stages of this process.

Each state has employed a variety of means to achieving a statewide telemedicine system. Issues that have to be addressed include the administrative structure, the technological infrastructure, reimbursement, and legal and regulatory barriers. It has been common for legislative and regulatory changes to be necessary. Furthermore, the degree of involvement of the state government has varied from essentially no involvement, to public-private partnerships, to more significant administration and oversight.

Telestroke services offer a viable mechanism to help alleviate gaps in access to 24/7 stroke expertise in hospitals across North Carolina, especially in the context of the evaluation and treatment of acute strokes. Telestroke consultative services alone should not be considered adequate for a hospital to be able to provide acute stroke care. There are many other elements required for a hospital to be capable of providing effective acute stroke treatment such as infrastructure, personnel, protocols, and services. Additionally, hospitals that provide telestroke consultative services for acute stroke should be certified by the Joint Commission as a Primary Stroke Center or another equivalent designation.

## B. Recommendations

1. **Advocate for more uniform geographic coverage of telemedicine reimbursement from CMS irrespective of the designation as metropolitan or rural site of service.**

   Utilize expertise on the Stroke Advisory Council (SAC) to identify current and potential partners who can assist with locating resources and leveraging support for national organizations such as the American Telemedicine Association (ATA) in endeavors to change the current reimbursement system of CMS. Refer to Appendix P for copies of six briefs sent by the ATA to the current administration.

2. **Execute a public policy initiative to pass a North Carolina telemedicine reimbursement bill that precludes all third-party payers from denying**

**reimbursement to hospitals and physicians if they provide telemedicine services by remote presence using HQ-VTC technologies.**

Identify existing partners such as the American Heart Association/American Stroke Association, the NC Medical Society, and the NC Hospital Association in order to begin drafting policy. Additionally, other partnerships should be explored such as collaboration on regulations or legislation with the NC Department of Insurance.

3. **Promote telestroke as a model to improve access to stroke expertise and acute treatment in North Carolina.**

   Engage various stakeholders such as the NC Hospital Association, the Office of Emergency Medical Services (OEMS), and the North Carolina Healthcare Information and Communications Alliance (NCHICA) to encourage hospitals with limited capacity for acute stroke care to adopt a telestroke mechanism. The system adopted by these facilities should be built on best practices using guidelines from the American Academy of Neurology and the American Stroke Association. Additionally, it should foster quality improvement, thus ensuring hospital awareness of essential stroke quality improvement programs such as the NCSCC or AHA's Get With The Guidelines – Stroke. Finally, in promoting this effort, opportunities for funding and demonstration projects for hospitals should be explored.

4. **Promote the practical use of telestroke across the overall continuum of the stroke system of care in North Carolina, from the acute event through rehabilitation.**

   While there is currently limited use of telestroke services outside of the acute care setting in NC, it is recommended that partnerships be developed to foster increased usage. This includes identifying current capabilities of facilities across the state. Ultimately, it would also require more infrastructure and interoperability of systems; however, there are many partners who could expand these endeavors. These include, but are not limited to, the North Carolina Health Information Exchange (NCHIE) Board and NCHICA. The Department of Health and Human Services can be engaged to assist with educating potential users and may provide avenues for evaluation of the stroke care system. Finally, it is anticipated that the SAC, including all subcommittees, will regularly communicate regarding opportunities to promote telemedicine and to increase the capacity of the Telestroke Work Group.

## REFERENCES

Adams, H.P., del Zoppo, G., Alberts, M.J. et. al. Guidelines for the early management of adults with ischemic stroke: a guideline from the American Heart Association/American Stroke Association Stroke Council, Clinical Cardiology Council, Cardiovascular Radiology and Intervention Council, and the Atherosclerotic Peripheral Vascular Disease and Quality of Care

Outcomes in Research Interdisciplinary Working Groups: The American Academy of Neurology affirms the value of this guideline as an educational tool for neurologists. Circulation. 2007;115:e478-534.

Deshpande, A., Khoja, S., McKibbon, A., et. al. Telehealth for acute stroke management (Telestroke): Systematic review of analytic studies and environmental scan of relevant initiatives. Ottawa: Canadian Agency for Drugs and Technologies in Health (CADTH); 2008.

Goldstein, L.B. Statewide Hospital-Based Stroke Services in North Carolina Changes Over 10 Years. Stroke. 2010; 41: 778-783.

Huston, S.L. *Burden of Cardiovascular Disease in North Carolina – July, 2010*. Raleigh, NC: NC Department of Health and Human Services; 2010. Available at: www.startwithyourheart.com/Default.aspx?pn=CVDBurden.

Meyer, B.C., Raman, R., Hemmen, T. et. al. Efficacy of site-independent telemedicine in the STRokE DOC trial: a randomized blinded, prospective study. Lancet Neurology. 2008; 7:8787-795.

Perendnia, D.A., Allen, A. Telemedicine technology and clinical applications. JAMA. 1995; 273: 483-488).

Schwamm, L.H., Pancioli, A., Acker, J.E. 3rd, Goldstein, L.B., Zorowitz, R.D., Shephard, T.J., Moyer, P., Gorman, M., Johnston, S.C., Duncan, P.W., Gorelick, P., Frank, J., Stranne, S.K., Smith, R., Federspiel, W., Horton, K.B., Magnis, E., Adams, R.J. Recommendations for the establishment of stroke systems of care: recommendations from the American Stroke Association's Task Force on the Development of Stroke Systems. Stroke. 2005;36:690 –703.

Schwamm, L., Holloway, R., Amarenco, P. et. al. A Review of the Evidence for the Use of Telemedicine Within Stroke Systems of Care: A Scientific Statement From the American Heart Association/American Stroke Association. Stroke. 2009a; 40: 2616-2634.

Schwamm, L., Audebert, H., Amarenco, P. et. al. Recommendations for the Implementation of Telemedicine Within Stroke Systems of Care: A Policy Statement From the American Heart Association. Stroke. 2009b; 40: 2635-2660.

The National Institute of Neurological Disorders and Stroke t-PA Stroke Study Group. "Tissue Plasminogen Activator for Acute Ischemic Stroke." The New England Journal of Medicine, Vol. 333, No. 24, pp. 1581-1587.

Virginia. General Assembly. Joint Legislative Audit Review Commission [JLARC]. (2009). *Evaluation of Proposed Mandated Health Insurance Benefits. Evaluation of House Bill 2191 and Senate Bill 1458: Mandated Coverage of Telehealth Services*; June 2009 report. Retrieved November 18, 2010 from the Joint Legislative Audit Review Commission Website: http://jlarc.virginia.gov/reports/Rpt385.pdf.

## APPENDICES

The American Stroke Association, *A Review of the Evidence for the Use of Telemedicine Within Stroke Systems of Care*

NC Telestroke Networks

Virginia Acts of Assembly – 2010 Session

Joint Legislative Audit and Review Commission of the Virginia General Assembly (JLARC), 2009

Joint Legislative Audit and Review Commission, Copies of Six Briefs Sent By the American Telemedicine Association (ATA) to the Current Administration

# Appendix A

# Stroke Advisory Council / Association of State and Territorial Health Officials

**Stroke Advisory Council / Association of State and Territorial Health Officials (ASTHO)**
**Stroke System of Care Plan**

# Planning Participants

1. Andrew W. Asimos, MD, FACEP
2. Jonathan Bailey, MHA
3. Paige Bennett, MPH
4. Janet Prvu Bettger, ScD, FAHA
5. Sharon Biby, MSN, ANP, GNP
6. Eileen Blaha, RN, BSN
7. Jane H. Brice, MD, MPH
8. Michael Campbell, MS, CCC-SLP
9. David M. Cline, MD, FACEP
10. Stacey Coffey, RN, BSN
11. Sylvia Coleman, RN, BSN, MPH, CLNC
12. John Costopoulos
13. Ronald Cromartie, FAHA
14. Carolyn Crook, MS
15. Beth Diaz, RN
16. Martha Dixon, MS, CCC-SLP
17. Pamela Duncan, PhD, PT, FAPTA, FAHA
18. Mary Edwards
19. Kimberly Elks, RN, BSN, CCM
20. Donald E. Ensley, MA, MPH, PhD
21. Carolyn Ezzell, BSN, RN-BC
22. Brooke Findley, MS, RD
23. India Foy, MPH
24. Susan Freeman, MSN, FNP-BC
25. Tiana Garrett, PhD, MPH
26. Larry B. Goldstein, MD, FAAN, FAHA
27. Carmelo Graffagnino, MD, FRCPC
28. Jacqueline R. Halladay, MD, MPH
29. Lisa Harrison, MPH
30. Valorie Holwerda, RN, MSN
31. David Y. Huang, MD, PhD
32. Rebecca Janssen
33. Rayetta Johnson, RN, MSN
34. Robin Jones, BSN, CNRN
35. Anna Kucharska-Newton, PhD, MPH
36. Kimberly H. Leathers, JD
37. Melvin Lewis, MPH
38. Sandy Maney, MSN, BSN, RN
39. Jim Martin, MS
40. Joy Martin, RN
41. Karen McCall
42. Pat McCormick
43. Greg D. Mears, MD, FACEP
44. Joan Mesler, RN, CNRN
45. Thea Monet
46. Jeremy Moseley, MPH
47. Carol Murphy, RN, MPH
48. Brent Myers, MD, MPH, FACEP
49. Vu Q. C. Nguyen, MD
50. Oby Nwankwo
51. Peg O'Connell, JD
52. Beth Osborne, RN-BC
53. Jan Parham, RN
54. Beth Parks
55. Nadine Pfeiffer, RN, BSN
56. Elizabeth Puckett, PT
57. Gale Reavis, RN
58. Sharon Rhyne, MHA, MBA, CHE
59. John Roberts, MHA
60. Wayne Rosamond, PhD, MS, FAHA
61. Wayne Royal
62. Susan Sain, RN, BSN
63. Judy Schanel, FACHE, MSN
64. Nandini Sen, PhD
65. Ross Simpson, Jr., MD, PhD
66. Dick Stevenson, M.Ed., LNHA
67. Charles H. Tegeler, IV, MD
68. Paige Waldrop, MSPH
69. Mary Jo Weavil, RN, BSN, MHA
70. Marie Welch, RN, MSN, CRRN
71. Alexander White, JD, MPH
72. Evelyn White
73. Melissa Wisneski, MS, CC-SLP
74. Marti Wolf, RN, MPH
75. Matt Womble, MHA, EMT-P
76. Betsy Vetter

**Stroke Advisory Council / Association of State and Territorial Health Officials (ASTHO)**
**Stroke System of Care Plan**

# Prevention/Public Awareness Workgroup


**Donald E. Ensley, MA, MPH, PhD, Co-chair**
Former Chair and Associate Professor, Department of Community Health,
College of Allied Health Sciences, East Carolina University
Vice-Chair, Justus-Warren Heart Disease and Stroke Prevention Task Force

**Betsy Vetter**, **Co-chair**
NC Government Relations Director, Prevention Issues
Mid-Atlantic Affiliate
American Heart Association

Eileen Blaha, RN, BSN
Stroke Coordinator
Rex Hospital – UNC Health Care

Brooke Findley, MS, RD
Healthy Weight Communications Specialist
Physical Activity and Nutrition Branch
NC Division of Public Health

Lisa Harrison, MPH
Director, Office of Healthy Carolinians and
Health Education
NC Division of Public Health

Kimberly H. Leathers, JD
Public Health Program Consultant
Office of Minority Health
NC Division of Public Health

Melvin Lewis, MPH
BI – Program Coordinator
Heart Disease & Stroke Prevention Branch
NC Division of Public Health

Jim Martin, MS
Director of Policy and Programs
Tobacco Prevention and Control Branch
North Carolina Division of Public Health

Joy Martin, RN
Clinical Director, Neuro Nursing
FirstHealth of the Carolinas

Thea Monet
Executive Director
Old North State Medical Society

Peg O'Connell, JD
AHA Volunteer

Beth Parks
Executive Director
North Carolina Stroke Association

Susan Sain, RN, BSN
Stroke Coordinator
Catawba Valley Medical Center

Nandini Sen, PhD
Consultant, ASTHO SSoC Plan
NC Heart Disease & Stroke Prevention Branch
Prevention Workgroup Resource Person

Paige Waldrop, MSPH
Regional Coordinator
NC Heart Disease & Stroke Prevention Branch
Cabarrus Health Alliance

Alexander White, JD, MPH
Policy and Intervention Specialist
Heart Disease & Stroke Prevention Branch
NC Division of Public Health
Prevention Workgroup Staff

Evelyn White
Lake Norman Regional Hospital

Marti Wolf, RN, MPH
Clinical Programs Director
NC Community Health Center Association

**Stroke Advisory Council / Association of State and Territorial Health Officials (ASTHO)**
**Stroke System of Care Plan**
# Pre-Hospital Workgroup


**Jane H. Brice, MD, MPH, Co-chair**
Associate Professor of Emergency Medicine
Medical Student Research Director
Chair, UNC Hospital Disaster Committee
Director, EMS Fellowship
University of North Carolina-Chapel Hill
Orange County EMS Director

**Greg D. Mears, MD, FACEP, Co-chair**
Associate Professor of Emergency Medicine
Director, EMS Performance Improvement Center
University of North Carolina-Chapel Hill
Medical Director, NC Office of EMS

Sylvia Coleman, RN, BSN, MPH, CLNC
Acting Manager, NC Stroke Care Collaborative
Manager, ASTHO SSoC Plan
Pre-Hospital Workgroup Resource Person

Beth Diaz, RN
Rural Trauma Specialist
NC Office of Emergency Medical Services

India Foy, MPH
Regional Coordinator
NC Heart Disease & Stroke Prevention Branch
Northeastern NC Partnership for Public Health
Pre-Hospital Workgroup Staff

Valorie Holwerda, RN, MSN
Patient Education Resource Coordinator
Nash Health Care

Sandy Maney, MSN, BSN, RN
Senior Clinical Specialist
Genentech

Brent Myers, MD, MPH, FACEP
Medical Director
Wake County EMS

Nadine Pfeiffer, RN, BSN
Assistant Chief, Health Systems
Office of Emergency Medical Services

Melissa Wisneski, MS, CC-SLP
Director of Speech and Audiology
Cape Fear Valley

Matt Womble, MHA, EMT-P
Program Manager, Rural Hospital Assistance
NC Office of Rural Health & Community Care

**Stroke Advisory Council / Association of State and Territorial Health Officials (ASTHO)**
**Stroke System of Care Plan**
## Acute/Sub-Acute Workgroup


**David Y. Huang, MD, PhD, Co-chair**
Associate Professor, Department of Neurology
Chief, Division of Stroke and Vascular Neurology
Director, UNC Hospitals Stroke Center
Program Director, UNC Adult Neurology Residency

**Karen McCall, Co-chair**
VP, Public Affairs & Marketing
UNC Hospitals
Chair, NC Stroke Advisory Council

Andrew W. Asimos, MD, FACEP
Director of Emergency Stroke Care
Carolinas Medical Center

Ronald Cromartie, FAHA
Senior Consultant, Quality Improvement
Mid-Atlantic Affiliate
American Heart Association

Kimberly Elks, RN, BSN, CCM
Stroke Program Coordinator
WakeMed Health & Hospitals

Carolyn Ezzell, BSN, RN-BC
Education Coordinator
Duplin General Hospital

Larry B. Goldstein, MD, FAAN, FAHA
Professor of Medicine (Neurology)
Director, Duke Stroke Center
Duke University Medical Center

Pat McCormick
Clinical Specialist
Genentech USA

Alexander White, JD, MPH
Policy and Intervention Specialist
Heart Disease & Stroke Prevention Branch
NC Division of Public Health
Acute/Sub-Acute Workgroup Staff

**Stroke Advisory Council / Association of State and Territorial Health Officials (ASTHO)**
**Stroke System of Care Plan**
# Telemedicine Workgroup


**Charles H. Tegeler, IV, MD, Chair**
McKinney-Avant Professor of Neurology
Director, Telestroke Services
Director, Ward A. Riley Ultrasound Center
Medical Director, Neuroultrasound Lab
Wake Forest University Baptist Medical Center

Jonathan Bailey, MHA
VP of Orthopedics, Neurosciences and Trauma Services
Mission Hospitals

Paige Bennett, MPH
Quality Improvement Specialist
NC Stroke Care Collaborative
Heart Disease & Stroke Prevention Branch
NC Division of Public Health
Telemedicine Workgroup Staff

Sharon Biby, MSN, ANP, GNP
Director, Stroke Center
Moses Cone Health System

David M. Cline, MD, FACEP
Professor, Emergency Medicine
Hypertension and Vascular Research Center
Wake Forest University Baptist Medical Center

John Costopoulos
NC Government Relations Director,
Systems Issues
Mid-Atlantic Affiliate
American Heart Association

Gale Reavis, RN
Stroke Coordinator
Forsyth Medical Center

Jacqueline R. Halladay, MD, MPH
Assistant Professor, Department of Family Medicine
Consultant, Heart Disease & Stroke Prevention Branch
NC Division of Public Health

Jan Parham, RN
Clinical Nurse Educator
Maria Parham Medical Center

Jeremy Moseley, MPH
Technical Writer, ASTHO SSoC Plan
Heart Disease & Stroke Prevention Branch
NC Division of Public Health

Mary Jo Weavil, RN, BSN, MHA
Director, Neurosciences
Forsyth Medical Center

Rayetta Johnson, RN, MSN
Neuroscience Outreach Coordinator
Wake Forest University Baptist Medical Center

Rebecca Janssen
Asst. VP of Patient Care Services
Maria Parham Medical Center

Susan Freeman, MSN, FNP-BC
Program Manager, Neurosciences
Pitt County Memorial Hospital

**Stroke Advisory Council / Association of State and Territorial Health Officials (ASTHO)**
**Stroke System of Care Plan**
# Recovery/Transitions of Care Workgroup


**Martha Dixon, MS, CCC-SLP, Co-chair**
VP, Rehabilitation & Behavioral Health Services
Pitt County Memorial Hospital, NC Hospital Association

**Pamela Duncan**, **PhD, PT, FAPTA, FAHA, Co-chair**
Professor and Bette Busch Maniscalco Research Fellow**,** Doctor of Physical Therapy Division,
Department of Community and Family Medicine, Duke University
Senior Fellow, Duke Center for Aging


**Extending Registries/QI into Post-hospital Sub-group**

Janet Prvu Bettger, ScD, FAHA
Assistant Professor
Duke University School of Nursing

Stacey Coffey, RN, BSN
Neuroscience Program Coordinator
Frye Regional Medical Center

**Martha Dixon, MS, CCC-SLP
VP, Rehabilitation & Behavioral Health Services
Pitt County Memorial Hospital

**Pamela Duncan, PhD, PT, FAPTA, FAHA
Professor
Doctor of Physical Therapy Division
Duke University
Senior Fellow
Duke Center for Aging

Tiana Garrett, PhD, MPH
Postdoctoral Fellow
UNC-Chapel Hill

Anna Kucharska-Newton, PhD, MPH
Postdoctoral Fellow
UNC- Chapel Hill

Carol Murphy, RN, MPH
Research Instructor
UNC-Chapel Hill
Project Manager, NC Stroke Care Collaborative

*Elizabeth Puckett, PT
Consultant
ASTHO SSoC Plan
Consultant
Heart Disease & Stroke Prevention Branch
NC Division of Public Health

Sharon Rhyne, MHA, MBA, CHE
Programs Manager
Chronic Disease and Injury Section
NC Division of Public Health

Wayne Rosamond, PhD, MS, FAHA
Professor
UNC-Chapel Hill
Principal Investigator, NC Stroke Care Collaborative

**Managing Transitions in Care Sub-group**

Mary Edwards
Consumer Affairs Program Manager
NC Division of Aging and Adult Services

Michael Campbell, MS, CCC-SLP
Director
Speech and Hearing Program
UNC-Greensboro

Carmelo Graffagnino, MD, FRCPC
Associate Professor of Medicine/Neurology
Director
Neurosciences Critical Care Unit
Duke University

Joan Mesler, RN, CNRN
Stroke Program Coordinator
Carolinas Medical Center-Northeast

*Jeremy Moseley, MPH
Technical Writer
ASTHO SSoC Plan
Heart Disease & Stroke Prevention Branch
NC Division of Public Health
Recovery/Transitions of Care Workgroup
Staff

Vu Q. C. Nguyen, MD
Residency Program Director
Department of PM&R
Carolinas Medical Center and
Director
Stroke Rehabilitation
Carolinas Rehabilitation

Oby Nwankwo
Chronic Disease Self-Management Project
Coordinator
NC Division of Aging and Adult Services

Wayne Royal
Ferrer Therapeutics

Marie Welch, RN, MSN, CRRN
Clinical Nurse Specialist
Stroke Center Coordinator
Pitt County Memorial Hospital Regional
Rehabilitation Center

**Elynor Wilson, MPH
Regional Coordinator – Eastern NC
Heart Disease & Stroke Prevention Branch
NC Division of Public Health
Pitt Co. Health Department

**Reimbursement Sub-group**

*Paige Bennett, MPH
Quality Improvement Specialist
NC Stroke Care Collaborative
Heart Disease & Stroke Prevention Branch
NC Division of Public Health

Carolyn Crook, MS
Regional Coordinator –Western NC
Heart Disease & Stroke Prevention Branch
NC Division of Public Health
MAHEC

**Robin Jones, BSN, CNRN
Stroke Program Coordinator
Mission Hospitals

Beth Osborne, RN-BC
Nurse Consultant
Clinical Policy and Programs
NC Division of Medical Assistance

John Roberts, MHA
Administrator
Carolinas Rehabilitation

Judy Schanel, FACHE, MSN
President
Moses H. Cone Memorial Hospital and
Executive Vice President Moses Cone
Health System

Ross Simpson, Jr., MD, PhD
Professor
Division of Cardiology
UNC-Chapel Hill
Principal Clinical Coordinator
Carolinas Center for Medical Excellence

Dick Stevenson, M.Ed., LNHA
Administrator
The Laurels of GreenTree Ridge

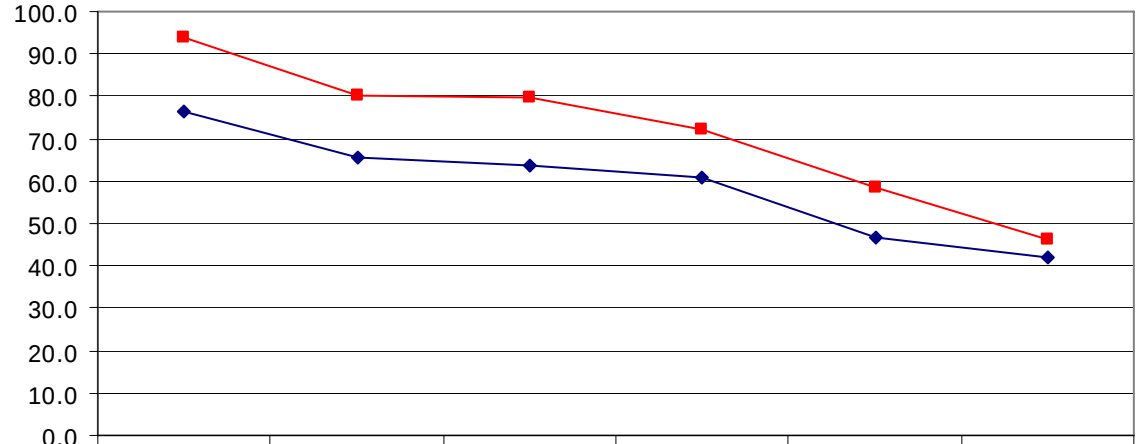
*** denote sub-group leaders*
**denote sub-group staff*

# Appendix B

# Stroke Data Charts

# STROKE

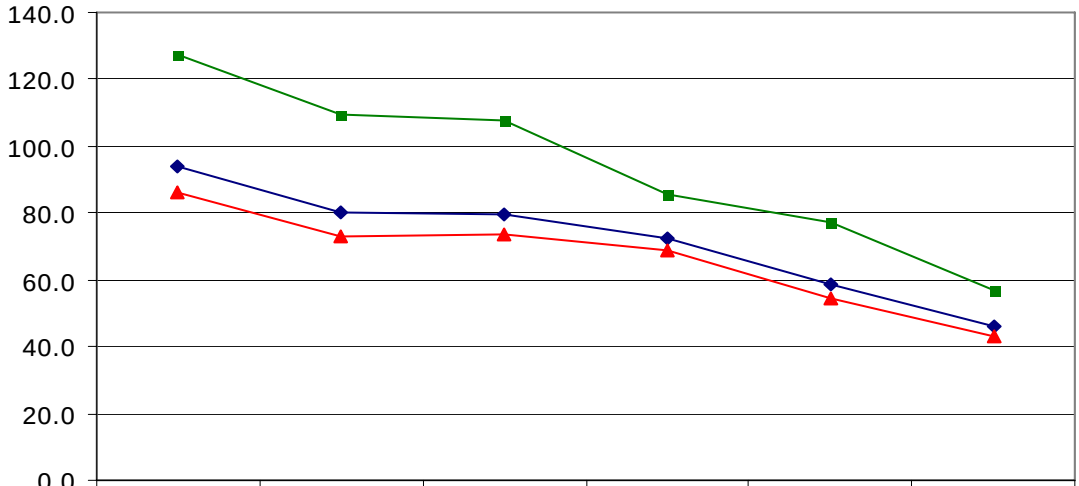
## U.S. & N.C. Age-Adjusted Stroke Mortality Rates (per 100,000 population): 1985-2009




| | 1985 | 1990 | 1995 | 2000 | 2005 | 2009* |
|---|---|---|---|---|---|---|
| U.S. | 76.6 | 65.5 | 63.9 | 60.8 | 46.6 | 42.2 |
| N.C. | 93.7 | 80.0 | 79.8 | 72.1 | 58.7 | 46.1 |

** Note: Latest Year of comparable US data is 2007*

## N.C. Age-Adjusted Stroke Mortality Rates (per 100,000 population) by Race: 1985-2009




| | 1985 | 1990 | 1995 | 2000 | 2005 | 2009 |
|---|---|---|---|---|---|---|
| Total | 93.7 | 80.0 | 79.8 | 72.1 | 58.7 | 46.1 |
| White | 86.0 | 73.1 | 73.7 | 68.8 | 54.2 | 43.2 |
| Minority | 127.3 | 109.7 | 107.4 | 85.5 | 77.3 | 56.7 |

# Appendix C

# Strategies to Address the ABCS

# NATIONAL HEART DISEASE AND STROKE PREVENTION PROGRAM

## Strategies to Address the "ABCS"

## Program Guidance – November 2010

## Introduction

As indicated in the guidance letter dated September 30 2010, FOA 704 continues to provide the purpose and framework for State Heart Disease and Stroke Prevention Programs. **The majority of resources and effort should be used to address the "ABCS" of heart disease and stroke prevention, with the main focus on preventing and controlling high blood pressure and reducing sodium intake.**

**Efforts to address the "ABCS" include:**

**A**spirin: Increase low dose aspirin therapy according to recognized guidelines
**B**lood pressure: Prevent and control high blood pressure; reduce sodium intake
**C**holesterol: Prevent and control high cholesterol
**S**moking Cessation: Increase the number of smokers counseled to quit and referred to quit lines; increase availability of no or low-cost cessations products

The NHDSP Program is anchored on the principles of the Socio-ecological Model, using policies, systems and environmental changes with the potential for broad reach and impact on the general population and Priority Populations (i.e., groups with increased burden or need based on race, ethnicity, gender, geography, or socio-economic status).

This document outlines priority strategies for States to use to address the "ABCS" of heart disease and stroke prevention. It is important for programs to focus their efforts and limited resources on evidence or practice-based strategies that can impact heart disease and stroke and to implement interventions with significant reach and impact.

The priority areas of work are grouped as: aspirin therapy, control of high blood pressure and high blood cholesterol (the healthcare focus is primary care settings), smoking, and sodium. The following are provided for each priority area of work: background and rationale, strategies (by setting where applicable), potential partners and references and resources. The following strategies are not all inclusive but examples of evidence-based strategies. Where possible the strategies have been linked to DHDSP's *Outcome Indicators for Policy and Systems Change: Controlling High Blood Pressure* and *Outcome Indicators for Policy and Systems Change: Controlling High Cholesterol* and recommendations from the Institute of Medicine Report, *Population-Based Approach to Prevent and Control, Hypertension and Strategies to Reduce Sodium in the United States.* Corresponding DHDSP indicators are listed after the strategy in parenthesis.

**Things to consider when choosing a strategy**

- What policy or systems change do we want to make?
- What scientific evidence exists to support this change?
- Who can help us understand the issues? What data are needed?
- Who has the authority to make the policy or systems change? Who can help us reach

those with authority? Who can help carry our message forward?

- How can we address the issue at the highest level possible? Which programs within the State health department can collaborate to carry our message and intervention forward? What existing activities can expand to address our priorities or populations?
- What do our partners need from us to move forward – health data, training, technical assistance?
- What evaluation support will be needed and who will provide it?

**References/Resources**


- State Heart Disease and Stroke Prevention Program Evaluation Guides: Developing and Using a Logic Model, Developing and Using and Evaluation Plan, and Writing SMART Objectives.
- Stoklos D. Translating social ecological theory into guidelines for community health promotion. American Journal of Health Promotion. 1996; 10(4):282-298.

## Aspirin Therapy

Background and Rationale

The United States Preventive Services Task Force (USPSTF) recommends taking aspirin for the prevention of cardiovascular disease and as a component of preventive medical services, within specific age and gender parameters. There are risks for people who take aspirin regularly, so no one should start aspirin therapy without first consulting a physician. Aspirin protocols should support consultation between physician and patient about appropriate use.

Strategies

***Health Care Systems***

- Promote provider adherence to current guidelines regarding the use of aspirin therapy

*Partners*

- State Hospital Association, Primary Care Association, Quality Improvement Organization, State Pharmacy Association, Pharmaceutical Companies, EMS Association, American Heart Association, Chain Drug Store Association

References/Resources

- USPSTF http://www.uspreventiveservicestaskforce.org/uspstf/uspsasmi.htm
- American Heart Association (AHA). Recommendations. http://www.americanheart.org/presenter.jhtml?identifier=4704
- Joint National Committee on Prevention 7 (JNC7). http://www.nhlbi.nih.gov/guidelines/hypertension/jnc7full.htm

## Control of High Blood Pressure and High Blood Cholesterol

Background and Rationale

High blood pressure (HBP) and high blood cholesterol (HC) are leading risk factors for heart disease and stroke. Lower blood pressure is associated with lower risk of heart disease and stroke even at levels below current cut-offs for hypertension and pre-hypertension. Because policy and systems strategies that impact high blood pressure control can also impact high blood cholesterol, these two areas are combined. Note: Sodium is covered in a separate section of this document.

Strategies

***Primary Care Health Systems***

- Promote use of EHR with registry function, decision support and electronic reminders (1.1.3, 1.1.4, 2.1.2, 2.1.4)
- Promote multi-disciplinary health care teams (1.1.1)
- Promote provider adherence to current JNC/ATP and evidence-based hypertension and cholesterol guidelines (e.g., quality improvement performance measurement, medication academic detailing) (1.1.5, 1.2.1, 1.2.2, 1.2.3, 1.2.4, 1.2.5, 1.2.6, 1.2.7, 2.1.4, 2.1.5, 2.2.1, 2.2.3 2.2.4, 2.2.5, 2.2.6)
- Promote systems to support self management (e.g., telephonic follow-up, linkage to home monitoring, community health workers, and self-management programs) (1.1.8, 1.1.9, 2.1.7, 2.2.7, 2.2.8)
- Promote system changes which integrate and sustain use of community health workers and other health care extenders into healthcare settings ( 1.1.2, 1.1.8, 1.1.9, 2.1.3)
- Promote linkage between healthcare systems and community resources (1.4.5, 2.4.4)
- Promote specialized blood pressure and cholesterol clinics (1.1.2, 2.1.3)

*Partners*

- Primary Care Association, Medicare Quality Improvement Organization, Foundations, Insurers, Diabetes Prevention and Control Program, American Heart Association, National Business Coalition Members

***Workplaces***

- Collaborate with other chronic disease programs and business coalitions to promote healthy workplace policies and environments that help prevent and control HBP and HBC. (1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.5, 1.3.6, 2.3.1, 2.3.2, 2.3.3,2.3.4)

*Partners*

- Nutrition, Physical Activity and Obesity Program, Communities Putting Prevention to Work (CPPW), Diabetes Prevention and Control Program, Tobacco Control Program, State and Regional Business Coalition on Health, Chamber of Commerce, Manufacturing Association, Governor's Council on Health

***Payers*** *(e.g., Medicaid, Self-Insured Employers, Third Party)*

- Promote the reduction or elimination of co-pays or deductibles for HBP and cholesterol screening and control, including monitoring medications, counseling, and lifestyle interventions (1.3.1, 2.3.1)
- Promote reimbursement for self management support provided by pharmacists, community health workers, and other health extenders (1.1.8, 1.1.9, 2.1.7)
- Promote payment incentives for quality improvement in hypertension and cholesterol

*Partners*

- Self-Insured Employers (e.g., State government), Third Party Insurers, Medicaid, and other State health department (DOH) programs

***Community***

- Promote use of pharmacists, dentists, case managers, CHWs and other health extenders to improve health outcomes (1.1.1, 1.1.6, 1.1.8, 1.4.2, 1.4.4, 1.4.5, 2.1.7, 2.4.2, 2.4.3, 2.4.4)
- Promote linkage between patients, community resources and healthcare systems (1.4.5, 2.4.4)
- Strengthen collaboration across chronic disease programs (e.g., CPPW) to promote healthy policies/environments, including integration of measures that reduce risks known to contribute to hypertension (1.4.1, .1.4.2, 1.4.4, 1.4.5, 2.4.1, 2.4.2, 2.4.3, 2.4.4)

*Partners*

- Nutrition, Physical Activity and Obesity Program, Tobacco Control Program, Healthy Community Programs, and other chronic disease prevention programs

References/Resources


- Glynn LG, Murphy AW, Smith SM, Schroeder K, Fahey T. Interventions used to improve control of blood pressure in patients with hypertension. Cochrane Database of systematic Reviews 2010, Issue 3. Art. No.: CD005182.
  Full report: http://www2.cochrane.org/reviews/en/ab005182.html
- Institute of Medicine Report. (2009). *A Population-based Approach to Prevent and Control Hypertension.* Washington, DC: National Academy Press.
- CDC. (2008). Draft *Outcome Indicators for Policy and System Change: Controlling High Blood Pressure.*

- *CDC. (2009) Draft Outcome indicators for Policy and System Change: Controlling High Cholesterol.*
- NCQA. (2009). *Supporting Small Practices: Lessons for Health Reform*. Washington DC.
- Purchasers Guide to Clinical Preventive Services. http://www.businessgrouphealth.org/benefitstopics/topics/purchasers/fullguide.pdf
- CDC's Successful Business Strategies to Prevent Heart Disease and Stroke Prevention Toolkit, 2006. http://www.cdc.gov/dhdsp/library/toolkit/pdfs/toolkit.pdf
- Torda P, Hans ES, Schoole, ES. (2010). Easing the Adoption and Use of Electronic Health Records in Small Practices. *Health Affairs*, 29(4), 668-75.
- Brownstein JN, Chowdhury FM, Norris SL, T Horsley, L Jack, X Zang, D Satterfieldl. Effectiveness of community health workers in the care of people with hypertension. *Am J Prev Med.* 2007; 32(5):435–447.
- CDC. (2010). Addressing Chronic Disease through *Community Health Workers: A Policy and Systems-Level Approach.*
- CDC. Community Health Workers Sourcebook; A Training Manual for Preventing Heart Disease and Stoke. http://www.cdc.gov/dhdsp/library/chw_sourcebook/pdfs/sourcebook.pdf
- CDC. ***Manual de Consulta para los Trabajadores de salud Comunitaria: Una herramienta para la prevención de cardiopatías y derrames cerebrales (Sourcebook for Community Health Workers: A Tool for Preventing Heart Disease and Stroke).***

## Sodium

Background and Rationale

High blood pressure (HBP) is a primary risk factor for heart disease and stroke, the first and third leading causes of death in the United States. Nearly one in three U.S. adults has HBP. Excess sodium intake is a primary risk factor for HBP and subsequently, cardiovascular events. In the United States, consumption of sodium far exceeds recommended daily limits. The 2005 *Dietary Guidelines for Americans* recommends consuming less than 2,300 mg of sodium per day for the general population; new guidelines are currently in revision and are expected to be released in early 2011. For specific populations, including people with HBP, which accounts for 70 percent of U.S. adults, intake should be limited to 1,500 mg per day. According to the National Health and Nutrition Examination Survey, average sodium intake for U.S. adults in 2005–2006 was more than 3,400 mg per day. Reducing excess sodium consumption in the population can reduce the rate of hypertension and the burden of cardiovascular disease. Public health action at the Federal, State, and local levels is necessary in order to reduce the amount of sodium in the American diet.

Strategies

***Policy, System and Environmental Change Strategies***

- Convene partners at the State level to promote adoption of procurement policies and practices that limit sodium intake (1.4.1, 1.4.2, 1.4.4)
- Promote availability of lower sodium food options (e.g., increase accessibility and competitive pricing) in worksites and government institutions; promote prominent placement of fresh produce.
- Promote expansion of consumer information labeling initiatives that include sodium (e.g., point of purchase, warning labels, etc.)

***Earned Media***

- Use earned media and other work to inform decision makers and opinion leaders of the need to reduce sodium intake. Earned media should be designed to support an identified policy or system change.

*Partners*

- Key governmental and non-governmental policymakers (legislative and administrative) at State and local levels, business association or corporation leaders (food producers, grocers, restaurants), consumer associations, Department of Health programs (e.g., Obesity or Nutrition Coordinator), nutrition experts, and food vendors.

References/Resources

- Institute of Medicine Report, *Strategies to Reduce Sodium in the United States.* http://www.iom.edu/sodiumstrategies
- DHDSP Salt webpage. http://www.cdc.gov/salt/resources/htm

## Smoking

Background and Rationale

**Cigarette smoking is the leading cause of preventable death in the United States, accounting for approximately 443,000 deaths or 1 of every 5 deaths in the United States each year.** Smoking cigarettes increases the risk of coronary heart disease, increases blood pressure and the tendency for blood to clot, decreases HDL cholesterol, and increases the risk of recurrent coronary heart disease after bypass surgery. Those who smoke are not the only ones at risk. The Institute of Medicine In its 2009 report, *Secondhand Smoke Exposure and Cardiovascular Effects: Making Sense of the Evidence*, concluded that data consistently demonstrates that exposure to secondhand-smoke increases the risk of coronary heart disease and heart attacks.

*Strategies*

***Health Care Systems***

- Promote a comprehensive clinical approach to smoking cessation, that includes screening for tobacco use, cessation counseling, and pharmacotherapy (1.1.4, 1.1.6, 1.1.8, 1.1.9, 1.2.3, 1.2.6)
- Promote referrals to quitlines for comprehensive cessation counseling and other community resources (1.1.4, 1.1.8, 1.1.9)
- Promote the availability of no or low cost cessation medication

Partners

- State Tobacco Control programs, American Cancer Society, American Heart Association, American Lung Association, primary care providers, hospital associations, FQHCs

***Workplaces and Communities***

- Support smoking bans as an effective means of reducing exposure to secondhand smoke (1.3.6, 1.4.1, 1.4.2, 1.4.4)
- Promote referral to quitlines (1.3.3, 1.4.2, 1.4.4)

Partners

- State Tobacco Control programs, American Cancer Society, American Heart Association, American Lung Association and business coalitions

***Payers*** *(e.g., Self-Insured Employers, Third Party, Medicaid)*

- Promote access to cessation products by reducing or eliminating co-pays or deductibles (1.1.8, 1.3.1)
- Promote reimbursement for clinical and community services related to smoking cessation (1.1.8, 1.3.1)

Partners

- State Tobacco Control programs, American Cancer Society, American Heart Association, American Lung Association, public and private insurance corporations

References


- Institute of Medicine Report, Secondhand Smoke Exposure and Cardiovascular Effects: Making Sense of the Evidence.
- Best Practices for Comprehensive Tobacco Control Programs. http://www.cdc.gov/tobacco/tobacco_control_programs/stateandcommunity/best_practices/pdfs/2007/BestPractices_Complete.pdf
- A Practical Guide to Working with Health-Care Systems on Tobacco-Use Treatment. http://www.cdc.gov/tobacco/quit_smoking/cessation/practical_guide/pdfs/practical_guide.pdf
- Sargent, Richard P., Shepard, Robert M., Glantz, Stanton A. Reduced incidence of admissions for myocardial infarction associated with public smoking ban: before and after study. BMJ 2004;328:977-980 (24 April). http://www.bmj.com/cgi/content/full/328/7446/977
- AHA scientific position on Cigarette Smoking and Cardiovascular Disease. http://www.americanheart.org/presenter.jhtml?identifier=4545
- National Cancer Institute. http://www.smokefree.gov/

# Appendix D

# The North Carolina Stroke Association Stroke Risk Identification Program

The NC Stroke Association's mission is to reduce the incidence and impact of stroke in North Carolina through relationships and collaborations to facilitate screening, education, outcome assessments, and advocacy.

The NC Stroke Association's **Stroke Risk Identification Program** screens individuals in community settings in order to identify those who are at high risk of stroke. Through this primary prevention program, health care professionals can review the screening outcomes with participants, counsel them on what interventions are needed to help prevent stroke, and give information on community medical resources for intervention treatment. Those who exhibit the most serious risk factors are sent immediately to their local hospital emergency departments.

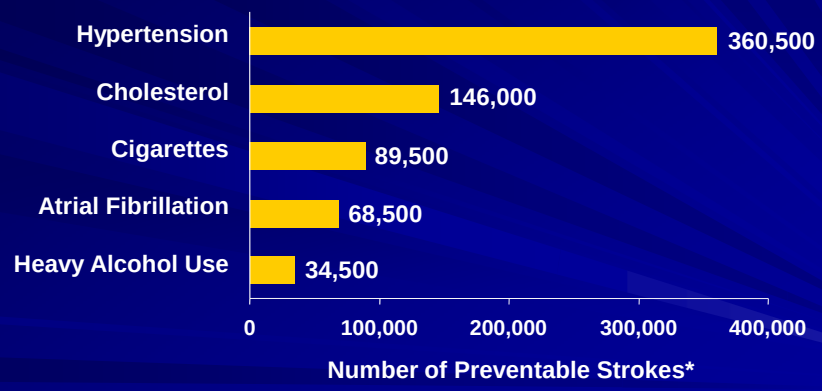
Program development was based on the Atherosclerosis Risk in Communities or ARIC model, and it was developed for the NC Stroke Association by Wake Forest University Baptist Medical Center's Public Health Sciences Department.

It is designed to:

- Provide evidenced-based and standardized screening protocol for community stroke risk screenings
- Identify individuals who are at high risk for stroke
- Review and counsel participants on screening results
- Provide participants with identified community medical resources for intervention treatment
- Provide outcome screening data to hospitals that include high risk participant screening results and contact information for hospitals to follow-up

The NCSA leverages its programs through partnership hospitals. This mechanism allows for hospitals across the state to facilitate community education, and to measure outcomes. In a powerpoint presentation by Dr. Charles Tegeler, risk-factor control is key to reducing stroke's impact, and the NCSA mechanism strives towards that end.

# How Many Strokes in the US Can Be Prevented by Risk-Factor Control?




*Based on estimated 700,000 annual strokes.

Gorelick PB. *Arch Neurol*. 1995;52:347-355.
Gorelick PB. *Stroke*. 2002;33:862-875.

The seamless process of statewide screenings using the partnership model has allowed for a successful outreach. The cost for NCSA materials/outcome data reports is $2.00/screening. In addition, the average cost to the hospital per person screened is $20.00. The cost includes staff and screening materials. The prevention of just two strokes per year enables the program to pay for itself in reduced costs of continuing care.

The NCSA welcomes the opportunity to transport its screening program to other agencies and hospitals that see their investment as a benefit toward reducing stroke's impact in North Carolina.

# Appendix E

# Stroke EMS
# Triage and Destination Plan

# Stroke
## EMS Triage and Destination Plan

### Stroke Patient

* **A patient with symptoms of an acute Stroke as identified by the EMS Stroke Screen**

### Time of Symptom Onset

* **Defined as the last witnessed time the patient was symptom free (i.e. the time of onset for a patient awakening with stroke symptoms would the last time he/she was known to be symptom free before the sleep period)**

### The Purpose of this plan is to:

* Rapidly identify acute Stroke patients who call 911 or present to EMS
* Minimize the time from onset of Stroke symptoms to definitive care
* Quickly diagnose a Stroke using validated EMS Stroke Screen
* Complete a reperfusion checklist (unless being transported directly to a Stroke Capable Hospital) to determine thrombolytic eligibility
* Rapidly identify the best hospital destination based on symptom onset time, reperfusion checklist, and predicted transport time
* Early activation/notification to the hospital prior to patient arrival
* Minimize scene time to 10 minutes or less
* Provide quality EMS service and patient care to the EMS Systems citizens
* Continuously evaluate the EMS System based on North Carolina's Stroke EMS performance measures

Symptoms of Acute Stroke
Positive Stroke Screen

**Stroke Center or Stroke Capable Hospital within 2 hours from onset of patient's symptoms and no greater than 50 minutes EMS transport time?**

Yes → **Transport to closest Primary Stroke Center or Stroke Capable Hospital Listed**
**Early Notification/Activation**

**Insert:**
**Stroke Capable Hospital Name(s) Here**
**or**
**No Stroke Capable Hospitals within 50 minutes**

No ↓

**Reperfusion Checklist**
**Contraindications to Thrombolysis**

Yes → **Air Medical SCTP within 30 minutes of patient's location and patient clearly a NEW onset stroke patient?**

Yes ↓ **Consider Activating Air or Ground SCTP**

**Transport to closest Primary Stroke Center Listed**
**Early Notification/Activation**

**Insert:**
**Primary Stroke Center Name(s) Here**

No ↓

**Transport to closest Community Hospital Listed**

**Insert:**
**Community Hospital Name(s) Here**

**Stroke EMS Triage and Destination Plan**

### Pearls and Definitions

* **All Stroke Patients must be triaged and transported using this plan. This plan is in effect 24/7/365**
* **All Patient Care is based on the EMS Suspected Stroke Protocol**
* **Primary Stroke Center** = a hospital that is currently accredited by the Joint Commission as a Primary Stroke Center. Free standing emergency departments and satellite facilities are not considered part of the Primary Stroke Center.
* **Stroke Capable Hospital** = a hospital which provides emergency care with a commitment to Stroke and the following capabilities:
  * CT availability with in-house technician availability 24/7/365
  * Ability to rapidly evaluate an acute stroke patient to identify patients who would benefit from thrombolytic administration
  * Ability and willingness to administer thrombolytic agents to eligible acute Stroke patients
  * Accepts all patients regardless of bed availability
  * Provides outcome and performance measure feedback to EMS including case review
* **Community Hospital** = a local hospital within the EMS System's service area which provides emergency care but does not meet the criteria for a Primary Stroke Center or Stroke Capable Hospital
* **Specialty Care Transport Program** = an air or ground based specialty care transport program which can assume care of an acute Stroke patient from EMS or a Hospital and transport the patient to a Primary Stroke Center.

## (Insert Name Here) EMS System

2009

**This protocol has been developed by the North Carolina Office of EMS (Final Version 11-1-2009)**

# Appendix F

# North Carolina
# Maps for Telestroke

# North Carolina Maps for Telestroke

# MAPS

**The first map was intended as a reference to show all N.C. counties and their names. The counties highlighted in gray do not have a hospital.**

**Map A: N.C. Counties**

**It is best to interpret the following five maps in a series. One of the goals of the telemedicine group was to identify existing resources. These maps show potential for leveraging some of these resources and their impact on stroke coverage across the state.**

**Map B:** **N.C. Primary Stroke Centers**

**Map C:** **N.C. Counties with Telestroke Networks**

**Map D:** **N.C. Telestroke Systems and Primary Stroke Centers**
**Note: This is a combination of both Map B and Map C. The counties highlighted in yellow on this map are used as layers for Map E and Map F.**

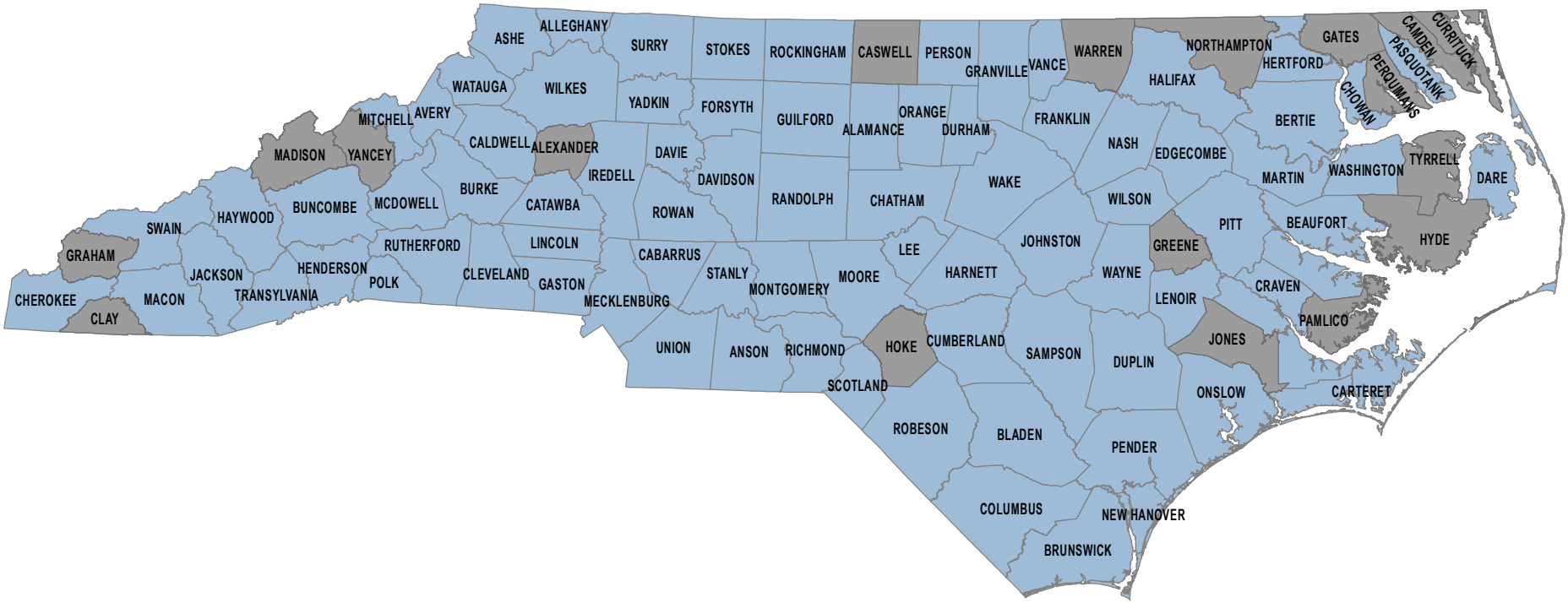
**Map E:** **N.C. Hospitals Participating in an Existing Telemedicine Network with Pitt Memorial Hospital and Twenty-four hour physician coverage for stroke**

**Map F:** **Twenty-four hour physician coverage for stroke with Multi-County Hospital Systems**

**This map was created on data based on Dr. Larry Goldstein's 2009 Stroke Facilities Survey.**

**Map G** **N.C. Counties and Twenty-Four Hour CT Scan Availability**

# North Carolina Counties



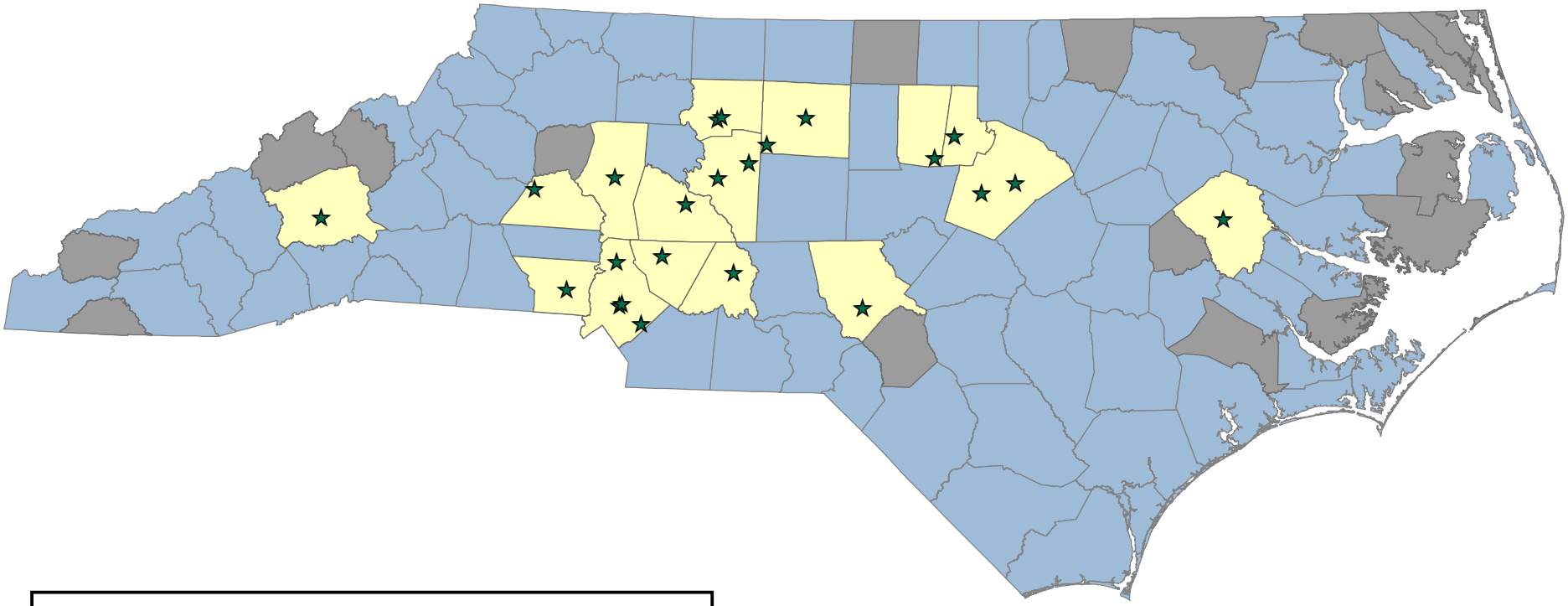

**Legend**

County With No Hospital

Start With Your Heart
North Carolina Heart Disease & Stroke Prevention Program

NCPH
North Carolina Public Health

# North Carolina Primary Stroke Centers



## Legend

- Primary Stroke Centers (23)
- County With No Hospital
- County with Twenty-Four Hour Physician Coverage

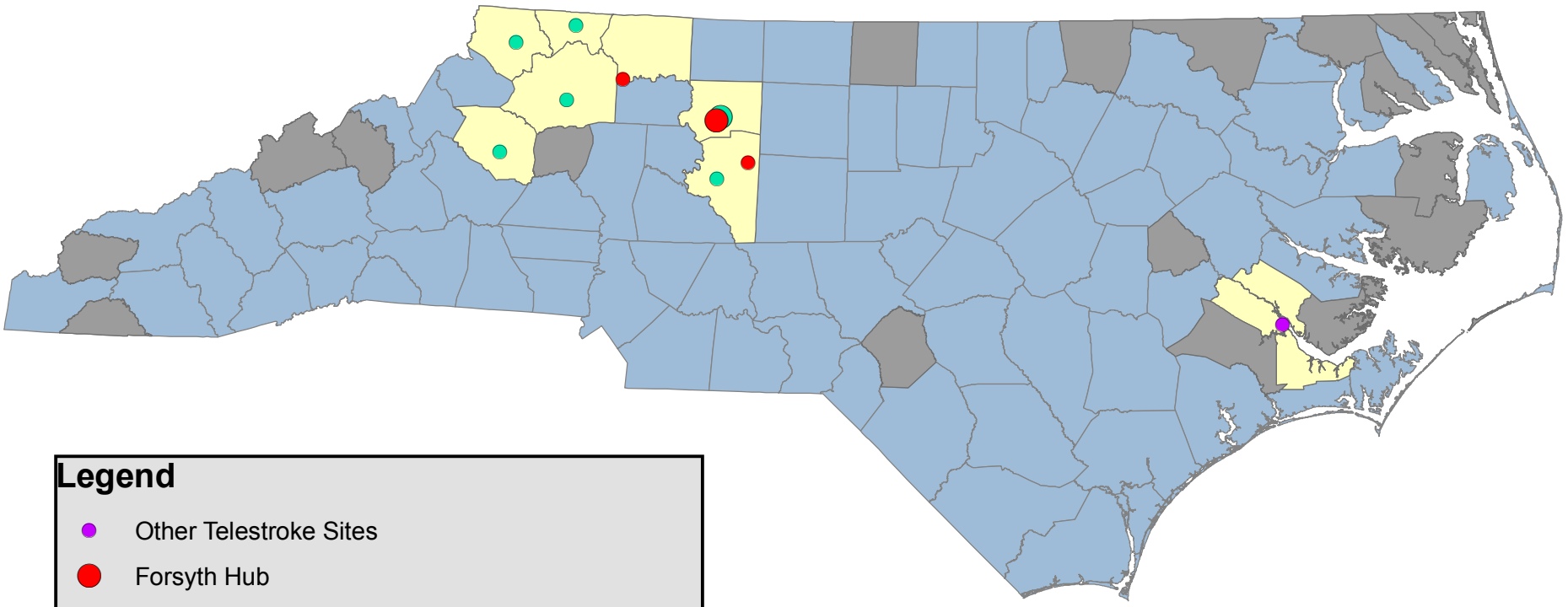
Primary Stroke Center certification was established on September 28, 2010 through the Joint Commissions website: http://www.qualitycheck.org

Location of a facility certified by the Joint Commission as a Primary Stroke Center within a county determined its inclusion as having twenty-four hour neurology coverage.

Start With Your Heart
North Carolina Heart Disease & Stroke Prevention Program

NCPH
North Carolina Public Health

# North Carolina Telestroke Networks



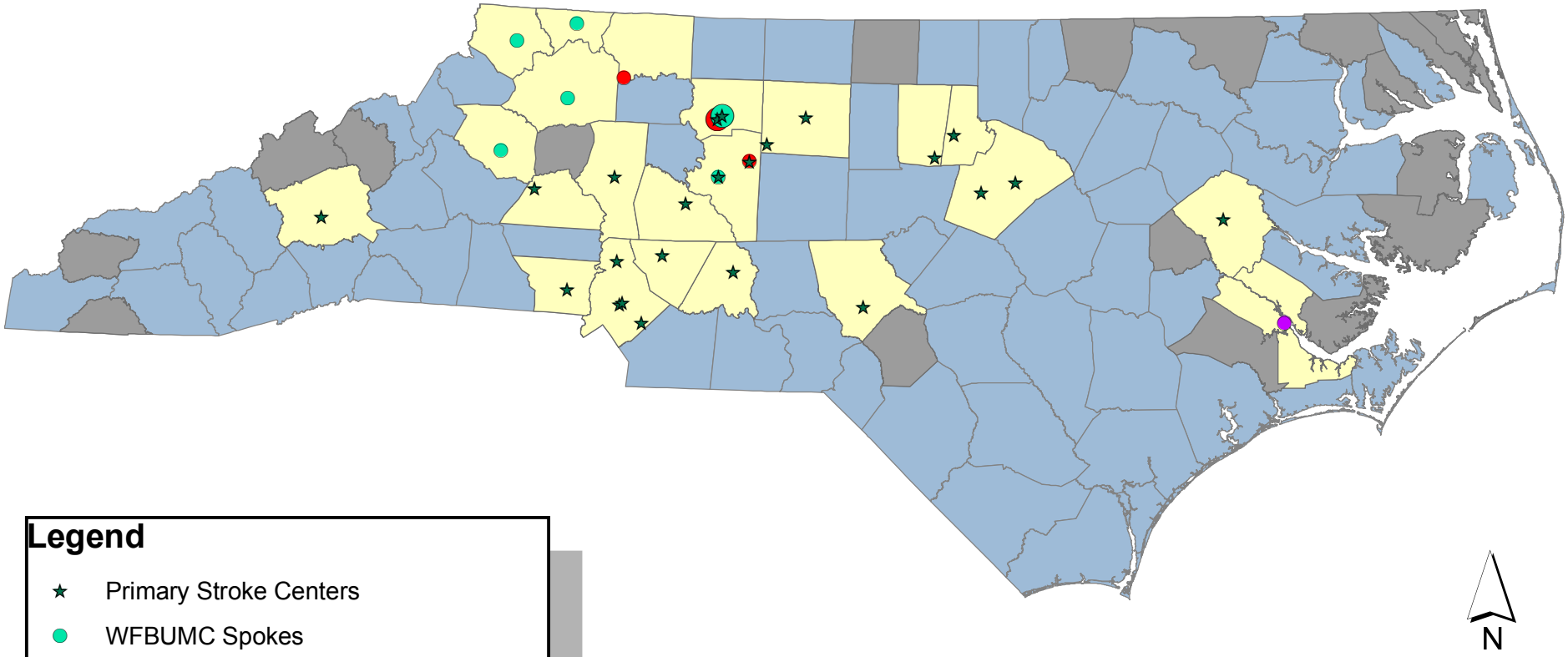
**Legend**

- Other Telestroke Sites
- Forsyth Hub
- Forsyth Spokes
- WFBUMC Hub
- WFBUMC Spokes
- County With No Hospital
- County with Twenty-Four Hour Neurology Coverage

Start With Your Heart
North Carolina Heart Disease & Stroke Prevention Program

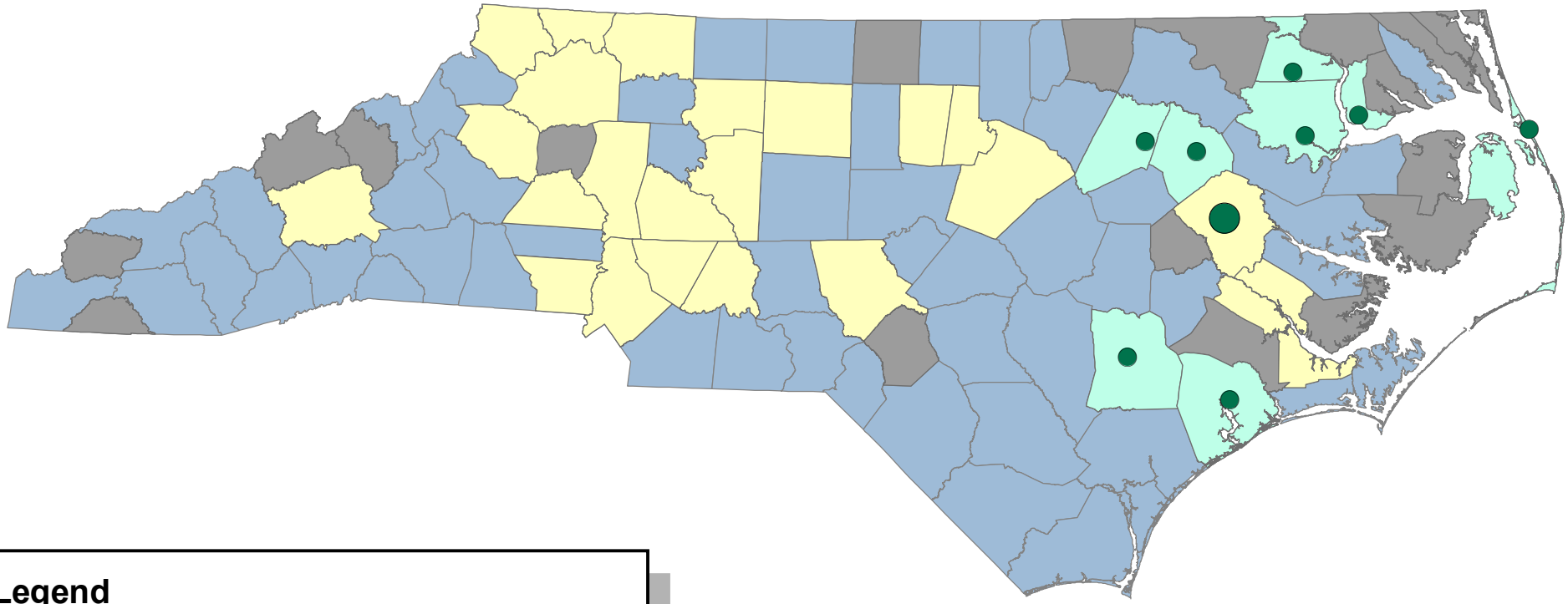
NCPH
North Carolina Public Health

# N.C. Telestroke Systems and Primary Stroke Centers




A county with twenty-four hour coverage is defined as a county which contains either a hospital participating in a telestroke program or a hospital designated as a Primary Stroke Center by the Joint Commission. In order to obtain certification by the the Joint Commission, a hospital is not required to have a neurologist, but is required to employ a physician with experience in the treatment of cerebrovascular disease.

# N.C. Hospitals Participating in an ExistingTelemedicine Network with Pitt County Memorial Hospital and Counties with Twenty-four Hour Physician Coverage for Stroke



## Legend

- Participating Sites
- Pitt County Memorial Hospital
- County with Twenty-Four Hour Physician Coverage
- County with Telemedicine Affiliation
- County With No Hospital

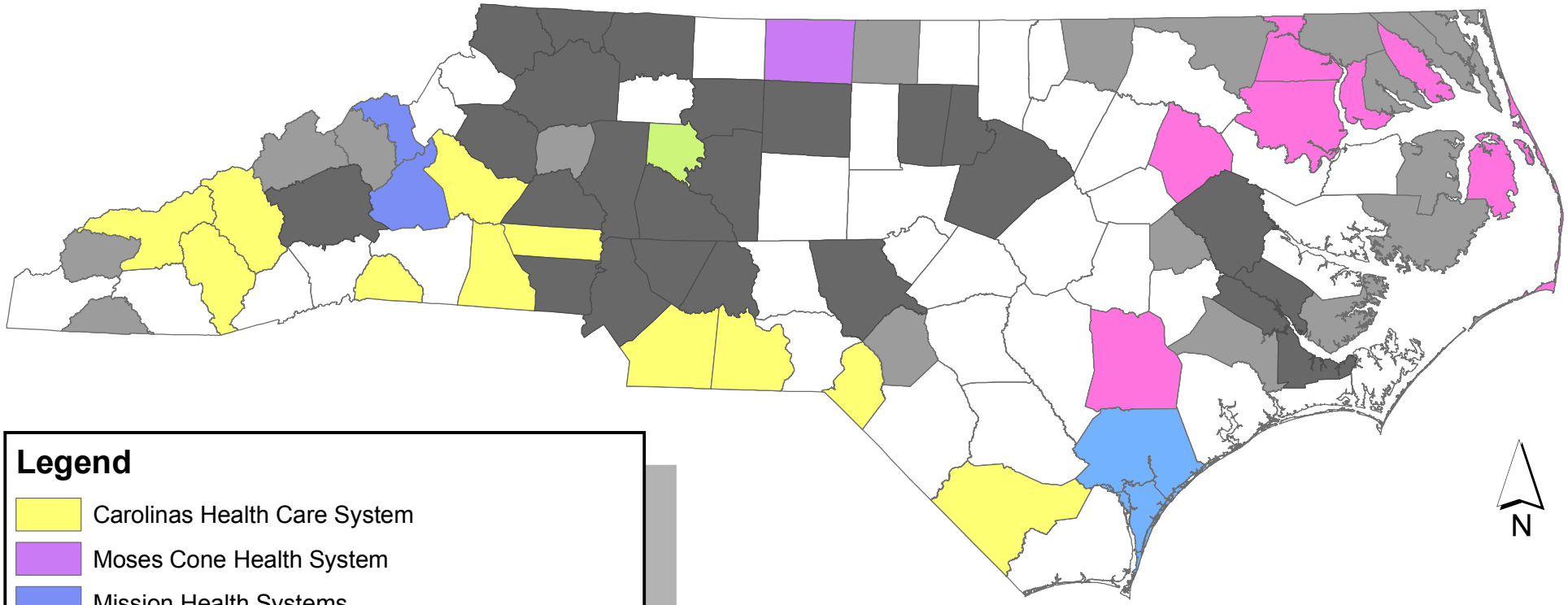
A county with twenty-four hour coverage is defined as a county which contains either a hospital participating in a telestroke program or a hospital designated as a Primary Stroke Center by the Joint Commission. In order to obtain certification by the the Joint Commission, a hospital is not required to have a neurologist, but is required to employ a physician with experience in the treatment of cerebrovascular disease.

Inclusion as an existing telemedicine participating site is determined by the ability to provide acute stroke treatment.

Start With Your Heart
North Carolina Heart Disease & Stroke Prevention Program

NCPH
North Carolina Public Health

# Twenty-Four Hour Physician Coverage in N.C. for Stroke with Multi-County Hospital Systems




## Legend

- Carolinas Health Care System
- Moses Cone Health System
- Mission Health Systems
- New Hanover Medical Center
- University Health Systems
- Wake Forest University Baptist Medical Center
- County with Unaffiliated Hospitals Only
- County with No Hospital
- County with Twenty-Four Hour Physician Coverage

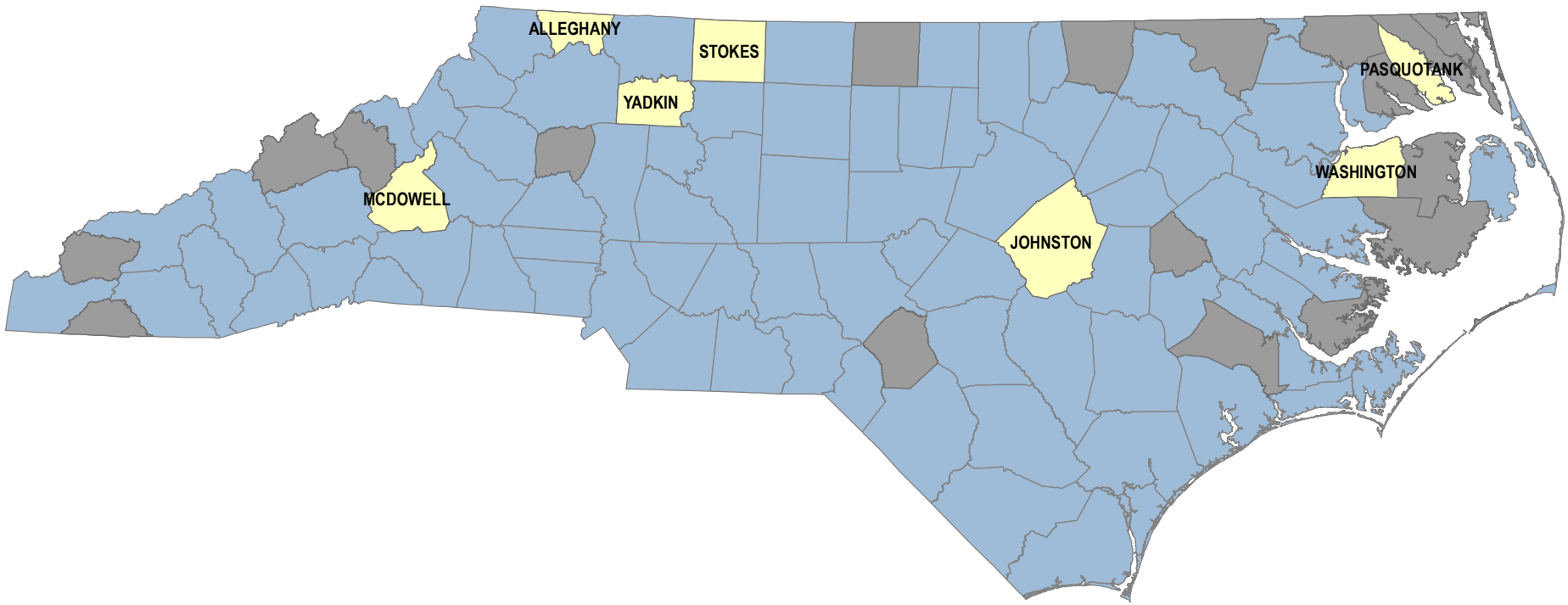
A county with twenty-four hour coverage is defined as a county which contains either a hospital participating in a telestroke program or a hospital designated as a Primary Stroke Center by the Joint Commission. In order to obtain certification by the the Joint Commission, a hospital is not required to have a neurologist, but is required to employ a physician with experience in the treatment of cerebrovascular disease.

Hospital System locations were determined by self report on their respective websites.

Start With Your Heart
North Carolina Heart Disease & Stroke Prevention Program

NCPH
North Carolina Public Health

# N.C. Counties and Twenty-Four Hour CT Scan Availability




**Legend**

- County With a Hospital Without Twenty-Four Hour CT Availability
- County With No Hospital or Twenty-Four Hour CT Availability

County CT scan availability was determined by data collected in the 2009 N.C. Stroke Facilities Survey by Dr. Larry Goldstein.

Start With Your Heart
North Carolina Heart Disease & Stroke Prevention Program

NCPH
North Carolina Public Health

# Appendix G

# Proposal for Governor's Summit on Coordinated Stroke Care

# Proposal for Governor's Summit on Coordinated Stroke Care

## Vision

Location shouldn't matter when it comes to stroke. Wherever you are in North Carolina you must have access to quality stroke care. North Carolina should provide high quality, accessible stroke care to all citizens by 2015.

## Needs

North Carolina needs to answer the question: what is reasonable for every community to expect for treatment of stroke? The NC Heart Disease and Stroke Program (HDSP), through the NC Public Health Foundation, received a grant from the Association of State and Territorial Health Officials (ASTHO) to write a statewide stroke system of care plan. The plan is to be delivered on or before December 31, 2010. The Stroke Advisory Council of the Justus-Warren Heart Disease and Stroke Prevention Task Force is working collaboratively with HDSP and the American Heart Association to write the plan. As stakeholders collaborate to develop the plan, consensus should be built around metrics that would illustrate minimum expectations for all communities regarding stroke care. The concept of a Governor's Summit would be an integral part of the building of North Carolina's Stroke System of Care and allow for the development and refinement of collaboratively defined metrics. The Summit would provide the opportunity for regions to come together in a collegial statewide setting and work to build an effective stroke system and encourage effective prevention initiatives.

Ensuring quality stroke care in North Carolina begins with considerations for all regions of the state. One of the challenges the state faces is bringing together, in one place, representatives from every stroke facility and appropriate agency or organization in the state to gather, collaborate and plan strategies to resolve any barriers or gaps in providing quality stroke care everywhere in North Carolina. A Governor's Summit would provide the impetus to ensure participation by all hospitals and agency/organization representatives across the state. All North Carolinians should be able to know in a transparent, easy-to-understand manner how their community compares to the metrics and the minimum expectations.

## Goals

The Summit would seek to answer the following questions:

- How do we help communities understand what is reasonable for them to expect from a stroke delivery system?
- What prevention strategies (primary and secondary) are working, have worked, etc. and are/should be available in communities? What resources are available to eliminate any community's identified gaps?
- What acute treatment strategies are working, have worked, etc. and are/should be available in communities? What resources, including Primary Stroke Center Hospitals and statewide stakeholders, are available to help facilities develop a plan to treat North Carolinians who present with stroke symptoms. What does your facility/agency need?

- How does the future of reimbursement fit into the issue? How can we help you get ready to respond to the new stroke reimbursement rules from the Center for Medicare and Medicaid Services (CMS)? (New stroke reimbursement requirements are expected to be initiated in 2011)
- What is the status of Rehabilitation facilities in North Carolina?What are the needs and expectations in our communities for rehab services?

In order to provide a meaningful dialogue to these questions pre-summit work would require:

A review of the Stroke Care Survey questions that address the barriers to providing stroke care and looking for common themes and issues. What is the process for developing consensus for identifying needs and how progress will be measured? Outline of summit workgroup sessions that could include but is not limited to:

- Telemedicine (including cross-border issues)
- Legal Issues
- Financial Issues, including financing the system and reimbursement issues
- Community Outreach
- Prevention
- Developing Regional Plans
- Logistical Issues
- Impact of Healthcare Reform

Other Stakeholders to be included for future planning:

- Community and Academic Neurologists
- Community and Academic Emergency Department Physicians
- Academy of Family Physicians
- Nurse Practitioners
- Neurology and Emergency Nurses
- NC Medical Society
- NC Hospital Association (call scheduled)
- OEMS
- Local EMS
- NC Stroke Nurse Coordinators
- Payers (Medicaid and/or Private – BC/BS?)
- Medicine & Rehabilitation Physicians
- CMS or CCME
- AHEC
- Survivors
- NC Stroke Association
- Rehabilitation Centers and professionals

# Appendix H

# Stroke Advisory Council's Stroke Rehabilitation Work Group

**Stroke Advisory Council's**
**Stroke Rehabilitation Work Group**

Pamela W. Duncan, PT, PhD, FAPTA, FAHA, Chair
Professor, Division of Doctor of Physical Therapy
Department of Community and Family Medicine, Duke University

Mary Bethel
Associate State Director for Advocacy
AARP NC

Martha Dixon, MS, CCC-SLP, Vice President,
Rehabilitation & Behavioral Health Services,
Pitt County Memorial Hospital
NC Hospital Association

Mary Edwards
Consumer Affairs Program Manager
NC Division of Aging and Adult Services

Patricia Gregory, MD
Assistant Professor, Department of Physical Medicine and Rehabilitation
UNC School of Medicine

Bob Guns, PhD
Facilitator, Lake Norman Regional Medical Center Stroke Support Group

David Huang, MD, PhD
Co-Director, UNC Stroke Center
UNC School of Medicine

Robin Jones, CNRN
Stroke Program Coordinator, Mission Hospitals

Beth Osborne, RN-BC,
Nurse Consultant
Clinical Policy and Programs
NC Division of Medical Assistance

Mary Elizabeth Parks
Executive Director, NC Stroke Association

Marcus Plescia, MD
Chief, Chronic Disease and Injury Section
NC Division of Public Health

Elizabeth Puckett, PT
Consultant
Heart Disease and Stroke Prevention Branch
NC Division of Public Health

Andy Raby
Data Manager, NC Office of Citizen Services

Margaret Rudisill, RN
Director, Disease Management/Health Promotion
Stanly Regional Medical Center

Judy Schanel, MSN
Vice President/Service Line Administrator
Moses Cone Health System

W. James Stackhouse, MD
Internist, Goldsboro Medical Specialists
NC Medical Society

Carolyn Tracy
Administrator
Mid-Carolina Area Agency on Aging

Alexander White
Policy Intervention Specialist
Heart Disease and Stroke Prevention Branch
NC Division of Public Health

# Appendix I

# Recovery-Transitions of Care Work Group

**Stroke Advisory Council/Association of State and Territorial Health Officials (ASTHO)**

**Stroke System of Care Plan**

# Recovery/Transitions of Care Work Group


**Martha Dixon, MS, CCC-SLP, Co-chair**
VP, Rehabilitation & Behavioral Health Services
Pitt County Memorial Hospital, NC Hospital Association

**Pamela Duncan**, **PhD, PT, FAPTA, FAHA, Co-chair**
Professor and Bette Busch Maniscalco Research Fellow**,** Doctor of Physical Therapy Division,
Department of Community and Family Medicine, Duke University
Senior Fellow, Duke Center for Aging


**Extending Registries/QI into Post-hospital Sub-group**

Janet Prvu Bettger, ScD, FAHA
Assistant Professor
Duke University School of Nursing

Stacey Coffey, RN, BSN
Neuroscience Program Coordinator
Frye Regional Medical Center

*Martha Dixon, MS, CCC-SLP
VP, Rehabilitation & Behavioral Health Services
Pitt County Memorial Hospital

*Pamela Duncan, PhD, PT, FAPTA, FAHA
Professor
Doctor of Physical Therapy Division
Duke University
Senior Fellow
Duke Center for Aging

Tiana Garrett, PhD
Postdoctoral Fellow
UNC-Chapel Hill

Anna Kucharska-Newton, PhD
Postdoctoral Fellow
UNC- Chapel Hill

Carol Murphy, RN, BSN, MPH
Research Instructor
UNC-Chapel Hill
Project Manager, NCSCC

Elizabeth Puckett, PT
Consultant
ASTHO SSoC Plan
NC Heart Disease & Stroke Prevention Branch

Sharon Rhyne
Programs Manager
Chronic Disease and Injury Section
NC Division of Public Health

Wayne Rosamond, PhD
Professor
UNC-Chapel Hill
Principal Investigator
NCSCC

**Managing Transitions in Care Sub-group**

Mary Edwards (consultant)
Consumer Affairs Program Manager
NC Division of Aging and Adult Services

Michael Campbell, MS, CCC-SLP
Director
Speech and Hearing Program
UNC-Greensboro

Carmelo Graffagnino, MD, FRCPC
Associate Professor of Medicine/Neurology
Director
Neurosciences Critical Care Unit
Duke University

Joan Mesler, RN, CNRN
Stroke Program Coordinator
Carolinas Medical Center-Northeast

Jeremy Moseley
Technical Writer
ASTHO SSoC Plan
NC Heart Disease & Stroke Prevention Branch

Vu Q. C. Nguyen, MD
Residency Program Director
Department of PM&R
Carolinas Medical Center and
Director
Stroke Rehabilitation
Carolinas Rehabilitation

Oby Nwankwo
CDSMP Project Coordinator-Public Health
NC Division of Aging and Adult Services

Wayne Royal
Ferrer Therapeutics

Marie Welch, RN, MSN, CRRN
Clinical Nurse Specialist
Stroke Center Coordinator
Pitt County Memorial Hospital Regional Rehabilitation Center

*Elynor Wilson
Regional Coordinator
NC Heart Disease & Stroke Prevention Branch, Eastern NC Stroke Network Staff

**Reimbursement Sub-group**

Paige Bennett
Quality Improvement Specialist
NCSCC
NC Heart Disease & Stroke Prevention Branch

Carolyn Crook
Regional Coordinator
NC Heart Disease & Stroke Prevention Branch
MAHEC

*Robin Jones, BSN, CNRN
Stroke Program Coordinator
Mission Hospitals

Beth Osborne, RN-BC
Nurse Consultant
Clinical Policy and Programs
NC Division of Medical Assistance

John Roberts
Administrator
Carolinas Rehabilitation

Judy Schanel, BSN, MSN
President
Moses H. Cone Memorial Hospital and
Executive Vice President
Moses Cone Health System

Ross Simpson, Jr., MD, PhD
Professor
Division of Cardiology
UNC-Chapel Hill
Principal Clinical Coordinator
Carolinas Center for Medical Excellence

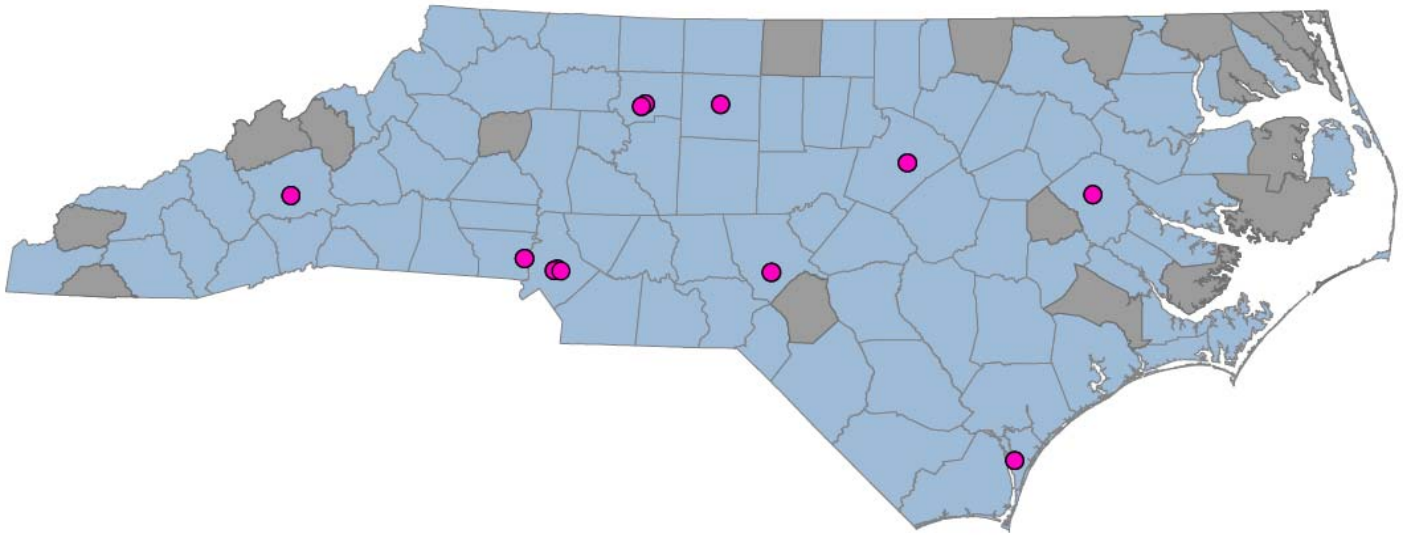
Dick Stevenson
Administrator
The Laurels of GreenTree Ridge

**Asterisks denote subgroup leaders*

# Appendix J

# North Carolina CARF Accredited Facilities Map

# North Carolina CARF Accredited Facilities with a Stroke Specialty Program



**Legend**

- CARF Accredited Facility with a Stroke Specialty Program
- County With No Hospital

Data Source: Information was collected from http://www.carf.org/providerSearch.aspx on November 17, 2010.

Start With Your Heart

North Carolina Heart Disease & Stroke Prevention Program

NCPH North Carolina Public Health

# Appendix K

# National Quality Forum Preferred Practices and Performance Measures

# NATIONAL QUALITY FORUM

## PREFERRED PRACTICES AND PERFORMANCE MEASURES FOR MEASURING AND REPORTING CARE COORDINATION

| Table 1: National Voluntary Consensus Standards for Care Coordination |
|---|
| **Preferred Practices: Healthcare "Home" Domain** |
| **Preferred Practice 1:** The patient shall be provided the opportunity to select the healthcare home that provides the best and most appropriate opportunities to the patient to develop and maintain a relationship with healthcare providers. |
| **Preferred Practice 2:** The healthcare home or sponsoring organizations shall be the central point for incorporating strategies for continuity of care. |
| **Preferred Practice 3:** The healthcare home shall develop infrastructure for managing plans of care that incorporate systems for registering, tracking, measuring, reporting, and improving essential coordinated services. |
| **Preferred Practice 4:** The healthcare home should have policies, procedures, and accountabilities to support effective collaborations between primary care and specialist providers, including evidence-based referrals and consultations that clearly define the roles and responsibilities. |
| **Preferred Practices 5:** The healthcare home will provide or arrange to provide care coordination services for patients at high risk for adverse health outcomes, high service use, and high costs. |
| **Preferred Practices: Proactive Plan of Care and Follow-up Domain** |
| **Preferred Practice 6:** Healthcare providers and entities should have structured and effective systems, policies, procedures, and practices to create, document, execute, and update a plan of care with every patient. |
| **Preferred Practice 7:** A systematic process of follow-up tests, treatments, or services should be established and be informed by the plan of care. |
| **Preferred Practice 8:** The joint plan of care should be developed and include patient education and support for self-management and resources. |
| **Preferred Practice 9:** The plan of care should include community and nonclinical services as well as healthcare services that respond to a patient's needs and preferences and contributes to achieving the patient's goals. |
| **Preferred Practice 10:** Healthcare organizations should utilize cardiac rehabilitation services to assist the healthcare home in coordinating rehabilitation and preventive care for patients with a recent cardiovascular event. |
| **Preferred Practices: Communication Domain** |
| **Preferred Practice 11:** The patient's plan of care should always be made available to the healthcare home team, the patient, and the patient's designees. |
| **Preferred Practice 12:** All healthcare home team members, including the patient and his or her designees, should work within the same plan of care and share responsibility for their contributions to the plan of care and for achieving the patient's goals. |
| **Preferred Practice 13:** A program should be used that incorporates a care partner to support family and friends when caring for a hospitalized patient. |
| **Preferred Practice 14:** The provider's perspective of care coordination activities should be assessed and documented. |
| **Preferred Practices: Information Systems Domain** |
| **Preferred Practice 15:** Standardized, integrated, interoperable, electronic, information systems with functionalities that are essential to care coordination, decision support, and quality measurement and practice improvement should be used. |

| |
|---|
| **Preferred Practice 16:** An electronic record system should allow the patient's health information to be accessible to caregivers at all points of care. |
| **Preferred Practice 17:** Regional health information systems, which may be governed by various partnerships, including public/private, state/local agencies, should enable healthcare home teams to access all patient information. |
| **Preferred Practices: Transitions or Handoffs Domain** |
| **Preferred Practice 18:** Decisionmaking and planning for transitions of care should involve the patient, and, according to patient preferences, family, and caregivers (including the healthcare home team). Appropriate follow-up protocols should be used to assure timely understanding and endorsement of the plan by the patient and his or her designees. |
| **Preferred Practice 19:** Patients and their designees should be engaged to directly participate in determining and preparing for ongoing care during and after transitions. |
| **Preferred Practice 20:** Systematic care transitions programs that engage patients and families in self-management after being transferred home should be used whenever available. |
| **Preferred Practice 21:** For high-risk chronically ill older adults, an evidence-based multidisciplinary, transitional care practice that provides comprehensive in-hospital planning, home-based visits, and telephone follow-up, such as the Transitional Care Model, should be deployed. |
| **Preferred Practice 22:** Healthcare organizations should develop and implement a standardized communication template for the transitions of care process, including a minimal set of core data elements that are accessible to the patient and his or her designees during care. |
| **Preferred Practice 23:** Healthcare providers and healthcare organizations should implement protocols and policies for a standardized approach to all transitions of care. Policies and procedures related to transitions and the critical aspects should be included in the standardized approach. |
| **Preferred Practice 24:** Healthcare providers and healthcare organizations should have systems in place to clarify, identify, and enhance mutual accountability (complete/confirmed communication loop) of each party involved in a transition of care. |
| **Preferred Practice 25:** Healthcare organizations should evaluate the effectiveness of transition protocols and policies, as well as evaluate transition outcomes. |
| **Performance Measures for Care Coordination** |
| • Cardiac rehabilitation patient referral from an inpatient setting |
| • Cardiac rehabilitation patient referral from an outpatient setting |
| • Patients with a transient ischemic event ER visit who had a follow-up office visit |
| • Biopsy follow-up |
| • Reconciled medication list received by discharged patients (inpatient discharges to home/self care or any other site of care) |
| • Transition record with specified elements received by discharged patients (inpatient discharges to home/self-care or any other site of care) |
| • Timely transmission of transition record (inpatient discharges to home/self care or any other site of care) |
| • Transition record with specified elements received by discharged patients (emergency department discharges to ambulatory care [home/self care]) |
| • Melanoma continuity of care – recall system |
| • 3-Item Care Transitions Measure (CTM-3)[1] |

[1] This NQF-endorsed measure was reviewed for continued endorsement.

# Appendix L

# ASA Review of the Evidence for the Use of Telemedicine within the Stroke System of Care

Stroke
JOURNAL OF THE AMERICAN HEART ASSOCIATION
American Stroke Association
A Division of American Heart Association

# A Review of the Evidence for the Use of Telemedicine Within Stroke Systems of Care: A Scientific Statement From the American Heart Association/American Stroke Association

Lee H. Schwamm, Robert G. Holloway, Pierre Amarenco, Heinrich J. Audebert, Tamilyn Bakas, Neale R. Chumbler, Rene Handschu, Edward C. Jauch, William A. Knight, IV, Steven R. Levine, Marc Mayberg, Brett C. Meyer, Philip M. Meyers, Elaine Skalabrin, Lawrence R. Wechsler and on behalf of the American Heart Association Stroke Council and the Interdisciplinary Council on Peripheral Vascular Disease

*Stroke* 2009;40;2616-2634; originally published online May 7, 2009;
DOI: 10.1161/STROKEAHA.109.192360
Stroke is published by the American Heart Association. 7272 Greenville Avenue, Dallas, TX 72514
 Print ISSN: 0039-2499. Online ISSN: 1524-4628

AHA/ASA Scientific Statement

# A Review of the Evidence for the Use of Telemedicine Within Stroke Systems of Care

## A Scientific Statement From the American Heart Association/American Stroke Association

*The American Academy of Neurology (AAN) affirms the value of this paper as an educational tool for neurologists.*

Lee H. Schwamm, MD, FAHA, Co-Chair; Robert G. Holloway, MD, MPH, Co-Chair; Pierre Amarenco, MD, FAHA; Heinrich J. Audebert, MD; Tamilyn Bakas, RN, DNS, FAHA, FAAN; Neale R. Chumbler, PhD; Rene Handschu, MD; Edward C. Jauch, MD, MS, FAHA; William A. Knight IV, MD; Steven R. Levine, MD, FAHA; Marc Mayberg, MD, FAHA; Brett C. Meyer, MD; Philip M. Meyers, MD, FAHA; Elaine Skalabrin, MD; Lawrence R. Wechsler, MD, FAHA; on behalf of the American Heart Association Stroke Council and the Interdisciplinary Council on Peripheral Vascular Disease

***Abstract*—**The aim of this new statement is to provide a comprehensive and evidence-based review of the scientific data evaluating the use of telemedicine for stroke care delivery and to provide consensus recommendations based on the available evidence. The evidence is organized and presented within the context of the American Heart Association's Stroke Systems of Care framework and is classified according to the joint American Heart Association/American College of Cardiology Foundation and supplementary American Heart Association Stroke Council methods of classifying the level of certainty and the class of evidence. Evidence-based recommendations are included for the use of telemedicine in general neurological assessment and primary prevention of stroke; notification and response of emergency medical services; acute stroke treatment, including the hyperacute and emergency department phases; hospital-based subacute stroke treatment and secondary prevention; and rehabilitation. **(*Stroke*. 2009;40:2616-2634.)**

**Key Words:** AHA Scientific Statements ■ stroke care ■ stroke management ■ telemedicine

The field of acute stroke care is evolving rapidly, and many states and communities are establishing designated stroke centers as a means to improve acute stroke care delivery.[1] Specialized stroke and brain imaging expertise is often required to facilitate delivery of advanced therapies, including intravenous tissue plasminogen activator (tPA). Access to this expertise is limited, often to larger urban centers, and there are significant disparities in access to specialty care across the United States. Telemedicine has been proposed as a method to increase access to limited specialty expertise in a cost-effective manner, especially for geographically remote areas. tPA is recommended for use in appropriate stroke patients by major professional societies and nursing organizations (American Heart Association [AHA], National Stroke Association, American Academy of Neurology, American College of Chest Physicians) and

**The online Data Supplement is available with this article at http://stroke.ahajournals.org/cgi/content/full/STROKEAHA.109.192360/DC1.**

The American Heart Association makes every effort to avoid any actual or potential conflicts of interest that may arise as a result of an outside relationship or a personal, professional, or business interest of a member of the writing panel. Specifically, all members of the writing group are required to complete and submit a Disclosure Questionnaire showing all such relationships that might be perceived as real or potential conflicts of interest.

This statement was approved by the American Heart Association Science Advisory and Coordinating Committee on March 13, 2009. A copy of the statement is available at http://www.americanheart.org/presenter.jhtml?identifier=3003999 by selecting either the "topic list" link or the "chronological list" link (No. LS-2043). To purchase additional reprints, call 843-216-2533 or e-mail kelle.ramsay@wolterskluwer.com.

The American Heart Association requests that this document be cited as follows: Schwamm LH, Holloway RG, Amarenco P, Audebert HJ, Bakas T, Chumbler NR, Handschu R, Jauch EC, Knight WA IV, Levine SR, Mayberg M, Meyer BC, Meyers PM, Skalabrin E, Wechsler LR; on behalf of the American Heart Association Stroke Council and the Interdisciplinary Council on Peripheral Vascular Disease. A review of the evidence for the use of telemedicine within stroke systems of care: a scientific statement from the American Heart Association/American Stroke Association. *Stroke.* 2009;40:2616–2634.

Expert peer review of AHA Scientific Statements is conducted at the AHA National Center. For more on AHA statements and guidelines development, visit http://www.americanheart.org/presenter.jhtml?identifier=3023366.



***Stroke* is available at http://stroke.ahajournals.org** **DOI: 10.1161/STROKEAHA.109.192360**

endorsed by the federal government (US Food and Drug Administration, Centers for Medicare and Medicaid Services, Agency for Healthcare Research and Quality) and multispecialty organizations (Brain Attack Coalition). Despite evidence of the benefit of intravenous tPA for treatment of stroke within 3 hours of stroke onset and recommendations for the use of tPA, only a small percentage of stroke patients receive this therapy.[2] One of the barriers to intravenous tPA treatment is the lack of availability of neurological expertise on an emergent basis. Emergency physicians are often not comfortable making the decision to institute tPA treatment without this guidance. Patients who might benefit from tPA may not receive treatment because of the treating physician's lack of familiarity with the appropriate inclusion and exclusion criteria or because of delays in evaluation and treatment resulting from inexperience. In addition, patients and families may not clearly understand the benefits and risks of intravenous tPA. It has been recommended that telemedicine be implemented within the Stroke Systems of Care Model to address these deficiencies.

In addition, teleconsultation can lead to many other changes in care apart from IV tPA decisions that are beneficial to the patient. Involvement of a neurologist in the care of the stroke patient has been shown to be associated with better outcomes in non–lytic-treated patients. Management of intracerebral hemorrhage is improved by selected triage to centers with neurosurgical capability. More rapid diagnosis of the underlying mechanism of ischemic stroke may lead to more rapid institution of secondary prevention therapy. We reviewed the available literature to evaluate the levels of scientific evidence that support the use of this telemedicine technology.

Of note, an important part of the application of a new technology depends on human factors and the ability to apply the new technology in a variety of scenarios, from research proof-of-concept environments to real-time acute stroke interventions. Whenever possible, we have attempted to distinguish between evidence of feasibility (ie, technically achievable in a proof-of-concept design) and effectiveness (ie, demonstrated benefit in a real clinical practice environment). Because telemedicine is not a treatment modality in and of itself but rather a technology that may enable the delivery of previously validated interventions, many of the studies reviewed assessed agreement between observers using traditional versus telemedicine-enabled methods of performing key tasks in the delivery of acute stroke care.

The aim of this new statement is to provide a comprehensive and evidence-based review of the scientific evidence supporting the use of telemedicine in acute stroke care delivery. The evidence is organized and presented within the context of the American Heart Association's Stroke Systems of Care framework and is classified according to the joint AHA/American College of Cardiology Foundation and supplementary AHA Stroke Council methods of classifying the level of certainty and the class of evidence (Tables 1 and 2).[3] Evidence-based recommendations are included for the use of telemedicine in general neurological assessment and primary prevention of stroke; notification and response of emergency medical services (EMS); acute stroke treatment, including the hyperacute and emergency department phases; hospital-based subacute stroke treatment and secondary prevention; and rehabilitation.

Two writing committee co-chairs were designated by the Stroke Council Manuscript Oversight Committee. A writing committee roster was developed by the AHA Stroke Council and approved by the AHA Manuscript Oversight Committee with representatives from emergency medicine, neurology, health services research, stroke telemedicine, radiology, neurosurgery, rehabilitation, and nursing. The committee met in person and held several teleconferences to develop the outline and text of the recommendations. The writing group conducted a comprehensive review of the relevant literature. Although a complete list of key words is beyond the scope of this section, the committee reviewed all compiled reports from computerized searches and conducted additional searching by hand. Searches were limited to English language sources and to human subjects. Literature citations were generally restricted to published manuscripts appearing in journals listed in Index Medicus and reflect literature published as of June 30, 2007, although selected articles of high relevance published in other languages or up until September 2008 were also included. Because of the scope and importance of certain ongoing clinical trials and other emerging information, published abstracts were cited when they were the only published information available; however, the levels of evidence and recommendations are based solely on full-length published peer-reviewed reports. The references selected for this document are exclusively from peer-reviewed papers that are representative but not all inclusive. All members of the committee had frequent opportunities to review drafts of the document, comment in writing or during teleconference discussions, and reach consensus with the final recommendations.

## Technology and Technical Standards

Telemedicine has been broadly defined as *the use of telecommunications technologies to provide medical information and services*.[4] Use of interactive full-motion audio and video for acute stroke care was first reported in the early 1990s, but Levine and Gorman[5] were the first to coin the term *telestroke* for the use of telemedicine in the form of videoteleconferencing (VTC) to support acute stroke intervention. This type of VTC, also called videoconferencing, is characterized by the use of dedicated, high-quality, interactive, bidirectional audiovisual systems, coupled with the use of teleradiology for remote review of brain images. In this review, we have focused on this telestroke type of telemedicine activity and have identified whenever studies did not use this high-quality videoconferencing (HQ-VTC) methodology.

Interactive videoconferencing allows the patient and/or family and both the bedside and distant healthcare providers to see and hear each other in full color using cameras with various degrees of remote control (eg, pan, tilt, or zoom) connected to a display screen (video graphics array [VGA] or television monitor) (see Figures 1 and 2 and full-motion video clips viewable in the online Data Supplement). Unless otherwise noted in the text, all telemedicine systems reviewed met certain minimum quality standards for HQ-VTC, including transmission rates and algorithms of sufficient quality to

**Table 1. Applying Classification of Recommendations and Level of Evidence**

| ESTIMATE OF CERTAINTY (PRECISION) OF TREATMENT EFFECT | SIZE OF TREATMENT EFFECT → | | | |
|---|---|---|---|---|
| | **CLASS I**<br>*Benefit >>> Risk*<br>Procedure/Treatment **SHOULD** be performed/administered | **CLASS IIa**<br>*Benefit >> Risk*<br>*Additional studies with focused objectives needed*<br>**IT IS REASONABLE** to perform procedure/administer treatment | **CLASS IIb**<br>*Benefit ≥ Risk*<br>*Additional studies with broad objectives needed; additional registry data would be helpful*<br>Procedure/Treatment **MAY BE CONSIDERED** | **CLASS III**<br>*Risk ≥ Benefit*<br>Procedure/Treatment should **NOT** be performed/administered **SINCE IT IS NOT HELPFUL AND MAY BE HARMFUL** |
| **LEVEL A**<br>Multiple populations evaluated*<br>Data derived from multiple randomized clinical trials or meta-analyses | ■ Recommendation that procedure or treatment is useful/effective<br>■ Sufficient evidence from multiple randomized trials or meta-analyses | ■ Recommendation in favor of treatment or procedure being useful/effective<br>■ Some conflicting evidence from multiple randomized trials or meta-analyses | ■ Recommendation's usefulness/efficacy less well established<br>■ Greater conflicting evidence from multiple randomized trials or meta-analyses | ■ Recommendation that procedure or treatment is not useful/effective and may be harmful<br>■ Sufficient evidence from multiple randomized trials or meta-analyses |
| **LEVEL B**<br>Limited populations evaluated*<br>Data derived from a single randomized trial or nonrandomized studies | ■ Recommendation that procedure or treatment is useful/effective<br>■ Evidence from single randomized trial or nonrandomized studies | ■ Recommendation in favor of treatment or procedure being useful/effective<br>■ Some conflicting evidence from single randomized trial or nonrandomized studies | ■ Recommendation's usefulness/efficacy less well established<br>■ Greater conflicting evidence from single randomized trial or nonrandomized studies | ■ Recommendation that procedure or treatment is not useful/effective and may be harmful<br>■ Evidence from single randomized trial or nonrandomized studies |
| **LEVEL C**<br>Very limited populations evaluated*<br>Only consensus opinion of experts, case studies, or standard of care | ■ Recommendation that procedure or treatment is useful/effective<br>■ Only expert opinion, case studies, or standard of care | ■ Recommendation in favor of treatment or procedure being useful/effective<br>■ Only diverging expert opinion, case studies, or standard of care | ■ Recommendation's usefulness/efficacy less well established<br>■ Only diverging expert opinion, case studies, or standard of care | ■ Recommendation that procedure or treatment is not useful/effective and may be harmful<br>■ Only expert opinion, case studies, or standard of care |
| Suggested phrases for writing recommendations† | should<br>is recommended<br>is indicated<br>is useful/effective/beneficial | is reasonable<br>can be useful/effective/beneficial<br>is probably recommended or indicated | may/might be considered<br>may/might be reasonable<br>usefulness/effectiveness is unknown/unclear/uncertain or not well established | is not recommended<br>is not indicated<br>should not<br>is not useful/effective/beneficial<br>may be harmful |

*Data available from clinical trials or registries about the usefulness/efficacy in different subpopulations such as gender, age, history of diabetes, history of prior myocardial infarction, history of heart failure, and prior aspirin use. A recommendation with Level of Evidence B or C does not imply that the recommendation is weak. Many important clinical questions addressed in the guidelines do not lend themselves to clinical trials. Even though randomized trials are not available, there may be a very clear clinical consensus that a particular test or therapy is useful or effective.

†In 2003, the American College of Cardiology/American Heart Association Task Force on Practice Guidelines developed a list of suggested phrases to use when writing recommendations. All guideline recommendations have been written in full sentences that express a complete thought so that a recommendation, even if separated and presented apart from the rest of the document (including headings above sets of recommendations), would still convey the full intent of the recommendation. It is hoped that this will increase readers' comprehension of the guidelines and will allow queries at the individual recommendation level.

support >20 frames per second of bidirectional synchronized audio and video at a resolution capable of being accurately displayed on monitors of ≥13 in. These parameters reflect the consensus expert opinion of the writing group, and no published articles were excluded from review because of these criteria. They are incorporated here to help define appropriate minimum standards of video transmission below which the quality of information transfer may be insufficient for the recommendations to apply. Because we can comment only on the parameters specified in the published reports, many of the systems used are described in terms of bandwidth rather than video quality.

Common intermediate format (CIF), also known as full CIF, is a format used to standardize the horizontal and vertical resolutions in pixels in video signals, commonly used in HQ-VTC systems. CIF was designed to be easy to convert to European or American video format standards. CIF defines a video sequence with a resolution of 352×288 at a frame rate of 30 frames per second in full color. Multiples of CIF are commonly used. Source input format is practically identical to CIF but is taken from Moving Pictures Expert Group—Phase 1 (MPEG-1) rather than international telecommunications union standards.

Early systems used dedicated high-speed telecommunications lines, usually integrated services digital network (ISDN) lines, at rates of 256 to 384 kilobits per second to achieve CIF transmission. However, with recent developments in the quality of private fiberoptic networks and public Internet providers and with different vendors using different video processing and error-checking algorithms, simple numeric statements about transmission rates (eg, 384 kilobits per second) may not reflect comparable image quality across vendors. Therefore, we have chosen to focus on visual resolution and latency (eg, CIF standards), which are psycho-

**Table 2. Definition of Classes and Levels of Evidence Used in AHA Stroke Council Recommendations**

| | |
|---|---|
| Class I | Conditions for which there is evidence for and/or general agreement that the procedure or treatment is useful and effective |
| Class II | Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment |
| Class IIa | The weight of evidence or opinion is in favor of the procedure or treatment |
| Class IIb | Usefulness/efficacy is less well established by evidence or opinion |
| Class III | Conditions for which there is evidence and/or general agreement that the procedure or treatment is not useful/effective and in some cases may be harmful |
| Therapeutic recommendation | |
| Level of Evidence A | Data derived from multiple randomized clinical trials |
| Level of Evidence B | Data derived from a single randomized trial or nonrandomized studies |
| Level of Evidence C | Consensus opinion of experts |
| Diagnostic recommendation | |
| Level of Evidence A | Data derived from multiple prospective cohort studies using a reference standard applied by a masked evaluator |
| Level of Evidence B | Data derived from a single level A study or ≥1 case-control studies or studies using a reference standard applied by an unmasked evaluator |
| Level of Evidence C | Consensus opinion of experts |
| Classifying evidence for agreement studies | |
| Level of Evidence A | Prospective |
| | Masked |
| | Broad/representative subject spectrum |
| | Complete assessment |
| | Adequate description of test method/reference standard |
| | Adequate description of test results/study finding |
| Level of Evidence B | ≥1 of the following: |
| | Retrospective |
| | Unmasked |
| | Narrow spectrum |
| | Incomplete assessment |
| | Inadequate description of test method/reference standard |
| | Inadequate description of test results/study finding |
| Level of Evidence C | ≥2 of the following: |
| | Retrospective |
| | Unmasked |
| | Narrow spectrum |
| | Incomplete assessment |
| | Inadequate description of test method/reference standard |
| | Inadequate description of test results/study finding |

physical properties that will continue to be meaningful over time even as technology continues to evolve. Systems that do not meet these minimum standards may not perform in a manner sufficient to be consistent with these guideline recommendations; therefore, caution should be used when these recommendations are applied to such systems.

Many of the studies compared the assessment of acute or subacute stroke severity among patients using the National Institutes of Health Stroke Scale (NIHSS) performed at the bedside (NIHSS-bedside) with that performed via HQ-VTC (NIHSS-telestroke). When evidence was available, studies comparing telestroke intervention with low-cost telephonic communication were also reviewed.

Teleradiology is the ability to obtain radiographic images at 1 location and transmit them remotely to another location for diagnostic and consultative purposes[6]; this is critical to the telestroke encounter. In 1982, the American College of Radiology and the National Electric Manufacturers Association published standards for digital imaging and communications in medicine, now the standard for transmissible medical images.[7] In 1994, the American College of Radiology published standards for teleradiology applications.[8] Equipment used for teleradiology systems must be approved by the US Food and Drug Administration (FDA).[9,10] The Joint Commission and other accrediting bodies play an important role in the performance appraisal and credentialing of teleradiology systems.[11] According to these standards of practice, the Centers for Medicare and Medicaid Services provide reimbursement for both intrastate and interstate teleradiology services.[12,13]

## Primary Prevention of Stroke

There are no published articles on the use of HQ-VTC for the primary prevention of stroke or management of risk factors per se. There are some reports on the use of other means of telemedicine to improve control of risk factors such as blood pressure or diabetes. None of these studies investigated stroke as an outcome event. Further study is warranted to determine whether such systems may be useful for remote staffing of prevention clinics or specialized centers for management of transient ischemic attacks.

## Notification and Response of EMS

If EMS providers could identify potential stroke patients and transport them to designated stroke centers, more patients might be able to receive appropriate therapies. Prehospital stroke assessment tools have been developed to help EMS personnel identify potential stroke patients, but even in the emergency department, stroke may be difficult to diagnose.[14,15] Providing stroke expertise to the ambulance via HQ-VTC or lower-quality technology may increase diagnostic accuracy, provide earlier resource mobilization, and increase appropriate triage. Furthermore, if effective prehospital neuroprotective interventions are available in the future, telemedicine may increase their appropriate use.

### Available Technology

The spectrum of telemedicine technology for EMS use ranges from cellular phone technology to primitive 2-way

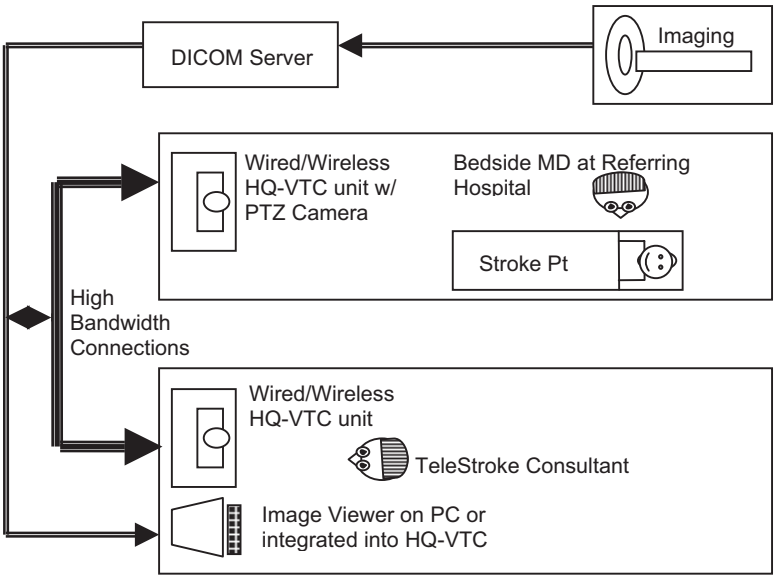



**Figure 1.** Telestroke schematic illustration. (Adapted from Rosenthal E, Schwamm LH. Telemedicine and stroke. In: Wooton R, Patterson V, eds. *Teleneurology*. London, England: Royal Society of Medicine Press, Ltd; 2005.)

audio and video. More recent developments in emergency video-multiplexing transport systems provide live video transmission with high spatial and temporal resolution and biotelemetry data using low-data-transmission-rate networks on satellite communications and cellular phone networks.[16] Current technology can provide real-time video with video frame rates of 15 frames per second at a video resolution of 360×240 pixels. Evolution-data optimized or evolution-data only is a telecommunications standard for the wireless transmission of data through radio signals, typically for broadband Internet access. It uses cellular telephone multiplexing techniques, including code division multiple access and time division multiple access, to maximize both individual user's throughput and the overall system throughput. This emerging telecommunications standard has been adopted by many mobile phone service providers around the world, particularly those previously using code division multiple access networks. As such broadband wireless networks from the major carriers become more available, transmission rates of >2 megabytes per second are possible, but this high bandwidth is often asymmetrical and therefore does not support bidirectional video at full capability. Application of wireless and satellite data transmission of video, audio, and device data from the prehospital and ambulance setting includes video examination and focused abdominal sonography for trauma.[17]

## EMS Telemedicine for Stroke

The only 2-way ambulance-based telemedicine system for stroke assessment reported in the literature is the integrated telecommunications system (TeleBAT) developed by the Maryland Brain Attack Team.[18,19] The TeleBAT system

**Figure 2.** Representative still images from telestroke consultations. Actual clarity of full-motion video is greater than that shown in these single-frame still images. (Images courtesy of Partners TeleStroke Center, with permission from all individuals depicted.)

**Table 3. NIHSS Reliability Studies**

| NIHSS Item | Goldstein | Brott | Shafqat | Meyer | Meyer | Handschu | Handschu | LaMonte | LaMonte |
|---|---|---|---|---|---|---|---|---|---|
| | Bedside vs. Bedside | Bedside vs. Bedside | Telemed vs. Bedside non-acute | Telemed vs. Bedside non-acute | Telemed vs. Bedside-untrained non-acute | Telemed vs. Bedside (0-36 hrs) | Telemed vs. Bedside (0-6 hrs) | Lab Simulation vs. Videotape (1 LS vs. 2 VT) | Lab Simulation vs. Videotape (2 LS vs. 1 VT) |
| LOC | 0.50 | 0.49 | 100% Agree | 100% Agree | 0.87 | 0.99 | 0.97 | 100% Agree | 100% Agree |
| LOC Q | 0.64 | 0.80 | 0.75 | 0.93 | 0.96 | 0.90 | 0.88 | 0.58 | 0.58 |
| LOC C | 0.41 | 0.58 | 0.29 | 100% Agree | 100% Agree | 0.93 | 0.89 | 100% Agree | 100% Agree |
| Gaze | 0.33 | 0.82 | 0.41 | 100% Agree | 0.60 | 0.95 | 0.88 | 100% Agree | 100% Agree |
| Visual Fields | 0.57 | 0.81 | 0.60 | 0.93 | 0.78 | 0.89 | 0.83 | 100% Agree | 0.44 |
| Facial Palsy | 0.22 | 0.57 | 0.40 | 0.22 | 0.62 | 0.85 | 0.62 | -0.11 | 0.69 |
| Motor Arm | 0.77 | 0.85 | 0.82 | 0.88 0.82 | 0.94 0.97 | 0.90 | 0.74 | 0.74 100% Agree | 100% Agree 100% Agree |
| Motor Leg | 0.78 | 0.83 | 0.83 | 0.74 0.80 | 0.95 0.89 | 0.92 | 0.72 | 0.72 0.44 | 0.44 0.58 |
| Ataxia | -0.16 | 0.57 | -0.07 | 0.34 | 0.65 | 0.95 | 0.94 | 100% Agree | 100% Agree |
| Sensory | 0.50 | 0.60 | 0.48 | 0.80 | 100% Agree | 0.91 | 0.83 | 0.58 | 100% Agree |
| Language | 0.79 | 0.64 | 0.65 | 0.73 | 0.89 | 0.98 | 0.97 | 0.58 | 0.67 |
| Dysarthria | 0.32 | 0.55 | 0.55 | 0.61 | 0.60 | 0.92 | 0.93 | 0.58 | 0.38 |
| Neglect | 0.61 | 0.58 | 0.77 | 0.80 | 0.72 | 0.96 | 1.00 | 0.62 | 0.58 |
| | | | | | | | | | |
| Study Specific Kappa Scoring | > 0.60 = Excellent | >0.80 = Excellent | >0.75 = Excellent | >0.75 = Excellent | ≥0.75 = Excellent | Weighted | Weighted | r > 0.5 = good | r > 0.5 = good |
| % Excellent | 5/13 (38%) | 4/13 (31%) | 4/13 (31%) | 10/15 (67%) | 10/15 (67%) | 13/13 (100%) | 12/13 (92%) | 6/15 (40%) | 7/15 (47%) |
| % Moderate | 4/13 (31%) | 9/13 (69%) | 7/13 (54%) | 3/15 (20%) | 5/15 (33%) | 0/13 (0%) | 1/13 (8%) | 7/15 (47%) | 5/15 (33%) |
| % Poor | 4/13 (31%) | 0/13 (0%) | 2/13 (15%) | 2/15 (13%) | 0/15 (0%) | 0/13 (0%) | 0/13 (0%) | 2/15 (13%) | 3/15 (20%) |

*Green= excellent agreement* *Yellow= moderate agreement* *Red= poor agreement*

consists of an ambulance unit using cellular technologies (4 simultaneous cellular phone connections) to communicate with the hospital base station via the hospital's intranet. The TeleBAT system provides a bandwidth of 9.6 kilobytes per second, producing a 320×240-pixel image at 2 frames per second and a voice channel. Using the TeleBAT system from a dedicated ambulance to remotely perform the NIHSS, investigators have shown the system to be feasible for evaluating prehospital neurological deficits.[19]

It is clear that existing technology can provide some degree of interactive video and audio communication with prehospital units in transport, although current published applications have unacceptably low frame rates, and broad application of this technology to large fleets of EMS vehicles is not yet practical. Real-time audiovisual telecommunication to perform a stroke screening assessment, including the NIHSS, in the prehospital setting is technically feasible. The usefulness of this intervention in real practice is uncertain, and further research is required. There are insufficient data to support a recommendation.

## Acute Stroke Evaluation, Including the Hyperacute and Emergency Department Phases

Although numerous scales have been used in the evaluation of stroke patients,[20,21] the NIHSS is generally regarded as the reference standard for stroke clinical deficit scale assessments. The NIHSS is a 13-item graded neurological examination that assesses consciousness, visual field abnormalities, gaze disturbances, motor and sensory abilities, speech and language functions, and inattention. Only a few clinical signs relevant for stroke diagnosis like distal motor function and balance and gait disorders are not covered by this standardized examination tool. The scale, developed for use in acute stroke therapy trials,[22,23] requires only a limited time to perform (generally <8 minutes).[22] Overall interrater reliability for examinations performed by stroke specialists at the bedside has been reported.[22,23] The percentage of items with excellent interrater reliability ranges from 31% to 38%[22,23] (Table 3). This reliability of the NIHSS performed at the bedside extends to nonneurologist physicians and nonphysician study coordinators,[24] to community neurologists and nurses,[25] and to retrospective medical record NIHSS abstraction.[26] Although the NIHSS is a reliable stroke deficit scale, it includes items with redundancy and items with less-than-excellent reliability.[25,27] This reliability can be improved with training.[28,29] To ensure the adequacy of stroke evaluation by HQ-VTC, the feasibility and reliability of performing the NIHSS were demonstrated first in the nonacute and subsequently in the acute stroke environment. In these validation study paradigms in general, an NIHSS is performed by a stroke expert over HQ-VTC assisted by a nurse or physician (eg, emergency physician) at the bedside for elements that require a physical presence at the bedside such as sensory testing or presentation of stimulus cards for language assessment. This is compared with the score obtained by a stroke specialist who independently performs the NIHSS at the bedside. In clinical practice, personnel who assist during the telestroke consultation may not have had specific training in either the NIHSS or telestroke administration, but this variable of physician-extender experience during telestroke consultation has not been the subject of any of the reports.

### Feasibility and Reliability of Performing Neurological Assessment Over Telestroke Systems

#### *Nonacute Setting*

There are data on the feasibility and reliability of conducting a general neurological evaluation over telemedicine compared with face-to-face consultation. One small study focusing on the feasibility and reliability of the neurological

examination performed via telemedicine evaluated the interobserver agreement of the examination of eye movements, facial strength, tongue movements, motor strength, deep tendon reflexes, plantar responses, sensation, coordination, sitting balance, and gait as parts of the general neurological examination.[30] In 17 patients with a variety of neurological diseases, a standard face-to-face examination by neurological experts was compared with an HQ-VTC examination over a 384–kilobits per second ISDN system performed by house officers and scored by senior neurological trainees at a distance. It is not stated if the distant examiners could direct the bedside examination or ask for individual tests to be repeated. Interobserver agreement ranged from fair to nearly perfect ($\kappa$=0.21 to 1.00), with the poorest agreement in eye movements. They also compared the results of 2 face-to-face examinations. The level of agreement between HQ-VTC and face-to-face evaluations was almost identical to that between 2 face-to-face evaluations for all tested components of the examination except eye movements.

One study addressed patient and provider satisfaction with telemedicine outpatient consultation.[31] The majority of 86 patients felt confident with HQ-VTC examination, and only a few noted problems with audio quality or reported feeling "shy in front of the camera." In a similar study of 25 patients, the majority of users did not report difficulties in the use of the telemedicine equipment or interpretation of the findings and expressed confidence in the use of telemedicine.[32]

## Class II Recommendation

1. HQ-VTC is reasonable for performing a general neurological examination by a remote examiner with interrater agreement that is comparable to that between different face-to-face examiners *(Class IIa, Level of Evidence B).*

Two studies addressed the feasibility and reliability of performing an NIHSS-telestroke in the nonacute setting, ie, patients who are beyond the time window for acute intervention. Shafqat et al[33] performed the first investigation of interrater agreement between NIHSS-bedside and NIHSS-telestroke when performed by stroke neurologists. Twenty patients with ischemic stroke (excluding unstable patients) were examined both at bedside and via HQ-VTC at full CIF of 30 frames per second using a point-to-point, ISDN telemedicine link at 384 kilobits per second and remote pan/tilt/zoom camera capability. The remote and bedside neurologists had no prior clinical knowledge of the patients, and each was kept blinded to the examinations and scores of the other. The telestroke examination was assisted by a bedside nurse. For the initial 10 patients, the remote assessment was performed first; for the remaining 10, the order was reversed. The NIHSS-telestroke was performed in an order designed to minimize the need for camera adjustments. NIHSS-bedside and NIHSS-telestroke scores ranged from 1 to 24. Thirty-one percent of NIHSS items showed excellent weighted $\kappa$ agreement. This finding was consistent with prior clinical reports comparing 2 bedside examiners (see Table 3).[22,23] NIHSS-bedside and NIHSS-telestroke scores were strongly correlated ($r$=0.97, $P$<0.001). Mean telestroke examination time was slightly longer than bedside (9.70 versus 6.55 minutes; $P$<0.001).

Meyer et al[34] performed a study of interrater NIHSS-bedside and NIHSS-telestroke agreement using a videoconferencing system capable of either wired or wireless connectivity over public Internet with a pan/tilt/zoom-capable camera and performing the NIHSS-telestroke in the conventional order. Because of the ability to download and run the videoconferencing software on many personal computers with access to high bandwidth (either wired or wireless), the authors refer to this method as site independent. This Internet-based system allowed 400×300-pixel resolution at 750 kilobits per second. Junior and senior stroke neurologist examiners were compared to assess reliability. Twenty-five patients with stroke symptoms were examined both at bedside and via telemedicine by 2 NIHSS-certified neurologists. One examiner (bedside) examined the patients at the bedside; the second examiner (remote) performed scale evaluations via the STRokE DOC (Stroke Team Remote Evaluation using a Digital Observation Camera) system. The remote neurologist directed the examination assisted by the onsite neurologist rather than by a nonphysician assistant. Feasibility was shown with all NIHSS-telestroke examinations (25 of 25, 100%) performed successfully with wireless telemedicine. NIHSS-bedside and NIHSS-telestroke scores ranged from 1 to 16. Intraclass correlation coefficient was 0.94 for NIHSS and 0.95 for modified NIHSS. Using weighted $\kappa$ coefficients, this trial showed the 67% of NIHSS items and 82% of modified NIHSS items had excellent agreement (Table 3).

Wiborg et al[35] demonstrated good to excellent agreement in testing 44 patients in a similar paradigm in which a remotely located stroke neurologist interviewed and examined the patient (depending on the patient's ability to cooperate) with the support of the local referring emergency physician. They used a standard HQ-VTC system and performed 2 other stroke severity scales used in Europe, the European Stroke Scale (weighted $\kappa$=0.72 to 0.95) and Scandinavian Stroke Scale (weighted $\kappa$=0.70 to 0.97). Some of these patients were examined within the first 24 hours of symptom onset.

In summary, stroke severity scales can be reliably administered over HQ-VTC. Items with the highest interrater reliability generally include level of consciousness and motor-related questions. Items with the lowest interrater reliability generally include facial palsy, ataxia, and dysarthria. These findings are similar to bedside reliability assessments.

## Class I Recommendation

1. HQ-VTC systems are recommended for performing an NIHSS-telestroke examination in nonacute stroke patients, and this is comparable to an NIHSS-bedside assessment. Similar recommendations apply for the European and Scandinavian Stroke scales *(Class I, Level of Evidence A).*

### *Acute Stroke Setting, Including Thrombolytic Evaluation*

The reliability of the NIHSS-telestroke in controlled environments such as the outpatient or nonacute setting does not necessarily imply reliability in the more chaotic environment

in which acute stroke interventions such as thrombolytic therapy are provided. Wang et al[36] investigated the reliability of performing the NIHSS-telestroke in the acute setting either in the emergency department or during an inpatient hospital admission. A Web-based system using 1-way video transmitted from the bedside and plain old telephone service for audio communications was used to assess interrater reliability between neurologists. Twenty patients with acute ischemic stroke were examined at the bedside by a neurologist or via the telestroke system with the help of an assistant. The level of training of the assistant was not specified. The NIHSS-telestroke order was rearranged to reduce the need for camera manipulations, with items requiring close-ups performed before items requiring a zoomed-out view. NIHSS-telestroke scores ranged from 1 to 24. There was no difference of >3 points on total score between NIHSS and NIHSS-telestroke ($r$=0.9552, $P$=0.0001). This study suggests that performing the NIHSS-telestroke by this Internet-based technique is both feasible and reliable in the acute hospital and emergency department setting.

Handschu et al[37] assessed the German version of the NIHSS within 6 and 36 hours of stroke onset using a HQ-VTC system displaying 25 images per second in a view of a matrix made up of 384×288 pixels up to 768×576 pixels. NIHSS-bedside and NIHSS-telestroke scores were performed by stroke neurologists assisted by a trained medical student for the remote evaluations and ranged from 1 to 24 in 41 patients. Standard NIHSS sequencing was used, and ≈11.4 minutes was needed to perform the NIHSS-telestroke. Although no examination was aborted, there were minor issues with video (n=2), audio (n=5), and lighting (n=3), which required repetition of the NIHSS-telestroke in 2 cases. Weighted $\kappa$ results showed excellent reliability for all 13 items in 41 patients examined within 36 hours of stroke onset (weighted $\kappa$=1.0) and in 12 patients examined within 6 hours (weighted $\kappa$=0.92). These 2 reports extended the feasibility and reliability of NIHSS-telestroke administered by telemedicine to the acute hospital environment and time period when therapeutic decisions are generally made.

Additional studies have been performed to assess the feasibility and reliability of NIHSS-telestroke during an actual acute stroke consultation when many additional human and environmental demands are present. Many hospitals struggle to complete the acute stroke evaluation in time for potential thrombolytic therapy, so it needed to be demonstrated that under these time-pressured conditions, the NIHSS-telestroke can still be performed swiftly and reliably. The feasibility of performing the NIHSS-telestroke during actual thrombolytic consultations has been demonstrated in multiple observational cases series. The originating sites (ie, clinical setting where the patient is physically located) include (1) a remote Maryland facility using ISDN connections and a restructured NIHSS-telestroke (23 telemedicine cases),[38] (2) an isolated Massachusetts island hospital (24 telemedicine cases),[39] (3) 12 German community hospitals within an ISDN network (1123 cases),[40] (4) 2 Texas community hospitals using a fiberoptic network (328 cases),[41] (5) 8 rural Georgia hospitals using a cell phone or regular telephone service for audio and a 1-way videoconferencing system (75 patients[42] and 194 patients[43]), and (6) 4 California community hospitals using HQ-VTC.[44]

Assessing NIHSS reliability during remote acute telestroke consultations is problematic because acute telestroke consults are generally performed when local neurological evaluations are unavailable. Without concurrent NIHSS-bedside examinations, interrater reliability cannot be directly assessed. Comparisons between patients examined by telestroke and others evaluated either at the bedside or by nontelemedicine techniques provide some insight into reliability in this setting. In a comparison of telestroke network hospitals and academic stroke centers, Audebert et al[45] recorded the NIHSS-telestroke (115 patients) in thrombolysis cases versus NIHSS-bedside (110 patients). Similar stroke severity scores were recorded in each group (median: NIHSS-telestroke, 12; NIHSS-bedside, 11). On the basis of these reports, performing the NIHSS during acute stroke consultation is feasible.

The recently reported STRokE DOC trial (design described previously[44]) compared decision making in acute stroke patients for thrombolytic eligibility using HQ-VTC with review of computed tomography (CT) images versus telephone consultation alone. It demonstrated that the accuracy of decision making by stroke neurologists via telestroke and assisted by the local referring physician is superior to that via telephone for patients with acute ischemic stroke when assessing their suitability for treatment with thrombolytics. Correct treatment decisions were made more often when telemedicine was used than telephone only (108 [98%] versus 91 [82%]; odds ratio, 10.9; 95% CI, 2.7 to 44.6; $P$=0.0009).[46] An ongoing clinical trial will further address the issue of reliability of the NIHSS-telestroke during acute stroke consultation (TRUST-tPA: Therapeutic Trial Evaluating Efficacy of Telemedicine [TELESTROKE] of Patients With Acute Stroke; NCT00279149).[47] We are not aware of any other published data that explore the reliability of other nonstroke experts performing an NIHSS-telestroke compared with a stroke specialist or a nonstroke expert at the bedside. Although this is fertile ground for further inquiry, we must limit our current recommendations to neurological assessments involving stroke specialists.

### Class I Recommendation

1. The NIHSS-telestroke examination, when administered by a stroke specialist using HQ-VTC, is recommended when an NIHSS-bedside assessment by a stroke specialist is not immediately available for patients in the acute stroke setting, and this assessment is comparable to an NIHSS-bedside assessment *(Class I, Level of Evidence A).*

### Feasibility and Reliability of Remote Assessment of Neuroimaging in Acute Stroke

All commercially available FDA-approved teleradiology systems produce images of sufficient quality for clinical interpretation. The application of teleradiology to acute stroke per se is a recent phenomenon. In 1990, the first mobile magnetic resonance imaging (MRI) scanner became available in the

Netherlands, and teleradiology was used by MRI specialists to support local physicians. From 1992 to 1993, expert opinion was sought in 43 cases, or 3% of the total scanner volume, with suspected subacute cerebral ischemia or infarction listed by the expert reviewer as probably MRI artifact in 2 cases.[48] In 2000, Yamada et al[49] used a mobile phone system to analyze emergency department CT, MRI, and angiographic images in 100 patients to facilitate rapid triage. Among the 100 patients included, there was a broad range of neurological conditions, including, but not limited to, ischemic stroke. Although these authors found the system adequate to evaluate most conditions, they commented that localization of ischemic stroke on the transmitted images required knowledge of a patient's physical examination.[49]

Several studies have examined the reliability of CT interpretation in actual or simulated acute stroke encounters between different providers. In 2001, Johnston et al[50] compared blinded stroke neurologists' reading of CTs using 2 different methods (teleradiology and review of printed films on a light box) and the reference standard of a neuroradiologist review of printed films on a light box. Sixty head CTs obtained during consecutive acute stroke evaluations for thrombolytic therapy were used. Agreement among neurologists for eligibility for thrombolysis by image review on a light box versus teleradiology was excellent ($\kappa=1.0$). Compared with the neuroradiologist's review (ie, the reference standard), the neurologist's sensitivity was 100% (95% CI, 0.93 to 1.0) and specificity was 100% (95% CI, 0.40 to 0.98) using either teleradiology or light box. This pilot study provided evidence that neurologists with stroke expertise can assess head CT scans via teleradiology to determine eligibility for intravenous tPA eligibility.

In 2005, 12 hospitals in Bavaria established a stroke network with the stroke center in Munich-Harlaching and Regensburg.[51] The goal was to evaluate the safety and efficacy of using telestroke to increase the use of intravenous tPA for acute ischemic stroke in the community hospital setting. In this program, HQ-VTC was used in conjunction with review of the CT images. Hypodensity visible on CT was one of the primary reasons for withholding thrombolytic therapy in 250 of 356 ischemic stroke patients evaluated over a 13-month period.[51]

Schwamm et al[39] reported on data from 24 patients in whom compressed brain images were interpreted by the telestroke neurologist in a browser-based image viewer (AMICAS, Inc, Waltham, Mass) on a Pentium-based desktop personal computer equipped with a cathode-ray tube monitor set at 1024×768-pixel resolution. Independently, a neuroradiologist reviewed uncompressed images at a high-resolution (2000×2000 pixel) workstation for clinical interpretation (AGFA, Inc). Both readers were blinded to the other's interpretation. For the first 15 patients evaluated, a second neuroradiologist was later provided with a clinical summary and retrospectively performed an interpretation, blinded to all other interpretations. There was perfect agreement among all readers for detecting absolute imaging exclusions to intravenous tPA, although the number of exclusions was small. The potential exclusions included the presence of any intracranial hemorrhage (n=1; subtle subdural hematoma), brain tumor, or acute hypodensity greater than one third of the middle cerebral artery territory (n=0). The interrater agreement for subtler ischemic changes was more variable. Transmission of the head CT was delayed for technical reasons in 1 patient (4.1%), who presented beyond the time window for intravenous tPA.

However, these studies have not compared the accuracy of image interpretation by stroke neurologists or other nonradiologists as a function of their level of training and experience. Further high-quality studies are needed to define the minimum level of training and expertise required by an individual physician to achieve results in acute brain imaging interpretation similar to that of a stroke specialist.

### Class I Recommendations

1. Teleradiology systems approved by the FDA (or equivalent organization) are recommended for timely review of brain CT scans in patients with suspected acute stroke *(Class I, Level of Evidence A).*
2. Review of brain CT scans by stroke specialists or radiologists using teleradiology systems approved by the FDA (or equivalent organization) is useful for identifying exclusions for thrombolytic therapy in acute stroke patients. *(Class I, Level of Evidence A).*
3. When implemented within a telestroke network, teleradiology systems approved by the FDA (or equivalent organization) can be effective in supporting rapid imaging interpretation in time for thrombolysis decision making *(Class I, Level of Evidence B).*

### Feasibility and Effectiveness of Telemedicine Consultation for Enabling and Providing Recommendations in Favor of or Against the Use of Intravenous tPA in Patients With Suspected Acute Ischemic Stroke

Several groups have shown the feasibility of using telestroke consultation for enabling and providing recommendations in favor of or against the use of intravenous tPA in patients with suspected acute ischemic stroke, resulting in thousands of acute stroke evaluations and a substantially increased number of tPA administrations.[52] Many of these studies have been in small community hospitals without prior tPA experience or 24/7 neurology coverage.[38,39,41–45,47,53–56]

The number of centers using telestroke for acute stroke care, including recommendations regarding thrombolysis, is growing. Feasibility has been established using primarily uncontrolled case series from single or multiple sites. Most originating sites (ie, the facility where the patient is located) have been rural or community hospitals, with increasing adoption by urban centers that are without adequate onsite neurology coverage.

The safety of using telestroke consultation for providing recommendations in favor of or against the use of intravenous tPA in patients with suspected acute ischemic stroke has been studied generally via the safety of giving tPA to a patient with an acute ischemic stroke. The major safety outcome studied has been symptomatic intracerebral hemorrhage and in-hospital mortality. Safety has also been indirectly studied by determining a diagnosis other than acute ischemic stroke so

that intravenous tPA would be contraindicated and thus potentially produce harm. The number of patients in whom tPA was overused or underused has not been reported.

The ability to identify stroke mimics in general and those patients with malingering, conversion reaction, or Munchausen's syndrome might be more difficult during telestroke evaluation than in person, but this has not been reported. By reviewing the video, Hess et al[43] recommended against treatment in 4 patients thought to have conversion disorders. There was no independent validation of this diagnosis. Recognition of nonvascular stroke-like syndromes has been evaluated in 3 studies. The rates of telestroke consultations yielding nonstroke diagnoses in these studies were 12%,[40] 16%,[53] and 30%.[39] In 1 study, the nonvascular origin was verified in the vast majority of identified cases.[40]

In 1 study, intravenous tPA protocol violations occurred in 15 of 106 cases (15%) during the first year of follow-up.[51] A second-year analysis found that patients who received tPA remotely after telestroke consultation had a nonsignificantly higher symptomatic intracerebral hemorrhage rate as defined by National Institute of Neurological Disorders and Stroke (NINDS) criteria (7.8% versus 2.7%; $P=0.14$) but a similar space-occupying parenchymal hemorrhage rate (PH2) as defined by the European Cooperative Acute Stroke Study (4.3% versus 2.7%; $P=0.72$) and similar in-hospital mortality rate compared with patients treated in established stroke centers (3.5 versus 4.5%; $P=0.74$).[45] On the basis of data from the Telemedic Pilot Project for Integrative Stroke Care (TEMPiS) study,[55] long-term mortality rates and functional outcomes (at 3 and 6 months) for patients at telestroke-enabled community hospitals using tPA were similar and comparable to the results of previous conventionally delivered tPA trials.[57] One hundred seventy patients were treated with tPA in the telestroke hospitals; 132 were treated in the stroke center hospitals. Mortality rates were 11.2% versus 11.5% at 3 months ($P=0.55$) and 14.2% versus 13% at 6 months ($P=0.45$). A good functional outcome after 6 months was found in 39.5% of patients at the telestroke hospitals versus 30.9% at the stroke centers ($P=0.10$) as defined by modified Rankin Scale (mRS) and 47.1% versus 44.8% ($P=0.44$) as defined by the Barthel Index (BI). These results reflect not just telestroke evaluation but also the formation of specialized stroke teams at the remote hospitals who underwent comprehensive stroke training, including thrombolysis management.

Limitations of the TEMPiS study include a cluster-control rather than randomized design and unblinded end-point assessment. Functional assessment at 6 months was missing in 1 of every 14 telestroke patients. Exclusion criteria included posterior circulation syndromes, very mild (NIHSS $<5$), or very severe strokes (NIHSS $>20$), thus limiting generalizability and comparability of their experience directly to published trials.

As described previously, the STRokE DOC trial compared HQ-VTC with telephone assessment for tPA eligibility assessment. Although the numbers of treated patients were small, intravenous thrombolytics were used at similar rates (28% telemedicine versus 23% telephone; $P=0.43$). The 90-day functional outcomes for the whole cohort were not different for the BI (95 to 100) (43% versus 54%; $P=0.13$) or mRS (34% versus 47%; $P=0.09$) score. There was no difference in overall mortality (19% versus 13%; $P=0.27$) or rates of intracerebral hemorrhage (7% versus 8%; $P=1.0$). Unadjusted mortality after treatment with thrombolytics was higher in the telemedicine group (39% versus 12%; $P=0.03$[17]), but this was no longer significant ($P=0.17$) when adjusted for the baseline NIHSS, which was much higher in the telemedicine group. Notably, there were more incomplete data in the telephone group than in the telemedicine group (12% versus 3%; $P=0.0001$). Only a portion of those treated with tPA were urgently transferred ("drip and ship"). No studies have specifically addressed the safety and efficacy of drip and ship versus drip and keep in a telestroke paradigm.

In summary, mortality after intravenous tPA recommended by a telestroke-supported stroke unit or by emergency department consultation appears to be similar to that in previous trials and clinical practice. A prospective, randomized controlled trial of telemedicine versus telephone suggests that similar intracerebral hemorrhage rate and functional outcomes can be achieved in comparable acute stroke populations.

## Class I Recommendation

1. It is recommended that a stroke specialist using HQ-VTC provide a medical opinion in favor of or against the use of intravenous tPA in patients with suspected acute ischemic stroke when on-site stroke expertise is not immediately available *(Class I, Level of Evidence B).*

## Telestroke Consultation Availability and Rates of Appropriate Use of Intravenous tPA

A report of the results of telemedicine consultation at 2 community hospitals in Houston compared rates of intravenous tPA over 13 months to the rate in the previous 13 months.[41] An *International Classification of Diseases*, ninth revision, clinical modification, review of ischemic strokes at these hospitals for the previous 13 months and during the telestroke project identified a prior treatment rate of 0.8%, increasing to 4.3% of all strokes during the telestroke project. Local programs highlighting telemedicine and stroke awareness, as well as stroke screenings, may have contributed to the improved treatment rates. The REACH (Remote Evaluation of Acute isCHemic stroke) program included telemedicine consultation to 8 hospitals in rural Georgia.[43] Over 15 months, 30 patients were treated with intravenous tPA from 194 acute telestroke consults. The total number of stroke patients at these hospitals during this interval was not reported. No prior monitoring of tPA treatment rates was noted, although the report suggests that tPA was not used previously at these sites.[42] Institution of telemedicine was accompanied by an educational course for the hospital staff involved in stroke care.

The TEMPiS project established HQ-VTC telestroke services to a network of 12 hospitals in Bavaria serviced by 2 hub stroke centers.[58] A report from the TEMPiS project reports a 10-fold relative increase in the thrombolysis treatment numbers at telestroke network hospitals compared with

the 12-month period before the network was started (from 10 to 115 per year).[45] A similar increase was found in the prospective study of the same group in the telestroke network hospitals compared with hospitals without network implementation (4.6% versus 0.4% of all stroke patients during a 21-month period).[55]

The Telemedicine in Stroke in Swabia (TESS) project reported intravenous tPA treatment in 2 of 153 patients (1.3%) evaluated by HQ-VTC over 18 months but provided no prior treatment rate information.[53] A telemedicine service in Ontario treated 27 of 88 evaluated patients (31%) over 34 months but also provided no information regarding treatment rates before their telestroke project was started.[56]

LaMonte et al[38] compared treatment rates by HQ-VTC and telephone consultation at the same site over a 2-year period. Intravenous tPA was administered in 23.8% of 21 telemedicine consults and only 3.8% of 27 telephone consults. Assignment to the 2 different arms was biased and makes interpretation of differences difficult because telephone consults were used when the telemedicine system was not available but also when patients were outside the 3-hour time window or not considered eligible for acute stroke treatment. No information was provided regarding rate of treatments for all eligible patients or all stroke patients.

Schwamm et al[39] reported the results of telemedicine consultation services provided over 27 months to a hospital located on an island just off the Massachusetts coast. Twenty-four patients were evaluated by HQ-VTC. Intravenous tPA treatment was initiated in 6 of 10 patients (60%) presenting within 3 hours of stroke onset and in 6 of 8 (75%) in whom telestroke consultation was begun within 3 hours after onset. It is not stated whether this represents all the acute stroke patients evaluated at this hospital during this time. There were 106 admissions for ischemic stroke during the 27 months of intervention, with 6 of 106 (5.6%) of all patients treated with intravenous tPA. This was significantly increased compared with 0 of 100 patients with ischemic stroke admitted during the 2-year period before the intervention, despite emergency department availability of intravenous tPA and a written tPA protocol in place ($P=0.03$).

In many of these studies and in practice, significant education and training frequently accompany telemedicine services and may have contributed to a measured increase in tPA treatment. Specifically, there is limited evidence regarding the extent or duration of training of the bedside assistant and their levels of expertise. In some cases, these are physicians; in others, they may be licensed nurses, advanced practice nurses, or emergency medical technicians, and they may be trained specifically in the operation of the telestroke technology recognition or in the use of accepted scales for evaluation of suspected stroke. Further high-quality studies are needed to define the minimum educational requirements and level of medical and technology training necessary for the bedside assistant to be an effective partner in telestroke care delivery. This is especially important in light of the decreasing availability and increasing cost of providing trained physicians to staff emergency departments.

In addition, there are limited data on the impact of concerns by practitioners regarding medical liability on the implementation of telestroke support systems. This may also limit the rapid generalizability of telestroke, especially in the United States.

In summary, the rate of treatment of acute stroke patients treated with telemedicine is considerably higher than most reported intravenous tPA treatment rates at community hospitals. In most cases, the treatment rate applies only to patients evaluated by HQ-VTC rather than the total number of stroke patients or intravenous tPA–eligible patients presenting to those hospitals. Few studies recorded the total number of stroke patients evaluated at telestroke hospitals, making it impossible to calculate the rate of intravenous tPA treatment before and after the introduction of telestroke. However, it is unlikely that total ischemic stroke admissions increased dramatically during the intervention period compared with baseline; therefore, increases in raw rates of tPA use likely reflect increased percentages of all stroke admissions.

### Class II Recommendation

1. Implementation of telestroke consultation in conjunction with stroke education and training for healthcare providers can be useful in increasing the use of intravenous tPA at community hospitals without access to adequate onsite stroke expertise *(Class IIa, Level of Evidence B).*

### Telephone Consultation Availability and Rates of Appropriate Use of Intravenous tPA

Telephone contact with a neurologist or stroke team member is probably the most common means of acute stroke consultation currently in widespread use. The lack of adequate monetary compensation for emergency stroke evaluation and the limited number of stroke specialists available likely limit frequent or consistent 24/7 onsite consultation.

Frey et al[59] published a retrospective analysis of the use of telephonic consultation in acute stroke to select patients for intravenous tPA compared with a cohort of patients receiving tPA after in-person evaluation at the referral care center (53 tPA patients treated by telephone versus 73 tPA patients treated in person). In this experience, 43 community hospitals were provided with telephone assistance by the referral stroke center to select eligible patients for tPA thrombolysis on arrival in the emergency department. Patients treated by telephone were transported to the referral stroke center (mean distance, 277 miles) with infusion continued during flight transportation (flight time, 20 to 90 minutes). Treatment by telephone increased the number of patients treated with tPA at the referral stroke center by 72%. Although intravenous tPA use increased, the reported patient outcomes were poorer with telephone-based tPA care. There were similar rates of symptomatic intracerebral hemorrhage (6% versus 3%; $P=$NS) but significantly fewer discharges home, significantly more discharges to a skilled nursing facility, and a trend toward higher mortality (7% versus 1%; $P=0.08$).[59] The authors state that "stroke severity was lower in the in-house group, for which outcomes were more favorable, consistent with the difference in stroke types" (p 154). However, no initial stroke severity scores are reported, and there is no

statistically significant difference in the stroke subtypes reported. The telephonically treated patients were older (67 versus 61 years; $P=0.04$), and it is possible that the differences in baseline characteristics in this retrospective cohort may account for part or all of the outcome differences.

Increased use of intravenous tPA has also been observed in a network of 20 hospitals.[60] In a third network of community hospitals located within 100 miles of Saint Luke's Stroke Center in Kansas City, 53 of 142 tPA-treated patients had tPA treatment initiated in the referring hospital after telephone consultation, and these patients had an acceptable hemorrhage rate.[61] Comparing the patients transferred after intravenous tPA with those receiving intravenous tPA at the tertiary referral center showed that there were no differences in mortality, percentage with NIHSS <6, or length of stay.[62] In a retrospective study of the safety of intravenous tPA using telephonic expert guidance in a rural community hospital linked to the University of Kentucky Medical Center,[63] symptomatic intracerebral hemorrhage occurred in 3 of 121 consecutive patients (2.5%), and mortality was 7.5%. Forty-seven percent of patients were discharged home. There were no controls in this study.

In summary, implementation of a stroke center telephone consultation service in conjunction with stroke education and training for healthcare providers may increase the use of intravenous tPA at community hospitals without access to adequate onsite stroke expertise. However, there are limited data on to the safety and efficacy of this approach.

### Class II Recommendation

1. Compared with traditional bedside evaluation and use of intravenous tPA, the safety and efficacy of intravenous tPA administration based solely on telephone consultation without CT interpretation via teleradiology is not well established *(Class IIb, Level of Evidence C).*

### Feasibility, Safety, and Effectiveness of Using Telemedicine Consultation for Enrollment Into Acute Stroke Clinical Trials

By increasing access to expert stroke specialists, a telemedicine videoconferencing system has the potential acutely and remotely to select patients for inclusion in clinical trials. Although there are several trials using telemedicine as part of the study intervention, to the best of our knowledge, there are currently no acute stroke clinical trials specifically testing the hypothesis of whether the use of HQ-VTC telestroke can increase enrollment into clinical trials. There are insufficient data to support a recommendation regarding the use of HQ-VTC. However, the completed Field Administration of Stroke Therapy–Magnesium (FAST-MAG) Pilot Trial has demonstrated the feasibility of enrolling patients via cellular telephone–based screening and consent into a hyperacute neuroprotective trial before hospital arrival.[64]

### Class II Recommendation

1. Prehospital telephone-based contact between emergency medical personnel and stroke specialists for screening and consent can be effective in facilitating enrollment into hyperacute neuroprotective trials *(Class IIa, Level of Evidence B).*

## Subacute Stroke Treatment and Secondary Prevention (Hospital Based)

### Feasibility and Effectiveness of Telemedicine Within Organized Systems of Stroke Care

This section focuses on the use of HQ-VTC to support organized inpatient stroke care or stroke units, which are one of the most widely available and best supported evidence-based stroke recommendations.[65] Both primary and comprehensive stroke centers should have personnel, programs, expertise, and infrastructure to rapidly triage acute stroke patients, to implement acute therapies (such as intravenous tPA), and to admit stroke patients into dedicated stroke units.[66] For many rural areas, limited availability of physicians and therapists with stroke expertise may be a primary barrier to achieving and maintaining a specialized stroke center. Stroke specialists are needed to recognize stroke mimics and high-risk patients, to assist in selecting appropriate acute and subacute treatments, and to select patients who may benefit from interventions available only at comprehensive stroke centers. Expertise may also be needed for in-hospital subacute care to determine stroke origin and optimal secondary prevention, as well as guidance of a multidisciplinary approach to early stroke rehabilitation and prevention of complications.

The TEMPiS study reviews the experience of two comprehensive stroke centers that partnered with 12 regional hospitals that had no stroke units before network implementation.[40] In addition, data were collected from nonparticipating control hospitals. The formation of the stroke teams at each regional center was supported by the 2 comprehensive stroke centers through an intensive stroke education program and financial support from the regional insurance carriers to hire additional dedicated therapists and place them at the regional community hospitals. Because most of the regional hospitals had no inpatient neurology service, specific indications for inpatient telestroke unit consultations were defined in advance, and the telestroke program provided the neurological expertise required to run the stroke units at the smaller regional hospitals.

The high rate of patients presented for telestroke consultations (38%)[40] and the significant number of patients treated with thrombolysis[55] appear to support the mutually beneficial relationship between dedicated stroke care units and telestroke networks. Hospitals with telestroke access to stroke expertise and dedicated stroke units had significant improvements in quality of care and neurological outcomes compared with those hospitals that were not included in the telestroke network and did not have telestroke access or stroke units.[54] Patients in telestroke network hospitals had a 38% lower odds ratio of a poor outcome defined as severe disability, institutional care, or death.[54]

### Class I Recommendation

1. When the lack of local physician stroke expertise is the only barrier to the implementation of inpatient stroke

units, telestroke consultation via HQ-VTC is recommended *(Class I, Level of Evidence B).*

## Rehabilitation

### Feasibility and Effectiveness of Telemedicine Consultation for Performing Assessments of Disability After Stroke

Very little research has been published regarding the feasibility and reliability of disability scales in stroke patients via HQ-VTC. The few studies available are small pilot trials, generally use lower-quality video systems, and are generally not specific to stroke patient populations.

#### *Occupational Therapy and Allied Health Providers*

Dreyer et al[67] performed a feasibility study on 4 elderly volunteers with reported difficulties in independent living skills. They compared in-person and Internet-based assessment using 2 standardized evaluations tools: the Kohlman Evaluation of Living Skill and the Canadian Occupational Performance Measure. They used a low-bandwidth system (20 kilobits per second), a headset, a videocamera, a portable telephone, and a modem on the patient side. On the occupational therapy side were a video monitor, computer, and keyboard. For the Kohlman Evaluation of Living Skill, the offsite occupational therapist scored 1 subset differently, but the Canadian Occupational Performance Measure yielded identical scores. They concluded that the low-bandwidth video images were insufficient to measure fine motor movement but that the audio quality was excellent.[67]

Guilfoyle et al[68] investigated assessments across multiple allied health fields comparing in-person and videoconferencing assessments. In this study, a HQ-VTC videoconferencing unit connected by a 384–kilobit per second ISDN line was established in a rural long-term care facility. Twelve elderly volunteers and a nursing assistant participated in videoconference assessments. The scheduling of assessments was balanced (6 underwent in-person evaluations first and 6 underwent videoconferencing first). All subjects were assessed by allied health therapists specializing in dietetics, occupational therapy, physiotherapy, podiatry, and speech pathology. Assessment led to the generation of a care plan for each setting. In the absence of a standard reference, 2 independent, blinded raters compared the care plans. The 2 raters agreed that care plans were the same in only 35 of 60 assessments ($\kappa=0.31$). In addition, therapists rated the in-person assessments more efficient and suitable than the videoconference assessments. Although the correlation between settings was poor, interpretation of these findings is limited by several methodological flaws: One therapist performed both in-person and offsite assessments, and there was no training of the therapist to perform assessments by videoconferencing not needed in an agreement assessment.[68]

#### *Physical Therapy*

The majority of the telemedicine literature related to stroke uses in-person motor assessments to establish the efficacy of virtual reality–based interventions and does not address the use of HQ-VTC to administer standardized disability scales. Much of the literature focuses on the use of computer-generated virtual or simulated environments in which a subject's movements in real 3-dimensional space are represented on a display screen. These so-called virtual reality systems simulate a real-world environment via computer software, and movements are practiced by the user through a human-machine interface.[69]

In a normal volunteer study of disability, Russell et al[70] investigated the reliability of observational kinetic gait assessment performed via a low-bandwidth Internet link (using a personal computer with a Web camera connected at 18 or 128 kilobits per second). Twenty-four volunteers underwent evaluation by a modified Gait Assessment Rating Scale (a 17-item 4-point gait quality scale), which was recorded by full-resolution video. The video clips were then accessed online, establishing an interrater reliability (intraclass correlation of 0.92 and intrarater reliability of 0.96 comparable across different Internet speeds.[70]

A single study established the feasibility and accuracy of physical assessments for stroke patients via HQ-VTC. Physical therapists (PTs) administered the European Stroke Scale and the Functional Reach Test to 26 subjects with a history of stroke, both face to face and remotely, via an HQ-VTC connected at 384 kilobits per second. Patients were randomized to remote or face-to-face administration groups. Each patient was simultaneously rated by both the face-to-face and remote PTs blinded to the ratings. Equivalence was set at the 95% limits of agreement. When the face-to-face PT directed the patient, the 2 PTs reported equivalent values in >90% of the patients for the Functional Reach Test and for all European Stroke Scale components, with the exception of gait (83%) and maintaining leg position (85%). When the remote PT directed the patient, the 2 PTs reported equivalent values in >90% of the patients for the Functional Reach Test and >83% for all European Stroke Scale components.[71]

#### *Speech and Language Pathology*

In contrast to the fields of occupational therapy and physical therapy, the level of evidence for stroke-related speech and language assessments via HQ-VTC is more convincingly established. In 2004, Brennan et al[72] published one of the first studies comparing traditional face-to-face speech and language evaluation to HQ-VTC assessment using the story retelling procedure. Although there was a mixed patient population, this study included 14 right hemispheric and 14 left hemispheric stroke patients within 1 year of symptom onset. This study used real-time audio and HQ-VTC while using a computerized story retelling program via a 10–megabyte per second local area network connection. There was no significant difference between the ratings from the 2 settings ($P=0.05$ by paired $t$ test).[72]

In a well-designed pilot study, Hill et al[73] assessed 19 speakers with dysarthria face to face and via an Internet-based application (real-time videoconferencing at 128 kilobits per second and the transfer of store and forward audio and video between patient and speech and language pathologist). Subjects were assessed with dysarthria ratings: Frenchay Dysarthria Assessment, dysarthria severity rating, perceptual speech battery, and the Assessment of Intelligibility of Dysarthric Speech.

The interrater reliability for these measures is $\rho$=0.72, 0.90, 0.57 to 0.85, and $r$=0.90, respectively. However, because this study included only 2 stroke patients of 19 total subjects, its generalizability to the stroke population may be limited.[73]

In a separate study, Palsbo[74] used a randomized, double-crossover agreement study of 24 poststroke patients randomized to a remote or face-to-face administration of a subset of the Boston Diagnostic Aphasia Examination and to remote or face-to-face assessment of speech comprehension, speech expression, and motor speech. The HQ-VTC equipment was operated at a transmission speed of 384 kilobits per second. Each patient was simultaneously scored by both the face-to-face and remote speech and language pathologists in a blinded fashion. Percentage agreement within the 95% limits of agreement ranged from 92% to 100% for each functional communication measure.[74]

### Class I Recommendation

1. Assessment of occupational, physical, or speech disability in stroke patients by allied health professionals via HQ-VTC systems using specific standardized assessments is recommended when in-person assessment is impractical, the standardized rating instruments have been validated for HQ-VTC use, and administration is by trained personnel using a structured interview *(Class I, Level of Evidence B).*

## Feasibility and Effectiveness of Telephonic Consultation for Performing Assessments of Disability After Stroke

Many stroke patients undergoing rehabilitation often require a range of therapies over extended periods of time, which frequently necessitate changes in venue. A feasible and reliable assessment tool is essential to establishing effectiveness of therapy. The use of telephone follow-up to establish the level of disability can be helpful in clinical practice and research. Whereas a wide variety of stroke outcome scales have been developed and validated, only those high-quality studies establishing reliability for telephonic administration are discussed in detail.

Of the quoted references, only 2 studies that test the reliability of the BI in stroke patients when administered over the telephone have been published in full. The BI, 10-item scale that assesses the level of independence for activities of daily living, is a frequently used. An early small study in stroke patients yielded a positive correlation between raters in person and over the telephone but used trends rather than reliability statistics.[75] In another study of 391 subjects, more than half of whom were stroke patients, the BI performed well when administered on the telephone, with an intraclass correlation of 0.89 compared with in person.[76]

The mRS is widely used in stroke research as an outcome measure, not infrequently collected by the telephone.[77] In their editorial, Newcommon et al[78] emphasized that administering the mRS over the telephone may lead to low interrater reliability ($\kappa$=0.03). NINDS investigators found an improved interrater reliability when administered by an experienced rater using dichotomized outcomes (mRS≤1, $\kappa$=0.78; mRS≥2, $\kappa$=0.74).[79] Wilson et al[80] showed that the mRS given as a structured interview (which can be delivered via the telephone) results in a higher interrater reliability than when obtained in person without a structured approach (weighted $\kappa$=0.93).

The Functional Independence Measure (FIM), a validated disability rating scale, is generally used in the rehabilitation setting. This 18-item, 7-level scale is used to assess the need for assistance in activities of daily living in 6 areas: self-care, sphincter control, transfers, locomotion, communication, and social cognition. The FIM has good interrater agreement, test-retest reliability, and validity in stroke patients.[81,82] Smith et al[83] performed a blinded comparison of in-person versus telephone FIM ratings in patients with stroke, demonstrating a total FIM intraclass correlation of 0.97 and intraclass correlation ranging from 0.85 to 0.98 for FIM subscales (except for social cognition, which showed poor correlation). Very similar correlations were found when the FIM was administered to a patient proxy (caregiver) via the telephone.[84]

The Stroke Impact Scale was developed with extensive psychometric testing and has no significant floor or ceiling effect.[85] This 59-item questionnaire contains the following domains: strength, hand function, activities of daily living/instrumental activities of daily living mobility, emotion, memory, concentration, and social participation. Kwon et al[86] have shown that it is feasible to administer the Stroke Impact Scale at 12 weeks after stroke and the mRS at 16 weeks after stroke via telephone. Telephone survey administration yielded a higher response rate, less bias in responder selection, and higher test-retest reliability than a mail-in survey.[87]

In summary, the feasibility and reliability of telephonically administered stroke disability scales have been established to a reasonably high level of evidence for the BI, mRS, and Stroke Impact Scale. The interrater reliability may be improved by the use of experienced raters and structured interviews. The use of a patient proxy may add considerable variability.

### Class I Recommendation

1. Telephonic assessment for measuring functional disability after stroke is recommended when in-person assessment is impractical, the standardized rating instruments have been validated for telephonic use, and administration is by trained personnel using a structured interview *(Class I, Level of Evidence B).*

## Feasibility, Safety, and Effectiveness of Providing Telemedicine-Enabled Poststroke Rehabilitation

*Telerehabilitation* is defined as the ability to provide distance support, evaluation, and intervention to persons who are disabled via telecommunication and is a subcategory of the wider area of telemedicine.[88] Access to services and quality of care were key factors in the development of telerehabilitation. The unfortunate reality is that many stroke survivors who complete inpatient rehabilitation have restricted access to outpatient rehabilitation services, especially those who reside in rural locations.[89] Telerehabilitation has the potential to provide timely and efficient postacute care for stroke patients beyond the hospital and into an individual's home so that clinicians are able to monitor the patient's health status

and to identify conditions that need improvement before complications or adverse complications ensue, eventually improving patient function while reducing long-term disability and costs.[88] A few nursing studies have emerged in the literature that explored the use of videoconferencing and telemedicine technologies with stroke survivors and their caregivers.[90–93] Although these studies provide some preliminary evidence of satisfaction and feasibility of these technologies, more work is needed to demonstrate the efficacy of these methods in promoting in home rehabilitation. A recent systematic review of the application of telerehabilitation services for stroke patients yielded only a small number of studies. This small number of studies, discussed in detail below, delineates the extent to which telerehabilitation is feasible for stroke patients.

### Feasibility of Telemedicine by PTs/Occupational Therapists in Community-Based Rehabilitation

Videoconferencing applications have been found to be feasible in community-based stroke rehabilitation. In a sample of 21 stroke patients living at home in Hong Kong, Lai et al[88] developed an 8-week intervention program—1 session per week and 1.5 hours per session that consisted of conversations about education, exercise, and social support—at a community center for community-dwelling stroke patients. The program was performed by a PT through a videoconference link, and a nonprofessional assistant was located at a community center to operate the equipment. The education element included signs and symptoms of stroke and the pathophysiology of stroke; the exercise program focused on improving balance and strength, involving mainly leg muscles. The study participants were asked to exercise at their home ≥3 times per week.[88] After the 8-week intervention, a significant improvement was found in the Berg Balance Test (mean improved score, 42.2 to 49.0), all subscales of the Medical Outcomes Study 36-Item Short Form, the State Self-Esteem Scale, and a stroke knowledge test. These findings demonstrated the feasibility and safety of using videoconferencing for community-based stroke rehabilitation.

Similarly, a separate study demonstrated the feasibility of using videoconferencing technology for delivering multifactorial, in-home rehabilitation intervention for community-dwelling adults who had recently been prescribed a mobility aid.[94] The intervention used regular telephone service to provide low-quality 2-way video and audio interaction between the occupational therapist and patient regarding prescription and/or training in functionally based exercises,

**Table 4. Summary of Recommendations**

Class I recommendations

1. High-quality videoconferencing systems are recommended for performing an NIHSS-telestroke examination in nonacute stroke patients, and this is comparable to an NIHSS-bedside assessment. Similar recommendations apply for the European and Scandinavian Stroke scales (Class I, Level of Evidence A).
2. The NIHSS-telestroke examination, when administered by a stroke specialist using high-quality videoconferencing, is recommended when an NIHSS-bedside assessment by a stroke specialist is not immediately available for patients in the acute stroke setting, and this assessment is comparable to an NIHSS-bedside assessment (Class I, Level of Evidence A).
3. Teleradiology systems approved by the FDA (or equivalent organization) are recommended for timely review of brain CT scans in patients with suspected acute stroke (Class I, Level of Evidence A).
4. Review of brain CT scans by stroke specialists or radiologists using teleradiology systems approved by the FDA (or equivalent organization) is useful for identifying exclusions for thrombolytic therapy in acute stroke patients (Class I, Level of Evidence A).
5. When implemented within a telestroke network, teleradiology systems approved by the FDA (or equivalent organization) are useful in supporting rapid imaging interpretation in time for thrombolysis decision making (Class I, Level of Evidence B).
6. It is recommended that a stroke specialist using high-quality videoconferencing provide a medical opinion in favor of or against the use of intravenous tPA in patients with suspected acute ischemic stroke when on-site stroke expertise is not immediately available (Class I, Level of Evidence B).
7. When the lack of local physician stroke expertise is the only barrier to the implementation of inpatient stroke units, telestroke consultation via high-quality videoconferencing is recommended (Class I, Level of Evidence B).
8. Assessment of occupational, physical, or speech disability in stroke patients by allied health professionals via high-quality videoconferencing systems using specific standardized assessments is recommended when in-person assessment is impractical, the standardized rating instruments have been validated for high-quality videoconferencing use, and administration is by trained personnel using a structured interview (Class I, Level of Evidence B).
9. Telephonic assessment for measuring functional disability after stroke is recommended when in-person assessment is impractical, the standardized rating instruments have been validated for telephonic use, and administration is by trained personnel using a structured interview (Class I, Level of Evidence B).

Class II recommendations

1. High-quality videoconferencing is reasonable for performing a general neurological examination by a remote examiner with interrater agreement comparable to that between different face-to-face examiners (Class IIa, Level of Evidence B).
2. Implementation of telestroke consultation in conjunction with stroke education and training for healthcare providers can be useful for increasing the use of intravenous tPA at community hospitals without access to adequate onsite stroke expertise (Class IIa, Level of Evidence B).
3. Compared with traditional bedside evaluation and use of intravenous tPA, the safety and efficacy of intravenous tPA administration based solely on telephone consultation without CT interpretation via teleradiology are not well established (Class IIb, Level of Evidence C).
4. Prehospital telephone-based contact between emergency medical personnel and stroke specialists for screening and consent can be effective in facilitating enrollment into hyperacute neuroprotective trials (Class IIa, Level of Evidence B).
5. Delivery of occupational or physical therapy to stroke patients by allied health professionals via high-quality videoconferencing systems is reasonable when in-person assessment is impractical (Class IIa, Level of Evidence B).

environmental modifications, and assistive technology. Data presented on 13 patients (mean age, 58.2 years) indicated that on average 13.1 mobility/self-care problems per patient were identified and an average of 12.5 recommendations per patient were made to address these problems.[94]

In summary, the findings suggest that HQ-VTC for telerehabilitation is feasible for delivery of in-home rehabilitation care.

### Class II Recommendation

1. Delivery of occupational or physical therapy to stroke patients by allied health professionals via an HQ-VTC systems is reasonable when in-person assessment is impractical *(Class IIa, Level of Evidence B).*

## Conclusion

This new statement provides a comprehensive and evidence-based review of the scientific evidence supporting the use of telemedicine for stroke care delivery organized by the stroke systems of care model. A summary of the recommendations organized by Class of Evidence is presented in Table 4.

## Disclosures

### Writing Group Disclosures

| Writing Group Member | Employment | Research Grant | Other Research Support | Speakers' Bureau/Honoraria | Expert Witness | Ownership Interest | Consultant/Advisory Board | Other |
|---|---|---|---|---|---|---|---|---|
| Lee H. Schwamm | Massachusetts General Hospital | Site PI for Forrest (multicenter clinical trials in thrombolysis)†; NIH-IMS3*; CDC† | None | None | Occasional expert review of medical records* None are related to telemedicine | None | Massachusetts Department of Public Health Stroke Systems Consultant†; CoAxia, Inc†; CryoCath, Inc*; RTI*; Phreesia, Inc† No commercial activities related to telemedicine | None |
| Robert G. Holloway | University of Rochester Medical Center (NY) | NIH† | None | None | None | None | Milliman, Inc* (review neurological guidelines for content and accuracy) | None |
| Pierre Amarenco | Denis Dierot University–Paris VII | Boehringer Ingelheim† (drug supply for the TRUST-tPA Trial) | None | Pfizer,* Sanofi-Aventis * | None | None | Pfizer*; Sanofi-Aventis*; Daiichi-Sankyo* | None |
| Heinrich J. Audebert | Center for Stroke Research, Charité Universitätsmedizin Berlin, Campus Benjamin Franklin, Berlin, Germany | German Federal Ministry of Research to Hospital,† Boehringer Ingelheim,* Meytec GmbH* | None | Boehringer Ingelheim Pharma GmbH* (manufacturer of thrombolysis agent and platelet inhibitor for secondary prevention of stroke), Meytec Gmbh* (manufacturer of telemedicine equipment), BMS* (manufacturer of platelet inhibitor for secondary prevention of stroke) | None | None | German Competence Network Stroke Board of Directors* (funded by the German Federal Ministry for Education and Research– BMBF) (role is coordinator of the subnet "Telemedicine in Acute Stroke"), no conflicts of interest with this activity | None |
| Tamilyn Bakas | Indiana University School of Nursing | None | None | None | None | None | None | None |
| Neale R. Chumbler | Department of Veterans Affairs, HSR&D Center for Implementing Evidence-Based Practice, Indianapolis VAMC and Department of Sociology, Indiana University School of Liberal Arts | PI of investigator-initiated grant funded by Rehabilitation Research & Development Division of Department of Veterans Affairs, "Home-Based Tele-Health Stroke Care: A Randomized Trial for Veterans"† (components of this grant do not conflict with duties on this committee) | None | None | None | None | None | None |
| Rene Handschu | Friedrich Alexander Universitaet | None | None | Boehringer Ingelheim,* Sanofi Aventis* | None | Siemens Co* | None | None |
| Edward C. Jauch | Medical University of South Carolina | Novo Nordisk* | None | Genentech* | None | None | Genentech*; Novo Nordisk* | None |
| William A. Knight IV | University of Cincinnati | None | None | None | None | None | None | None |

(*Continued*)

## Writing Group Disclosures, Continued

| Writing Group Member | Employment | Research Grant | Other Research Support | Speakers' Bureau/Honoraria | Expert Witness | Ownership Interest | Consultant/Advisory Board | Other |
|---|---|---|---|---|---|---|---|---|
| Steven R. Levine | Mount Sinai School of Medicine | Gaisman Aware Grant for telestroke research (Gaisman Foundation)* | None | American Academy of Neurology Annual Meeting Course* (telemedicine for stroke) | Expert witness in medicolegal case involving stroke Medlink* | None | NXY 059 AstraZeneca* (no longer active) | None |
| Marc Mayberg | SwedishNeuroscience Institute | NIH–Mechanisms of Blood Brain Barrier Disruption,† NINDS R01, NS046513-01* | Swedish Foundation Grant to establish collaborative MGH–Swedish Telestroke Program† (these funds support capital equipment acquisition to develop regional telestroke network) | None | None | Cerevision† (this company is developing workflow software to facilitate rapid stroke diagnosis and treatment, $10 000 stock option) | None | None |
| Brett C. Meyer | University of California, San Diego, School of Medicine | PI of NIH-funded Stroke Team Remote Evaluation Using a Digital Observation Camera (STRokE DOC) clinical trial, NIH (P50 NS044148)† | None | Boehringer Ingelheim (past)* | None | None | Boehringer Ingelheim*; Genentech* | None |
| Philip M. Meyers | Columbia University, College of Physicians and Surgeons–New York Presbyterian Hospitals | None | None | None | None | None | None | None |
| Elaine Skalabrin | University of Utah | None | None | Genentech*; Boehringer Ingelheim* | None | None | None | None |
| Lawrence R. Wechsler | University of Pittsburgh Medical Center | AstraZeneca*; Boehringer Ingelheim*; Boston Scientific*; NMT Medical* | None | Bristol Myers Squibb* | None | None | AstraZeneca*; Atherosys*; ImaRx*; NMT Medical*; Nuvelo*; ReNeuron*; Sage Medical* | None |

This table represents the relationships of writing group members that may be perceived as actual or reasonably perceived conflicts of interest as reported on the Disclosure Questionnaire, which all members of the writing group are required to complete and submit. A relationship is considered to be "significant" if (a) the person receives $10 000 or more during any 12-month period, or 5% or more of the person's gross income; or (b) the person owns 5% or more of the voting stock or share of the entity, or owns $10 000 or more of the fair market value of the entity. A relationship is considered to be "modest" if it is less than "significant" under the preceding definition.

*Modest.

†Significant.

## Reviewer Disclosures

| Reviewer | Employment | Research Grant | Other Research Support | Speakers' Bureau/Honoraria | Expert Witness | Ownership Interest | Consultant/ Advisory Board | Other |
|---|---|---|---|---|---|---|---|---|
| Seemant Chaturvedi | Wayne State University | None | None | None | None | None | None | None |
| Scott Kasner | Hospital of the University of Pennsylvania | None | None | None | None | None | None | None |
| Paul McMullan | Ochsner Medical Center | None | None | None | None | None | None | None |
| Karen Rheuban | University of Virginia | FCC grant for rural broadband for acute stroke access† | Medicare Health IT grant for acute stroke telehealth program† | None | None | None | None | None |

This table represents the relationships of reviewers that may be perceived as actual or reasonably perceived conflicts of interest as reported on the Disclosure Questionnaire, which all reviewers are required to complete and submit. A relationship is considered to be "significant" if (a) the person receives $10 000 or more during any 12-month period, or 5% or more of the person's gross income; or (b) the person owns 5% or more of the voting stock or share of the entity, or owns $10 000 or more of the fair market value of the entity. A relationship is considered to be "modest" if it is less than "significant" under the preceding definition.

*Modest.

†Significant.

## References

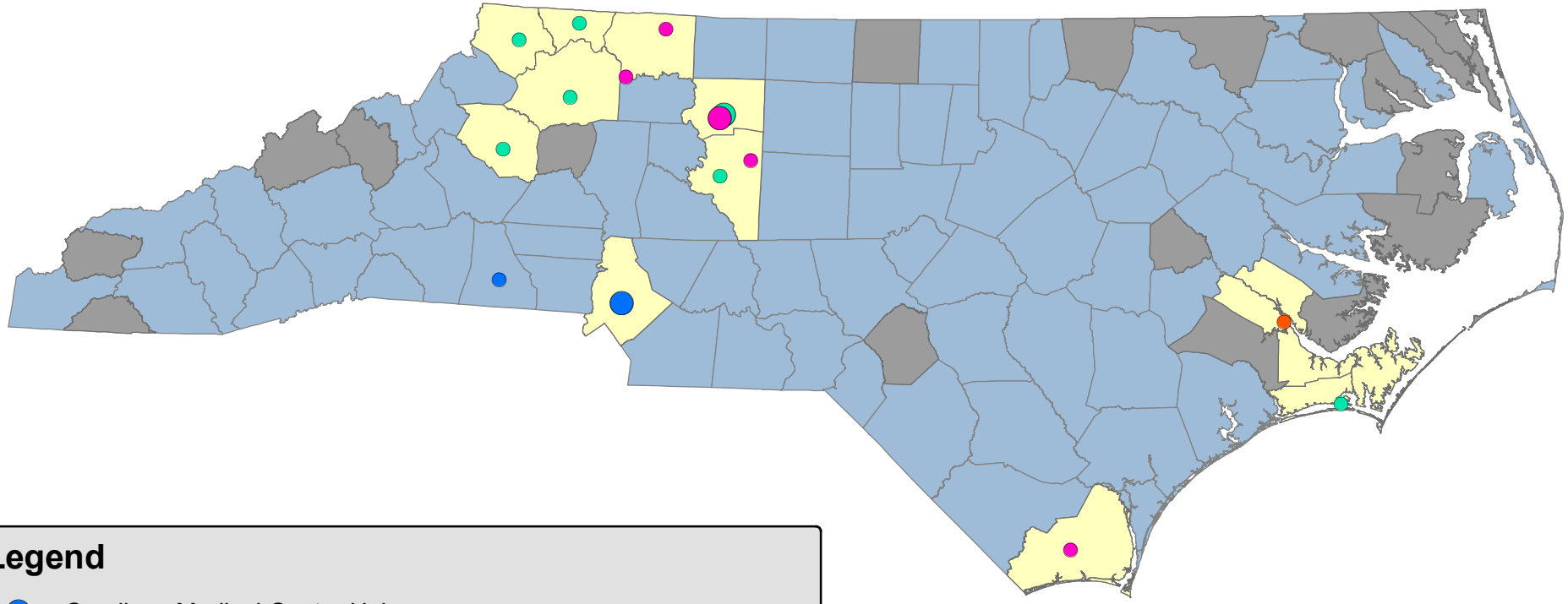

1. Park S, Schwamm LH. Organizing regional stroke systems of care. *Curr Opin Neurol*. 2008;21:43–55.
2. Reeves MJ, Arora S, Broderick JP, Frankel M, Heinrich JP, Hickenbottom S, Karp H, LaBresh KA, Malarcher A, Mensah G, Moomaw CJ, Schwamm L, Weiss P, for the Paul Coverdell Prototype Registries Writing Group. Acute stroke care in the US: results from 4 pilot prototypes of the Paul Coverdell National Acute Stroke Registry. *Stroke*. 2005;36:1232–1240.
3. *Stroke Council Guideline Development Manual*. Dallas, Tex: American Heart Association Stroke Council; 2008.
4. Perednia DA, Allen A. Telemedicine technology and clinical applications. *JAMA*. 1995;273:483–488.
5. Levine SR, Gorman M. "Telestroke" : the application of telemedicine for stroke. *Stroke*. 1999;30:464–469.
6. Thrall JH. Teleradiology, part I: history and clinical applications. *Radiology*. 2007;243:613–617.
7. *Association NEM Digital Imaging and Communications*. Rosslyn, Va: National Electrical Manufacturers Association; 1985.
8. *ACR Standard for Teleradiology*. Reston, Va: American College of Radiology; 1994.
9. Food and Drug Administration. *Radiology Devices; Classifications for Five Medical Image Management Devices; Correction–FDA: Final Rule; Correction*. Silver Spring, Md: Department of Health and Human Services; 1998;63:44998.
10. Food and Drug Administration, Department of Health and Human Services. *Radiology Devices; Classifications for Five Medical Image Management Devices–FDA: Final Rule. Vol Fed Regist.* 1998;63:23385–23387 .
11. Joint Commission on Accreditation of Healthcare Organizations. Existing requirements for telemedicine practitioners explained. *Jt Comm Perspect.* 2003;23:4.
12. *Medicare Payment of Telemedicine and Telehealth Services*. Washington, DC: American Telemedicine Organization; 2007.
13. *Medicare Guide to Rural Health Services Information for Providers, Suppliers, and Physicians*. Baltimore, Md: Centers for Medicare and Medicaid Services; 2007.
14. Kidwell CS, Saver JL, Schubert GB, Eckstein M, Starkman S. Design and retrospective analysis of the Los Angeles Prehospital Stroke Screen (LAPSS). *Prehosp Emerg Care*. 1998;2:267–273.
15. Kothari RU, Pancioli A, Liu T, Brott T, Broderick J. Cincinnati Prehospital Stroke Scale: reproducibility and validity. *Ann Emerg Med*. 1999;33:373–378.
16. Nagatuma H. Development of an Emergency Medical Video Multiplexing Transport System (EMTS): aiming at the nation-wide prehospital care in ambulance. *J Med Syst*. 2003;27:225–232.
17. Strode CA, Rubal BJ, Gerhardt RT, Bulgrin JR, Boyd SY. Wireless and satellite transmission of prehospital focused abdominal sonography for trauma. *Prehosp Emerg Care*. 2003;7:375–379.
18. LaMonte MP, Cullen J, Gagliano DM, Gunawardane R, Hu P, Mackenzie C, Xiao Y, for the Brain Attack Team. TeleBAT: mobile telemedicine for the Brain Attack Team. *J Stroke Cerebrovasc Dis*. 2000;9:128–135.
19. LaMonte MP, Xiao Y, Hu PF, Gagliano DM, Bahouth MN, Gunawardane RD, MacKenzie CF, Gaasch WR, Cullen J. Shortening time to stroke treatment using ambulance telemedicine: TeleBAT. *J Stroke Cerebrovasc Dis*. 2004;13:148–154.
20. Cote R, Battista RN, Wolfson C, Boucher J, Adam J, Hachinski V. The Canadian Neurological Scale: validation and reliability assessment. *Neurology*. 1989;39:638–643.
21. De Haan R, Horn J, Limburg M, Van Der Meulen J, Bossuyt P. A comparison of five stroke scales with measures of disability, handicap, and quality of life. *Stroke*. 1993;24:1178–1181.
22. Brott T, Adams HP Jr, Olinger CP, Marler JR, Barsan WG, Biller J, Spilker J, Holleran R, Eberle R, Hertzberg V. Measurements of acute cerebral infarction: a clinical examination scale. *Stroke*. 1989;20:864–870.
23. Goldstein LB, Bertels C, Davis JN. Interrater reliability of the NIH stroke scale. *Arch Neurol*. 1989;46:660–662.
24. Goldstein LB, Samsa GP. Reliability of the National Institutes of Health Stroke Scale: extension to non-neurologists in the context of a clinical trial. *Stroke*. 1997;28:307–310.
25. Dewey HM, Donnan GA, Freeman EJ, Sharples CM, Macdonell RA, McNeil JJ, Thrift AG. Interrater reliability of the National Institutes of Health Stroke Scale: rating by neurologists and nurses in a community-based stroke incidence study. *Cerebrovasc Dis*. 1999;9:323–327.
26. Kasner SE, Chalela JA, Luciano JM, Cucchiara BL, Raps EC, McGarvey ML, Conroy MB, Localio AR. Reliability and validity of estimating the NIH stroke scale score from medical records. *Stroke*. 1999;30:1534–1537.
27. Lyden PD, Lu M, Levine SR, Brott TG, Broderick J, for the NINDS rtPA Stroke Study Group. A modified National Institutes of Health Stroke Scale for use in stroke clinical trials: preliminary reliability and validity. *Stroke*. 2001;32:1310–1317.
28. Schmulling S, Grond M, Rudolf J, Kiencke P. Training as a prerequisite for reliable use of NIH Stroke Scale. *Stroke*. 1998;29:1258–1259.
29. Lyden P, Brott T, Tilley B, Welch KM, Mascha EJ, Levine S, Haley EC, Grotta J, Marler J. Improved reliability of the NIH Stroke Scale using video training: NINDS TPA Stroke Study Group. *Stroke*. 1994;25:2220–2226.
30. Craig JJ, McConville JP, Patterson VH, Wootton R. Neurological examination is possible using telemedicine. *J Telemed Telecare*. 1999;5:177–181.
31. Chua R, Craig J, Wootton R, Patterson V. Randomised controlled trial of telemedicine for new neurological outpatient referrals. *J Neurol Neurosurg Psychiatry*. 2001;71:63–66.
32. Craig J, Russell C, Patterson V, Wootton R. User satisfaction with realtime teleneurology. *J Telemed Telecare*. 1999;5:237–241.
33. Shafqat S, Kvedar JC, Guanci MM, Chang Y, Schwamm LH. Role for telemedicine in acute stroke: feasibility and reliability of remote administration of the NIH stroke scale. *Stroke*. 1999;30:2141–2145.
34. Meyer BC, Lyden PD, Al-Khoury L, Cheng Y, Raman R, Fellman R, Beer J, Rao R, Zivin JA. Prospective reliability of the STRokE DOC wireless/site independent telemedicine system. *Neurology*. 2005;64:1058–1060.
35. Wiborg A, Widder B, Riepe MW, Krauß M, Huber R, Schmitz B. Contribution of telemedicine to global stroke care in rural areas. *Akt Neurol*. 2000;27:119–124.
36. Wang S, Lee SB, Pardue C, Ramsingh D, Waller J, Gross H, Nichols FT III, Hess DC, Adams RJ. Remote evaluation of acute ischemic stroke: reliability of National Institutes of Health Stroke Scale via telestroke. *Stroke*. 2003;34:e188–e191.
37. Handschu R, Littmann R, Reulbach U, Gaul C, Heckmann JG, Neundorfer B, Scibor M. Telemedicine in emergency evaluation of acute stroke: interrater agreement in remote video examination with a novel multimedia system. *Stroke*. 2003;34:2842–2846.
38. LaMonte MP, Bahouth MN, Hu P, Pathan MY, Yarbrough KL, Gunawardane R, Crarey P, Page W. Telemedicine for acute stroke: triumphs and pitfalls. *Stroke*. 2003;34:725–728.
39. Schwamm LH, Rosenthal ES, Hirshberg A, Schaefer PW, Little EA, Kvedar JC, Petkovska I, Koroshetz WJ, Levine SR. Virtual TeleStroke support for the emergency department evaluation of acute stroke. *Acad Emerg Med*. 2004;11:1193–1197.
40. Audebert HJ, Wimmer ML, Hahn R, Schenkel J, Bogdahn U, Horn M, Haberl RL, for the TEMPIS Group. Can telemedicine contribute to fulfill WHO Helsingborg Declaration of specialized stroke care? *Cerebrovasc Dis*. 2005;20:362–369.
41. Choi JY, Porche NA, Albright KC, Khaja AM, Ho VS, Grotta JC. Using telemedicine to facilitate thrombolytic therapy for patients with acute stroke. *Jt Comm J Qual Patient Saf*. 2006;32:199–205.
42. Wang S, Gross H, Lee SB, Pardue C, Waller J, Nichols FT III, Adams RJ, Hess DC. Remote evaluation of acute ischemic stroke in rural community hospitals in Georgia. *Stroke*. 2004;35:1763–1768.
43. Hess DC, Wang S, Hamilton W, Lee S, Pardue C, Waller JL, Gross H, Nichols F, Hall C, Adams RJ. REACH: clinical feasibility of a rural telestroke network. *Stroke*. 2005;36:2018–2020.
44. Meyer BC, Raman R, Rao R, Fellman RD, Beer J, Werner J, Zivin JA, Lyden PD. The STRokE DOC trial technique: "video clip, drip and/ or ship." *Int J Stroke*. 2007;2:281–287.
45. Audebert HJ, Kukla C, Vatankhah B, Gotzler B, Schenkel J, Hofer S, Furst A, Haberl RL. Comparison of tissue plasminogen activator administration management between Telestroke Network hospitals and academic stroke centers: the Telemedical Pilot Project for Integrative Stroke Care in Bavaria/Germany. *Stroke*. 2006;37:1822–1827.
46. Meyer BC, Raman R, Hemmen T, Obler R, Zivin JA, Rao R, Thomas RG, Lyden PD. Efficacy of site-independent telemedicine in the STRokE DOC trial: a randomised, blinded, prospective study. *Lancet Neurol*. 2008;7:787–795.
47. Amarenco P, Nadjar M. Telemedicine for improving emergent management of acute cerebrovascular syndromes. *Int J Stroke*. 2007;2:47–50.
48. Binkhuysen FH, Ottes FP, Valk J, de Vries C, Algra PR. Remote expert consultation for MRI procedures by means of teleradiology. *Eur J Radiol*. 1995;19:147–150.
49. Yamada M, Watarai H, Andou T, Sakai N. Emergency image transfer system through a mobile telephone in Japan: technical note. *Neurosurgery*. 2003;52:986–988.
50. Johnston KC, Worrall BB, for the Teleradiology Assessment of Computerized Tomographs Online Reliability Study. Teleradiology Assessment

of Computerized Tomographs Online Reliability Study (TRACTORS) for acute stroke evaluation. *Telemed J E Health*. 2003;9:227–233.
51. Audebert HJ, Kukla C, Clarmann von Claranau S, Kuhn J, Vatankhah B, Schenkel J, Ickenstein GW, Haberl RL, Horn M, for the TEMPiS Group. Telemedicine for safe and extended use of thrombolysis in stroke: the Telemedic Pilot Project for Integrative Stroke Care (TEMPiS) in Bavaria. *Stroke*. 2005;36: 287–291.
52. Wu O, Langhorne P. The challenge of acute-stroke management: does telemedicine offer a solution? *Int J Stroke*. 2006;1:201–207.
53. Wiborg A, Widder B, for the Telemedicine in Stroke in Swabia Project. Teleneurology to improve stroke care in rural areas: the Telemedicine in Stroke in Swabia (TESS) Project. *Stroke*. 2003;34:2951–2956.
54. Audebert HJ, Schenkel J, Heuschmann PU, Bogdahn U, Haberl RL, for the Telemedic Pilot Project for Integrative Stroke Care Group. Effects of the implementation of a telemedical stroke network: the Telemedic Pilot Project for Integrative Stroke Care (TEMPiS) in Bavaria, Germany. *Lancet Neurol*. 2006;5:742–748.
55. Schwab S, Vatankhah B, Kukla C, Hauchwitz M, Bogdahn U, Furst A, Audebert HJ, Horn M, for the TEMPiS Group. Long-term outcome after thrombolysis in telemedical stroke care. *Neurology*. 2007;69:898–903.
56. Waite K, Silver F, Jaigobin C, Black S, Lee L, Murray B, Danyliuk P, Brown EM. Telestroke: a multi-site, emergency-based telemedicine service in Ontario. *J Telemed Telecare*. 2006;12:141–145.
57. Khaja AM, Grotta JC. Established treatments for acute ischaemic stroke. *Lancet*. 2007;369:319–330.
58. Ickenstein GW, Horn M, Schenkel J, Vatankhah B, Bogdahn U, Haberl R, Audebert HJ. The use of telemedicine in combination with a new stroke-code-box significantly increases t-PA use in rural communities. *Neurocrit Care*. 2005;3:27–32.
59. Frey JL, Jahnke HK, Goslar PW, Partovi S, Flaster MS. tPA by telephone: extending the benefits of a comprehensive stroke center. *Neurology*. 2005;64:154–156.
60. Wang DZ, Rose JA, Honings DS, Garwacki DJ, Milbrandt JC. Treating acute stroke patients with intravenous tPA: the OSF Stroke Network experience. *Stroke*. 2000;31:77–81.
61. Rymer MM, Thurtchley D, Summers D, for the American Brain and Stroke Institute Stroke Team. Expanded modes of tissue plasminogen activator delivery in a comprehensive stroke center increases regional acute stroke interventions. *Stroke*. 2003;34:e58–e60.
62. Rymer MM, Thrutchley DE, for the Stroke Team at the Mid American Brain and Stroke Institute. Organizing regional networks to increase acute stroke intervention. *Neurol Res*. 2005;27(suppl 1):S9–S16.
63. Vaishnav AG, Pettigrew LC, Ryan S. Telephonic guidance of systemic thrombolysis in acute ischemic stroke: safety outcome in rural hospitals. *Clin Neurol Neurosurg*. 2008;110:451–454.
64. Saver JL, Kidwell C, Eckstein M, Ovbiagele B, Starkman S, for the FAST-MAG Pilot Trial Investigators. Physician-investigator phone elicitation of consent in the field: a novel method to obtain explicit informed consent for prehospital clinical research. *Prehosp Emerg Care*. 2006;10:182–185.
65. Organised inpatient (stroke unit) care for stroke: Stroke Unit Trialists' Collaboration. *Cochrane Database Syst Rev*. 2000:CD000197.
66. Adams HP Jr, del Zoppo G, Alberts MJ, Bhatt DL, Brass L, Furlan A, Grubb RL, Higashida RT, Jauch EC, Kidwell C, Lyden PD, Morgenstern LB, Qureshi AI, Rosenwasser RH, Scott PA, Wijdicks EF, for the American Heart Association; American Stroke Association Stroke Council; Clinical Cardiology Council; Cardiovascular Radiology and Intervention Council; Atherosclerotic Peripheral Vascular Disease and Quality of Care Outcomes in Research Working Groups. Guidelines for the early management of adults with ischemic stroke: a guideline from the American Heart Association/American Stroke Association Stroke Council, Clinical Cardiology Council, Cardiovascular Radiology and Intervention Council, and the Atherosclerotic Peripheral Vascular Disease and Quality of Care Outcomes in Research Interdisciplinary Working Groups: the American Academy of Neurology affirms the value of this guideline as an educational tool for neurologists. *Stroke*. 2007;38:1655–1711.
67. Dreyer NC, Dreyer KA, Shaw DK, Wittman PP. Efficacy of telemedicine in occupational therapy: a pilot study. *J Allied Health*. 2001;30:39–42.
68. Guilfoyle C, Wootton R, Hassall S, Offer J, Warren M, Smith D. Preliminary experience of allied health assessments delivered face to face and by videoconference to a residential facility for elderly people. *J Telemed Telecare*. 2003;9:230–233.
69. Holden MK. Virtual environments for motor rehabilitation: review. *Cyberpsychol Behav*. 2005;8:187–211.
70. Russell TG, Jull GA, Wootton R. The diagnostic reliability of Internet-based observational kinematic gait analysis. *J Telemed Telecare*. 2003;9(suppl 2):S48–S51.
71. Palsbo SE, Dawson SJ, Savard L, Goldstein M, Heuser A. Televideo assessment using Functional Reach Test and European Stroke Scale. *J Rehabil Res Dev*. 2007;44:659–664.
72. Brennan DM, Georgeadis AC, Baron CR, Barker LM. The effect of videoconference-based telerehabilitation on story retelling performance by brain-injured subjects and its implications for remote speech-language therapy. *Telemed J E Health*. 2004;10:147–154.
73. Hill AJ, Theodoros DG, Russell TG, Cahill LM, Ward EC, Clark KM. An Internet-based telerehabilitation system for the assessment of motor speech disorders: a pilot study. *Am J Speech Lang Pathol*. 2006;15:45–56.
74. Palsbo SE. Equivalence of functional communication assessment in speech pathology using videoconferencing. *J Telemed Telecare*. 2007;13:40–43.
75. Shinar D, Gross CR, Bronstein KS, Licata-Gehr EE, Eden DT, Cabrera AR, Fishman IG, Roth AA, Barwick JA, Kunitz SC. Reliability of the activities of daily living scale and its use in telephone interview. *Arch Phys Med Rehabil*. 1987;68:723–728.
76. Korner-Bitensky N, Wood-Dauphinee S. Barthel Index information elicited over the telephone: is it reliable? *Am J Phys Med Rehabil*. 1995;74:9–18.
77. New PW, Buchbinder R. Critical appraisal and review of the Rankin scale and its derivatives. *Neuroepidemiology*. 2006;26:4–15.
78. Newcommon NJ, Green TL, Haley E, Cooke T, Hill MD. Improving the assessment of outcomes in stroke: use of a structured interview to assign grades on the modified Rankin Scale. *Stroke*. 2003;34:377–378.
79. Merino JG, Lattimore SU, Warach S. Telephone assessment of stroke outcome is reliable. *Stroke*. 2005;36:232–233.
80. Wilson JT, Hareendran A, Grant M, Baird T, Schulz UG, Muir KW, Bone I. Improving the assessment of outcomes in stroke: use of a structured interview to assign grades on the modified Rankin Scale. *Stroke*. 2002;33:2243–2246.
81. Ottenbacher KJ, Hsu Y, Granger CV, Fiedler RC. The reliability of the functional independence measure: a quantitative review. *Arch Phys Med Rehabil*. 1996;77:1226–1232.
82. Granger CV, Cotter AC, Hamilton BB, Fiedler RC. Functional assessment scales: a study of persons after stroke. *Arch Phys Med Rehabil*. 1993;74:133–138.
83. Smith PM, Illig SB, Fiedler RC, Hamilton BB, Ottenbacher KJ. Intermodal agreement of follow-up telephone functional assessment using the Functional Independence Measure in patients with stroke. *Arch Phys Med Rehabil*. 1996;77:431–435.
84. Segal ME, Gillard M, Schall R. Telephone and in-person proxy agreement between stroke patients and caregivers for the functional independence measure. *Am J Phys Med Rehabil*. 1996;75:208–212.
85. Duncan PW, Bode RK, Min Lai S, Perera S, for the Glycine Antagonist in Neuroprotection Americas Investigators. Rasch analysis of a new stroke-specific outcome scale: the Stroke Impact Scale. *Arch Phys Med Rehabil*. 2003;84:950–963.
86. Kwon S, Duncan P, Studenski S, Perera S, Lai SM, Reker D. Measuring stroke impact with SIS: construct validity of SIS telephone administration. *Qual Life Res*. 2006;15:367–376.
87. Duncan P, Reker D, Kwon S, Lai SM, Studenski S, Perera S, Alfrey C, Marquez J. Measuring stroke impact with the stroke impact scale: telephone versus mail administration in veterans with stroke. *Med Care*. 2005;43:507–515.
88. Lai JC, Woo J, Hui E, Chan WM. Telerehabilitation: a new model for community-based stroke rehabilitation. *J Telemed Telecare*. 2004;10:199–205.
89. Holden MK, Dyar TA, Dayan-Cimadoro L. Telerehabilitation using a virtual environment improves upper extremity function in patients with stroke. *IEEE Trans Neural Syst Rehabil Eng*. 2007;15:36–42.
90. Buckley KM, Tran BQ, Prandoni CM. Receptiveness, use and acceptance of telehealth by caregivers of stroke patients in the home. *Online J Issues Nurs*. 2004;9:9.
91. Lutz BJ, Chumbler NR, Roland K. Care coordination/home-telehealth for veterans with stroke and their caregivers: addressing an unmet need. *Top Stroke Rehabil*. 2007;14:32–42.
92. Tran BQ, Buckley KM, Prandoni CM. Selection & use of telehealth technology in support of homebound caregivers of stroke patients. *Caring*. 2002;21:16–21.
93. Winters JM, Winters JM. Videoconferencing and telehealth technologies can provide a reliable approach to remote assessment and teaching without compromising quality. *J Cardiovasc Nurs*. 2007;22:51–57.
94. Hoenig H, Sanford JA, Butterfield T, Griffiths PC, Richardson P, Hargraves K. Development of a teletechnology protocol for in-home rehabilitation. *J Rehabil Res Dev*. 2006;43:287–298.

# Appendix M

# North Carolina
# Telestroke Networks

# North Carolina Telestroke Networks



## Legend

- Carolinas Medical Center Hub
- Carolinas Medical Center Network Sites
- Forsyth Hub
- Forsyth Network Sites
- WFBUMC Hub
- WFBUMC Network Sites
- CarolinaEast
- County with No Hospital
- County with Twenty-Four Hour Physician Coverage for Acute Stroke

Only hospitals who are currently using telestroke to provide treatment for acute stroke are identified.

A county with twenty-four hour physician coverage is defined as a county that contains either a hospital participating in a telestroke program that provides treatment for acute stroke twenty-four hours a day seven days a week, or contains a hub hospital. All hub hospitals in N.C. are certified by the Joint Commission as Primary Stroke Centers.

Carolinas Medical Center's Network Site is a pilot project with limited physician coverage.

November 30, 2010

# Appendix N

# Virginia Acts of Assembly-
# 2010 Session

# VIRGINIA ACTS OF ASSEMBLY -- 2010 SESSION

## CHAPTER 222

*An Act to amend and reenact § 38.2-4319 of the Code of Virginia and to amend the Code of Virginia by adding a section numbered 38.2-3418.16, relating to health insurance coverage for telemedicine services.*

[S 675]

Approved April 7, 2010

**Be it enacted by the General Assembly of Virginia:**

**1. That § 38.2-4319 of the Code of Virginia is amended and reenacted and that the Code of Virginia is amended by adding a section numbered 38.2-3418.16 as follows:**

*§ 38.2-3418.16. Coverage for telemedicine services.*

*A. Notwithstanding the provisions of § 38.2-3419, each insurer proposing to issue individual or group accident and sickness insurance policies providing hospital, medical and surgical, or major medical coverage on an expense-incurred basis; each corporation providing individual or group accident and sickness subscription contracts; and each health maintenance organization providing a health care plan for health care services shall provide coverage for the cost of such health care services provided through telemedicine services, as provided in this section.*

*B. As used in this section, "telemedicine services," as it pertains to the delivery of health care services, means the use of interactive audio, video, or other electronic media used for the purpose of diagnosis, consultation, or treatment. "Telemedicine services" do not include an audio-only telephone, electronic mail message, or facsimile transmission.*

*C. An insurer, corporation, or health maintenance organization shall not exclude a service for coverage solely because the service is provided through telemedicine services and is not provided through face-to-face consultation or contact between a health care provider and a patient for services appropriately provided through telemedicine services.*

*D. An insurer, corporation, or health maintenance organization shall not be required to reimburse the treating provider or the consulting provider for technical fees or costs for the provision of telemedicine services; however, such insurer, corporation, or health maintenance organization shall reimburse the treating provider or the consulting provider for the diagnosis, consultation, or treatment of the insured delivered through telemedicine services on the same basis that the insurer, corporation, or health maintenance organization is responsible for coverage for the provision of the same service through face-to-face consultation or contact.*

*E. Nothing shall preclude the insurer, corporation, or health maintenance organization from undertaking utilization review to determine the appropriateness of telemedicine services, provided that such appropriateness is made in the same manner as those determinations are made for the treatment of any other illness, condition, or disorder covered by such policy, contract, or plan. Any such utilization review shall not require pre-authorization of emergent telemedicine services.*

*F. An insurer, corporation, or health maintenance organization may offer a health plan containing a deductible, copayment, or coinsurance requirement for a health care service provided through telemedicine services, provided that the deductible, copayment, or coinsurance does not exceed the deductible, copayment, or coinsurance applicable if the same services were provided through face-to-face diagnosis, consultation, or treatment.*

*G. No insurer, corporation, or health maintenance organization shall impose any annual or lifetime dollar maximum on coverage for telemedicine services other than an annual or lifetime dollar maximum that applies in the aggregate to all items and services covered under the policy, or impose upon any person receiving benefits pursuant to this section any copayment, coinsurance, or deductible amounts, or any policy year, calendar year, lifetime, or other durational benefit limitation or maximum for benefits or services, that is not equally imposed upon all terms and services covered under the policy, contract, or plan.*

*H. The requirements of this section shall apply to all insurance policies, contracts, and plans delivered, issued for delivery, reissued, or extended in the Commonwealth on and after January 1, 2011, or at any time thereafter when any term of the policy, contract, or plan is changed or any premium adjustment is made.*

*I. This section shall not apply to short-term travel, accident-only, limited or specified disease, or individual conversion policies or contracts, nor to policies or contracts designed for issuance to persons eligible for coverage under Title XVIII of the Social Security Act, known as Medicare, or any other similar coverage under state or federal governmental plans.*

§ 38.2-4319. Statutory construction and relationship to other laws.

A. No provisions of this title except this chapter and, insofar as they are not inconsistent with this

chapter, §§ 38.2-100, 38.2-136, 38.2-200, 38.2-203, 38.2-209 through 38.2-213, 38.2-216, 38.2-218 through 38.2-225, 38.2-229, 38.2-232, 38.2-305, 38.2-316, 38.2-322, 38.2-400, 38.2-402 through 38.2-413, 38.2-500 through 38.2-515, 38.2-600 through 38.2-620, Chapter 9 (§ 38.2-900 et seq.), §§ 38.2-1016.1 through 38.2-1023, 38.2-1057, Article 2 (§ 38.2-1306.2 et seq.), § 38.2-1306.1, § 38.2-1315.1, Articles 3.1 (§ 38.2-1316.1 et seq.), 4 (§ 38.2-1317 et seq.) and 5 (§ 38.2-1322 et seq.) of Chapter 13, Articles 1 (§ 38.2-1400 et seq.) and 2 (§ 38.2-1412 et seq.) of Chapter 14, §§ 38.2-1800 through 38.2-1836, 38.2-3401, 38.2-3405, 38.2-3405.1, 38.2-3407.2 through 38.2-3407.6:1, 38.2-3407.9 through 38.2-3407.16, 38.2-3411.2, 38.2-3411.3, 38.2-3411.4, 38.2-3412.1:01, 38.2-3414.1, 38.2-3418.1 through ~~38.2-3418.15~~ *38.2-3418.16*, 38.2-3419.1, 38.2-3430.1 through 38.2-3437, 38.2-3500, subdivision 13 of § 38.2-3503, subdivision 8 of § 38.2-3504, §§ 38.2-3514.1, 38.2-3514.2, 38.2-3522.1 through 38.2-3523.4, 38.2-3525, 38.2-3540.1, 38.2-3541.1, 38.2-3542, 38.2-3543.2, Article 5 (§ 38.2-3551 et seq.) of Chapter 35, Chapter 52 (§ 38.2-5200 et seq.), Chapter 55 (§ 38.2-5500 et seq.), Chapter 58 (§ 38.2-5800 et seq.) and § 38.2-5903 of this title shall be applicable to any health maintenance organization granted a license under this chapter. This chapter shall not apply to an insurer or health services plan licensed and regulated in conformance with the insurance laws or Chapter 42 (§ 38.2-4200 et seq.) of this title except with respect to the activities of its health maintenance organization.

B. For plans administered by the Department of Medical Assistance Services that provide benefits pursuant to Title XIX or Title XXI of the Social Security Act, as amended, no provisions of this title except this chapter and, insofar as they are not inconsistent with this chapter, §§ 38.2-100, 38.2-136, 38.2-200, 38.2-203, 38.2-209 through 38.2-213, 38.2-216, 38.2-218 through 38.2-225, 38.2-229, 38.2-232, 38.2-322, 38.2-400, 38.2-402 through 38.2-413, 38.2-500 through 38.2-515, 38.2-600 through 38.2-620, Chapter 9 (§ 38.2-900 et seq.), §§ 38.2-1016.1 through 38.2-1023, 38.2-1057, § 38.2-1306.1, Article 2 (§ 38.2-1306.2 et seq.), § 38.2-1315.1, Articles 3.1 (§ 38.2-1316.1 et seq.), 4 (§ 38.2-1317 et seq.) and 5 (§ 38.2-1322 et seq.) of Chapter 13, Articles 1 (§ 38.2-1400 et seq.) and 2 (§ 38.2-1412 et seq.) of Chapter 14, §§ 38.2-3401, 38.2-3405, 38.2-3407.2 through 38.2-3407.5, 38.2-3407.6 and 38.2-3407.6:1, 38.2-3407.9, 38.2-3407.9:01, and 38.2-3407.9:02, subdivisions 1, 2, and 3 of subsection F of § 38.2-3407.10, 38.2-3407.11, 38.2-3407.11:3, 38.2-3407.13, 38.2-3407.13:1, and 38.2-3407.14, 38.2-3411.2, 38.2-3418.1, 38.2-3418.2, 38.2-3419.1, 38.2-3430.1 through 38.2-3437, 38.2-3500, subdivision 13 of § 38.2-3503, subdivision 8 of § 38.2-3504, §§ 38.2-3514.1, 38.2-3514.2, 38.2-3522.1 through 38.2-3523.4, 38.2-3525, 38.2-3540.1, 38.2-3542, 38.2-3543.2, Chapter 52 (§ 38.2-5200 et seq.), Chapter 55 (§ 38.2-5500 et seq.), Chapter 58 (§ 38.2-5800 et seq.) and § 38.2-5903 shall be applicable to any health maintenance organization granted a license under this chapter. This chapter shall not apply to an insurer or health services plan licensed and regulated in conformance with the insurance laws or Chapter 42 (§ 38.2-4200 et seq.) of this title except with respect to the activities of its health maintenance organization.

C. Solicitation of enrollees by a licensed health maintenance organization or by its representatives shall not be construed to violate any provisions of law relating to solicitation or advertising by health professionals.

D. A licensed health maintenance organization shall not be deemed to be engaged in the unlawful practice of medicine. All health care providers associated with a health maintenance organization shall be subject to all provisions of law.

E. Notwithstanding the definition of an eligible employee as set forth in § 38.2-3431, a health maintenance organization providing health care plans pursuant to § 38.2-3431 shall not be required to offer coverage to or accept applications from an employee who does not reside within the health maintenance organization's service area.

F. For purposes of applying this section, "insurer" when used in a section cited in subsections A and B of this section shall be construed to mean and include "health maintenance organizations" unless the section cited clearly applies to health maintenance organizations without such construction.

# Appendix O

# Joint Legislative Audit and Review Commission Evaluation of Proposed Mandated Health Insurance Benefits

# Appendix O

# Joint Legislative Audit and Review Commission Evaluation of Proposed Mandated Health Insurance Benefits

JOINT LEGISLATIVE AUDIT AND REVIEW COMMISSION
OF THE VIRGINIA GENERAL ASSEMBLY

EVALUATION OF PROPOSED
MANDATED HEALTH INSURANCE BENEFITS

# Evaluation of House Bill 2191 and Senate Bill 1458: Mandated Coverage of Telehealth Services

**June 2009**

## Members of the Joint Legislative Audit and Review Commission

**Chairman**
Delegate M. Kirkland Cox

**Vice-Chairman**
Senator Charles J. Colgan

Delegate H. Morgan Griffith
Delegate Frank D. Hargrove, Sr.
Senator Janet D. Howell
Delegate Harvey B. Morgan
Delegate Robert D. Orrock, Sr.
Delegate Lacey E. Putney
Delegate Phillip A. Hamilton
Senator R. Edward Houck
Delegate Johnny S. Joannou
Senator Thomas K. Norment, Jr.
Delegate Clarence E. Phillips
Senator Walter A. Stosch

Walter J. Kucharski, Auditor of Public Accounts

**Director**
Philip A. Leone

## Members of the Special Advisory Commission on Mandated Health Insurance Benefits

Delegate Clifford L. Athey, Jr.
Delegate Timothy D. Hugo
Senator Donald A. McEachin
Senator George Barker
Delegate Terry G. Kilgore
Delegate Donald Merricks

Elnora H. Allen
Peter J. Bernard
Renard A. Charity, M.D.
Phyllis L. Cothran
Joyal M. Mulheron
Alfred W. Gross
Angie Benton
Dorothye S. Brodersen
James F. Childress, Ph.D.
Joseph A. Kelliher
Laura Lee O. Viergever
Karen Remley, M.D., M.B.A., FAAP

## JLARC Staff for This Evaluation

Hal Greer, Division Chief
Kimberly Sarte, Principal Fiscal Analyst

JLARC provides evaluations of proposed health insurance mandates in accordance with Sections 2.2-2503 and 30-58.1 of the *Code of Virginia*.

**This evaluation is available on the JLARC website at http://jlarc.virginia.gov**

# Evaluation of House Bill 2191 and Senate Bill 1458: Mandated Coverage of Telehealth Services

# JLARC SUMMARY

House Bill 2191 and Senate Bill 1458 of the 2009 General Assembly Session would mandate coverage for telehealth services. In particular, the bills indicate that, for those services appropriately provided through telehealth, insurers cannot exclude a service for coverage solely because the service is provided through telehealth and not through a face-to-face consultation or contact between a health care provider and a patient. This report draws a distinction between the terms 'telemedicine' and 'telehealth' because of the range of services that they entail. Telemedicine typically refers to direct patient care provided using telecommunications technology whereas telehealth includes the direct patient care aspect of telemedicine but also can include activities that are not directly related to the clinical care of a patient, such as transfer of medical data and medical education. Proponents of the proposed mandate indicate that they are most interested in gaining coverage for telemedicine, and similar mandates in other states have typically focused on telemedicine. Therefore, this report concentrates on telemedicine services rather than the broader definition of telehealth.

## MEDICAL EFFICACY AND EFFECTIVENESS

A wide body of literature assessing the medical efficacy and effectiveness of telemedicine exists. While concerns have been raised regarding the quality of existing research, staff at the federal Office for the Advancement for Telehealth (OAT), the federal Agency for Healthcare Research Quality (AHRQ), and medical experts at two Virginia medical schools as-

**In This Evaluation**

sert that the research sufficiently supports telemedicine and any research limitations should not prevent its expansion as a mode of care. Further, the Virginia Board of Medicine reports very few complaints related to patient care delivered using telemedicine.

## SOCIAL IMPACT

Utilization of telemedicine services appears generally low in Virginia and elsewhere. Medicare and Medicaid both provide limited coverage of telemedicine services. However, private insurance coverage appears minimal with approximately 25 percent of health insurers reporting that they provide any coverage of telemedicine services. The State employee health plan also does not provide coverage of these services. Medical experts and staff at the Virginia Department of Health (VDH) indicate that there are positive public health impacts associated with telemedicine through increased access to care in underserved areas. However, without insurance coverage, patients may receive inappropriate care, experience delayed access to specialty care or fail to receive specialty care at all, and/or end up in the emergency department of their local hospital.

## FINANCIAL IMPACT

The proposed mandate is not expected to significantly increase utilization of telemedicine because lack of reimbursement is not the only barrier preventing increased use of these services. Other barriers include an unwillingness of practitioners to participate in telemedicine and technology issues. Concerns over whether the mandate would require coverage of out-of-state health care providers does not appear founded. However, a valid concern may be that the mandate's current definition of telehealth could require coverage of services that are not traditionally reimbursed by health insurance. The premium costs associated with mandated coverage of telemedicine services is expected to be low and less than that of many existing mandates, and telemedicine appears to have the potential to reduce overall health care costs.

## BALANCING MEDICAL, SOCIAL, AND FINANCIAL CONSIDERATIONS

There is significant support from the medical community, VDH, OAT, and AHRQ for the expansion of telemedicine services. Telemedicine increases access in underserved areas and can bring significant positive public health impacts. A mandate requiring coverage for telemedicine services is not expected to significantly increase the utilization of telemedicine, but it would remove one of the barriers faced and is expected to have only a minimal impact on premiums. Focusing the mandate on coverage of telemedicine services, rather than the broader definition of telehealth, would help ensure that the scope of medical services for which coverage is required would not be a change from the types of services typically covered by health insurance.

# Evaluation of House Bill 2191 and Senate Bill 1458: Mandated Coverage of Telehealth Services

House Bill 2191 and Senate Bill 1458 of the 2009 General Assembly Session would mandate coverage for telehealth services. In particular, the bills indicate that insurers shall not exclude a service for coverage solely because the service is provided through telehealth and is not provided through face-to-face consultation or contact between a health care provider and a patient for services appropriately provided through telehealth. The bills define telehealth services as the use of interactive audio, video, or other telecommunications technology by a health care provider to deliver health care services within the scope of the provider's practice at a site other than the site where the patient is located. They also define telehealth services to include the use of electronic media for consultation relating to the health care diagnosis or treatment of the patient, transfer of medical data, and medical education, which could include activities such as continuing physician education. The proposed mandates stipulate that telehealth services do not include an audio-only telephone conversation, electronic mail message, or facsimile transmission between a health care provider and a patient. Because HB 2191 and SB 1458 are identical, hereafter they are referred to as the 'bill' or the 'proposed mandate.'

## BACKGROUND

*Telemedicine has the potential to improve health care by bridging time and distance barriers, giving patients in rural and other underserved areas greater access to a broad range of clinical expertise, and reducing delivery costs.*

The terms telemedicine and telehealth are often used interchangeably. However, this report draws a distinction between the terms because of the range of services that they can entail. Telemedicine typically refers to services directly related to patient care whereas telehealth can refer to a broader range of services that includes the transfer of medical data and medical education. Proponents of the proposed mandate indicate that they are most interested in gaining insurance coverage for telemedicine services, and similar mandates in other states are typically focused on telemedicine. Therefore, the analysis in this report concentrates more on telemedicine and the issues surrounding mandated coverage of these services rather than the broader definition of telehealth, though telehealth is also addressed to some extent.

### a. Description of Medical Condition and Proposed Treatment

Since its emergence in the early 1970s, the primary purpose of telehealth has been to address problems related to access and cost of health services, particularly in geographically disadvantaged areas. Supporters indicate that the widespread adoption of telehealth can link diverse aspects of the health care system; increase patients' access to all types of care, including specialty and tertiary care; enable services to be provided where they are needed most; and ameliorate the shortage of primary care physicians and specialists in certain geographic areas. Telehealth also makes subspecialty decision support readily available to primary care physicians who would otherwise lack it, allows clinicians to improve productivity by supervising nurses and interns remotely, and has the potential to reduce health care costs. In addition, supporters indicate that telehealth helps avoid unnecessary transfers of patients, and improves the evaluation and treatment of those patients who do require transfer.

**Telemedicine** typically refers to medical services that are provided using telecommunications technology and are directly related to patient care. Common telemedicine services may include patient diagnosis, consultation, or monitoring.

**Telehealth** includes the direct patient care aspects of telemedicine but also can include activities that are not directly related to the clinical care of a patient, such as the transfer of medical data and education for medical residents or practicing physicians.

Many different definitions of telehealth exist which vary in scope. For example, the Virginia Telehealth Network, a Virginia-based organization devoted to advancing telehealth in the Commonwealth, defines telehealth as the utilization of information and telecommunications technologies to electronically distribute health care services and health care data between health care providers, or between health care providers and patients. The federal Health Resources and Services Administration (HRSA) defines telehealth as the use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health, and health administration. The Center for Telehealth and E-Health Law (CTel), a leading national telehealth advocacy organization, further defines telehealth as the provision of health care, health information, and health education across a distance using telecommunications technology and specially adapted equipment. The proposed mandate includes a definition for telehealth that is similar to those of the HRSA and CTel and defines telehealth to include the use of electronic media for consultation relating to the health care diagnosis or treatment of the patient, transfer of medical data, and medical education.

Table 1 provides examples of the types of services that could be included in the proposed mandate's definition of telehealth. Consultation relating to patient diagnosis and treatment is the most common use of telehealth and is often referred to as telemedicine. Telemedicine generally follows three usage models: real-time, store and forward (asynchronous), and home health.

## Table 1: Types of Telehealth Services

| Examples of Services |
|---|
| **Consultation Relating to Patient Diagnosis or Treatment (Telemedicine)** |
| • Real-time patient consultation |
| • Store & forward transfer of patient information |
| • Home health |
| **Transfer of Medical Data** |
| • Support store & forward telemedicine |
| • Administrative purposes or health data management |
| **Medical Education** |
| • Provided as part of a telemedicine consultation |
| • Preventive care classes for patients, e.g. diabetes |
| • Continuing education for practicing physicians or education for medical residents |

Source: Telemedicine.com, Virginia medical experts.

**Example of Real Time Telemedicine**

A man living in a sparsely populated area of southwest Virginia has a stroke. His physician knows that treatment must occur within three hours of the stroke or the man will suffer long-term disability or even death. The physician contacts a stroke expert in a different location who examines the patient via interactive video, reviews the CAT scan via digital radiology, and prescribes a clot dissolving drug that must be administered within the three hour window, thus reducing the likelihood of disability or death.

Source: Based on example from Center for Telehealth and E-Law.

Real-time is the most common use of telemedicine and allows the local provider, patient, and specialist to communicate together simultaneously on a patient's diagnosis or treatment. In a typical example, a medical specialist is not available locally for a patient. However, the local provider has a relationship with a specialist located at a hub site, such as a university medical school, and refers the patient to the specialist. Rather than physically traveling to the specialist, the patient can be seen via videoconferencing technologies over broadband communications services. The encounter is usually staffed by a local licensed provider (for example, a registered nurse, nurse practitioner, physician's assistant, or doctor) at the origination site and a specialist provider at the hub site. Medical experts indicate that real-time telemedicine consultations and follow-up care may be provided in more than 50 specialties and subspecialties.

Store-and-forward, or asynchronous, telemedicine is used when the local provider and specialist are not available or needed at the same time. With asynchronous telemedicine, the local provider electronically supplies information on the patient's history, such as text, pictures, video, or radiology images to the specialist. The specialist then provides his diagnosis and treatment plan to the local provider. Teleradiology is a frequently used form of store-and-forward telemedicine.

Home health is the third telemedicine usage model and allows the remote observation and care of a patient. Home health telemedicine can use equipment to capture a patient's vital signs, video conference with the patient, and provide patient statistics and information in real time so that the physician or hospital can be alerted if the patient needs immediate attention. Home health

telemedicine is most often used with post-hospital care, chronic disease management such as diabetes and congestive heart failure, high risk pregnancy monitoring, and assisted living.

The two other categories of telehealth included in Table 1, transfer of medical data and medical education, may or may not relate directly to the clinical care of a patient. For example, transfer of medical data could refer to the transfer of data in support of telemedicine activities. However, it could also refer to transfer of data for health data management or administrative purposes. Similarly, medical education could refer to education a physician would provide to a patient as part of a telemedicine consultation. However, it could also refer to medical education for groups of patients with similar diseases, such as diabetes, or continuing medical education for practicing physicians or residents. For instance, telehealth can be particularly helpful in assisting rural physicians in meeting their continuing medical education needs.

A variety of technologies are used in providing telemedicine and telehealth services. More sophisticated technologies include videoconferencing, store-and-forward data imaging, streaming media, interactive video, virtual reality, and telerobotics. However, telephone, fax, and email are also technologies that are used to provide these services.

Telehealth is currently practiced across many different specialties and settings. Generally speaking, the top three specialties making use of telemedicine are radiology, dermatology, and psychiatry. Radiology and dermatology lend themselves to telemedicine because they are both very visual in nature. Dermatologists do not need to see the patient in person if they have high quality images available, and the nature of radiology is based on the evaluation of images rather than face-to-face contact with the patient. Telepsychiatry lends itself to telemedicine because it can be effectively carried out through videoconferencing. Additionally, some patients prefer the anonymity that telepsychiatry provides. In addition to these three specialties, telemedicine is utilized across many other specialties including cardiology, ophthalmology, high risk pregnancies, and critical care and emergency settings, such as acute stroke.

### b. History of Proposed Mandate

Since 1995, at least ten states have enacted mandates requiring health insurers to cover telehealth and/or telemedicine services (Appendix E). These states include California, Colorado, Georgia, Hawaii, Kentucky, Louisiana, Maine, Oklahoma, Oregon, and Texas. Most state mandates require coverage of telemedicine and appear to focus on the direct care provided to patients. This con-

trasts with the proposed mandate in Virginia which would require coverage of the broader definition of telehealth services. The impetus behind the mandates in several states appears to be improving access to services in rural areas. For example, the Colorado mandate only applies to individuals living in counties with 150,000 or fewer residents. As with the proposed Virginia mandate, most state mandates do not require coverage for consultations provided by telephone or facsimile, and in some cases email. Staff at the federal Office for the Advancement of Telehealth (OAT) indicate that they expect a large increase in the number of states with telemedicine mandates over the next five years.

### c. Proponents and Opponents of Proposed Mandate

Proponents and opponents of the proposed mandate will have the opportunity to express their views at the Special Advisory Commission on Mandated Health Insurance Benefits public hearing on June 29, 2009. Proponents of a mandate for telemedicine services appear to be medical centers that provide specialty care through telemedicine, and providers and patients in rural areas of the Commonwealth that do not have access to specialists. Staff at the Virginia Department of Health (VDH) also expressed support for efforts to expand the availability of telemedicine services. Proponents indicate that their objective is to obtain coverage for telemedicine activities directly related to patient care rather than the potentially broader list of activities that could be encompassed by the bill's definition of telehealth. Proponents further stated that their aim is not to require insurers to increase the scope of medical services or providers that they cover, but to ensure that coverage cannot be denied for those services and providers that are already covered solely because services are provided through telemedicine.

In general, there is not strong opposition to telemedicine as a means to delivering health care services. Health insurers have indicated that they support the service but that a health insurance mandate is not the best way to go about increasing coverage for it. Insurers have also expressed concern that the current mandate for telehealth services is too broad and could require them to cover activities that are not currently reimbursed through health insurance.

## MEDICAL EFFICACY AND EFFECTIVENESS

A wide body of literature assessing the medical efficacy and effectiveness of telemedicine exists. While concerns have been raised as late as 2006 regarding the quality of existing research, staff at the federal Office for the Advancement for Telehealth, the federal Agency for Healthcare Research Quality, and medical experts at two

Virginia medical schools assert that the research sufficiently supports telemedicine in general and any research limitations should not prevent its expansion as a mode of care. Further, the Virginia Board of Medicine reports very few complaints related to patient care delivered using telemedicine.

### a. Medical Efficacy of Benefit

**Medical Efficacy**

Assessments of medical efficacy are typically based on clinical research, particularly randomized clinical trials, demonstrating the efficacy of a particular treatment compared to alternative treatments or no treatment.

There is a large amount of literature assessing the medical efficacy and effectiveness of telemedicine services, and studies are readily found supporting its efficacy and effectiveness across different specialty areas. For example, two recent 2009 reviews of the research for stroke telemedicine found that well-designed studies have shown that telestroke as a consultative modality is valid, accurate, and reliable and recommended the use of telestroke for a variety of stroke-related procedures across different clinical settings.

Research has also supported the use of telemental health services. For instance, a 2004 randomized, controlled trial of 119 depressed veterans found that remote treatment of depression using telepsychiatry and in-person treatment have comparable outcomes and equivalent levels of patient adherence, patient satisfaction, and health care cost. More recently, a 2008 review of the existing telemental health research found that evidence of the benefit from telemental health applications is encouraging, though more good-quality research is needed.

Research supports the use of telemedicine in a consultative capacity in other areas as well. A 2001 non-randomized study of 100 new consultant referrals in the area of rheumatology found that, while telephone consultations were often unsatisfactory, televisual consultations were highly accurate (97 percent) and acceptable to patients, general practitioners, and specialists. And, a 2003 study of 76 pediatric patients found that telephonic stethoscopes can accurately distinguish between functional and organic heart murmurs and thus can detect heart disease in pediatric patients.

In addition to research supporting the use of telemedicine for consultations, there are studies supporting its use in a home health monitoring environment. For example, a 2003 study of the use of telemedicine for homecare monitoring of congestive heart failure patients found that the readmission charges for patients receiving home telecare were 80 percent lower than groups receiving conventional care, and that the home telecare patients had significantly fewer emergency visits. Similarly, a 2007 study of homebound patients receiving telewound care found that telewound patients had fewer emergency department visits and fewer hospitalizations than the control group.

Despite research supporting the efficacy and effectiveness of telemedicine across different specialties, since 2000 there have been a number of published assessments of the telemedicine literature which have found that the existing research is inconclusive in terms of telemedicine's efficacy in delivering care. These assessments found that many existing studies were too small, methodologically limited, or their results not sufficiently generalizable to the larger field of telemedicine. Several of these reviews were prepared for the U.S. Department of Health and Human Services, Agency for Healthcare Research and Quality (AHRQ). The most recent review prepared for the AHRQ was in 2006 and updated a prior study assessing telemedicine for the Medicare population. The 2006 study concluded that there are "still significant gaps in the evidence base between where telemedicine is used and were its use is supported by high-quality evidence. Further well-designed targeted research that provide high-quality data will provide a strong contribution to understanding how best to deploy technological resources in health care." As discussed below, medical experts and experts at two federal agencies, including the AHRQ, indicate that sufficient research does currently exist to support the expansion of telemedicine.

### b. Medical Effectiveness of Benefit

**Medical Effectiveness**

Medical effectiveness refers to the effectiveness of a particular treatment in a normal clinical setting as opposed to ideal or laboratory conditions.

Two federal agencies and medical experts at two Virginia medical schools were consulted on a number of issues for this study, including the extent to which existing research supports telemedicine. All of those consulted indicated that the existing body of research is generally supportive of telemedicine and supports its expansion as a mode of delivering health care.

Staff at the U.S. Department of Health and Human Services, Office for the Advancement of Telehealth (OAT) and staff at the AHRQ were familiar with the various assessments discussing the limitations of the existing telemedicine research, including the 2006 report prepared for the AHRQ. The OAT and AHRQ staff indicated that, while randomized, controlled trials would be ideal, the 2006 report inappropriately discounted the wide range of small, non-randomized studies supporting telemedicine. Staff at both agencies also pointed out that more recent studies completed since 2006 continue to support the efficacy and effectiveness of telemedicine and address some of the concerns in the prior literature assessments.

Medical experts consulted at two Virginia medical schools also indicated that the overall body of research has been and continues to be very supportive of telemedicine. In addition, one expert suggested that there can be medical ethics concerns related to con-

trolled trials of a treatment if they involve restricting access to specialists for one population involved in the trial.

Further evidence that research of sufficient quality exists, particularly in the area of telestroke care, is that the American Heart Association recently released general policy recommendations for the implementation of telestroke care. One of the recommendations includes that:

> *Whenever local or on-site acute stroke expertise or resources are insufficient to provide around the clock coverage for a healthcare facility, telestroke systems should be deployed to supplement resources at participating sites.*

The Virginia Board of Medicine provides added support that telemedicine does not compromise quality of care based on patients' satisfaction with the care they receive via telemedicine. A 2006 report from the Board of Medicine states that "the Executive Director cannot recall any complaints on Virginia licensees for telehealth practiced within the Commonwealth." In 2009, staff at the Board of Health indicated that this continues to be true and that the Board receives very few complaints regarding in-state telemedicine.

## SOCIAL IMPACT

Utilization of telemedicine services is generally low in Virginia and elsewhere based on the experience of other states and Virginia Medicaid. Medicare and Medicaid both provide limited coverage of real-time telemedicine services, though the State employee health plan does not provide coverage of telemedicine. The availability of coverage in the fully insured private market is minimal. Approximately 25 percent of health insurers report providing any coverage of telemedicine services, and none appear to provide the level of coverage required by the proposed mandate. Medical experts and staff at VDH indicate that there are positive public health impacts associated with telemedicine by increasing access to necessary and appropriate specialty care in underserved areas. However, it appears that without insurance coverage, patients are likely to receive care from their local practitioners who may or may not have the expertise to deal with their condition, experience delayed access to specialty care or fail to receive specialty care at all, and/or end up in the emergency department of their local hospital.

### a. Utilization of Treatment

Although telemedicine has been available in various forms for several decades, it has not become a common fixture in the American health care system and its utilization tends to be low. In addition,

the use of telemedicine services is probably underreported to some extent. If the individuals responsible for reporting medical claims do not code telemedicine claims as such, it is impossible to know that services were provided via telemedicine rather than in the conventional manner. Also, large medical systems may be practicing telemedicine within their system, but may not identify it as such.

Utilization of telemedicine services is not tracked at the State level in Virginia. However, several sources can provide insight on the utilization of telemedicine services. Medicaid in Virginia has been covering telemedicine services since 1995. The Department of Medical Assistance Services (DMAS) reports that, in 2008, 458 telemedicine encounters took place. This is a tiny fraction of the overall medical encounters covered by Medicaid in Virginia.

Similarly, utilization of telemedicine services in other states has been low - even in those states with mandates requiring coverage of telemedicine. For instance, a 2008 report by the California HealthCare Foundation indicates that only three percent of California consumers said they had participated in a telemedicine session within the previous 12 months. Also, a recent report by the Texas Department of Insurance shows that claims for telemedicine services were less than one one-hundredth of a percent of the total claims paid by fully insured group benefit plans in 2005 and 2006. In some states, the primary use of telemedicine has been for education rather than clinical encounters. A 2008 report by the Kentucky TeleHealth Network (KTHN) showed that the network conducted over 5,000 clinical encounters and 30,000 contact hours of educational programming for the 2007-2008 fiscal year. Staff associated with the KTHN indicated that the educational programming hours were largely provided to medical students or physicians to meet continuing education requirements.

Data provided by DMAS, the University of Virginia (UVA), and Virginia Commonwealth University (VCU) give insight on the medical specialty areas where telemedicine has been used in Virginia. For Medicaid, the predominant telemedicine service received by patients has been psychiatric consultations, in particular pharmacological management. For 2008, there were few, if any, Medicaid telemedicine consultations that were not psychiatric in nature. Based on the local provider location where Medicaid recipients received telemedicine services, Medicaid recipients do not appear to live in low population density areas. This contrasts with the expectation that patients using telemedicine are more likely to live in rural areas. DMAS staff indicate that, due to the very low level of utilization of telemedicine by Medicaid patients, utilization data may be skewed by a few participating local providers.

UVA and VCU are the two hub sites providing the majority of telemedicine care in Virginia. Since 1995 when the UVA Telemedicine Center opened, UVA has provided nearly 15,000 telemedicine consultations to patients (Table 2). The top areas in which UVA specialists have provided telemedicine consultations have been psychiatry, pediatric echocardiography, hepatology, infectious disease care, and dermatology. UVA reports that most patients participating in the UVA telemedicine program are located in rural parts of the Commonwealth.

**Table 2: UVA Consultations by Specialty Since the Opening of the UVA Telemedicine Center (1995-May 2009)**

| Specialty | # of Consultations |
|---|---|
| Psychiatry | 4,407 |
| Pediatric Echocardiography | 3,380 |
| Hepatology | 2,015 |
| Infectious Disease | 1,822 |
| Dermatology | 1,392 |
| Neurology | 379 |
| Retinopathy | 333 |
| Endocrinology | 239 |
| Nephrology | 229 |
| Other | 752 |
| Total Consultations | 14,948 |

Source: UVA.

VCU also started a telemedicine program in 1995 and reports that since 2003 it has provided a total of nearly 11,000 telemedicine consultations. There has been significant growth in the number of telemedicine consultations at VCU over the past five years - from 191 consultations in 2003 to 3,091 consultations in 2008. VCU reports that its telemedicine program mainly consists of consultations provided to prisoners in the Department of Corrections system, largely for HIV care. However, VCU has started providing telemedicine services to patients in rural localities as well and reported seeing 32 patients in 2008 through its Outreach Telemedicine program. In addition to HIV care, VCU provides telemedicine services in the following specialty areas: infectious disease, cardiology, neurosurgery, oral surgery, cardiothoracic surgery, rheumatology, neurology, anesthesiology assessment, oncology, nephrology, and podiatry.

The utilization data in this section pertains to telemedicine services used to provide clinical care to patients. However, as indicated previously, language in the proposed mandate could be construed to cover a broader definition of telehealth to include transfer of various forms of medical data and medical education. With the exception of the medical education utilization information

provided by Kentucky, utilization of the broader definition of telehealth services is unknown.

### b. Availability of Coverage

Based on a Bureau of Insurance (BOI) survey of the top health insurance providers in Virginia, the majority of health insurers do not report providing any coverage of telemedicine services. Twenty-seven of 36 companies (approximately 75 percent) responding to the survey reported that they do not provide coverage of any of the basic forms of telemedicine. (An additional three companies indicated that State mandates do not apply to them so are not part of the estimates in this section.)

Only one of 33 companies responding to the survey reported providing coverage of telehealth services as required by the proposed mandate. However, even this company likely does not cover the full breadth of services that the bill could be construed to require, such as transfer of medical administrative data and physician education. This company does report covering the three basic forms of telemedicine—real time, store and forward, and home health—as part of its standard benefit. However, its coverage policy also appears to be based on Medicare's coverage of telemedicine, so store-and-forward and home health benefits benefits may be in support of real time patient care (the only type of telemedicine currently covered by Medicare). Two companies responding to the survey reported providing coverage of telehealth services, as defined in the bill, as an optional benefit for group plans.

Six insurers (17 percent of those responding to the survey) reported providing some coverage for telemedicine services, though it appears that they do not provide the full range of coverage required by the proposed mandates even in terms of telemedicine services. For instance, none of the plans reported providing coverage of all three forms of telemedicine. The plans did not report any stipulations on coverage based on patient diagnosis, procedure performed, or region where the patient is located.

### c. Availability of Treatment/ Benefit

As with the utilization of telemedicine services, telemedicine providers are not officially tracked in Virginia. Therefore, it is difficult to know how many locations around the state use telemedicine to provide patient care. However, in 2004 the Virginia Telehealth Network (VTN) collected information on the locations in the State that have the capacity to provide telehealth services. As of 2004, there were 237 sites with telehealth capacity around the Commonwealth. These 237 sites are likely using telehealth in some form, but it may or may not be to provide clinical care to patients.

For example, some sites may use telehealth to provide physician or staff training and education. A map with the locations of the providers with telehealth capacity is provided in Appendix F. The number of sites with telehealth capacity has likely increased since 2004. However, the VTN has not had the staffing resources to update this data.

The two hub sites in the state providing the majority of specialist care to patients through telemedicine are the University of Virginia (UVA) and Virginia Commonwealth University (VCU), although other large medical centers may also be providing telemedicine access to specialists. UVA is the largest provider of telemedicine to rural patients, and its network consists of 60 sites, including hospitals, clinics, health department sites, prisons, and school clinics. VCU is the largest provider of telemedicine services for the prison system serving approximately 500 inmates at 25 facilities. VCU has also started providing some services to rural patients through its rural outreach program.

The 200 plus local sites with telehealth capacity around the State include, but are not limited to, physician offices, local VDH sites, Department of Corrections facilities, and Community Service Boards. The Northern Neck Middle Peninsula Telehealth Consortium and the Southwest Virginia Community Health System are two regionally based entities that help coordinate patient access to telehealth services in their regions. In addition, the Edward Via Virginia College of Osteopathic Medicine is a telehealth center focused on education and preparing osteopathic primary care physicians to serve the rural and medically underserved areas of the Commonwealth.

### d. Availability of Treatment Without Coverage

It would seem that the ability of patients without health insurance coverage to access telemedicine services would depend on the cost of the treatment. As discussed below in *Financial Hardship*, the cost of telemedicine services varies depending on the type and frequency of the service. In some cases, such as for a single consultation with a specialist, the cost does not seem prohibitively high to prevent a patient from paying out of pocket for the service. However, in practice it appears that very few patients pay for telemedicine services out of pocket. For example, a 2008 study of telemedicine conducted by the California HealthCare Foundation found no examples of patients self-paying for teledermatology services in California—one of the more common types of telemedicine. Also, a regional consortium of local telemedicine providers in Virginia reports that it has never had a patient pay out of pocket for telemedicine services. This has been, in part, because funding from other sources such as grants has been available to cover patient

costs thus far. However, one explanation for the absence of patients paying for services out of pocket may be that some patients may have difficulty finding local providers to refer them for a telemedicine consultation, as discussed under *Effect on Providers.*

A possibility for some rural Virginia patients without insurance coverage to receive services is participation in telemedicine pilot programs funded through grants from Anthem Blue Cross/Blue Shield with UVA and VCU. The UVA grant, established in 2002 up to a maximum of $250,000, is intended to support the provision of telemedicine services to rural citizens in designated, underserved geographies and has been used for both clinical services and equipment enhancement. Patients do not need to be covered by Anthem to receive care through the pilot. In addition, in late 2006 Anthem provided the VCU Health System with $238,000 to assist in developing its Rural Outreach Telemedicine Project to increase the availability of telemedicine in rural areas.

However, for those patients that are unable to participate in the UVA and VCU pilot programs and do not qualify for Medicare or Medicaid, the alternatives to receiving care via telemedicine include delayed access to specialty services, long distance travel for care, no access to specialty care, or care received in the local emergency department.

### e. Financial Hardship

The financial hardship for a patient paying for telemedicine services out of pocket would depend on the service the patient receives and the frequency with which they receive it. The proposed mandate does not specify services to be covered. However, some frequently utilized services through telemedicine include consultations, individual psychotherapy, and medication management. Medicare provides insight into the potential out-of-pocket costs for these services, though Medicare rates are typically below health provider charges (which patients without insurance coverage could be required to pay). The 2009 Medicare Physician Fee Schedule indicates the following approximate reimbursement levels for these three services in Virginia:

***Most payers, including Medicare and Medicaid, provide the same reimbursement to specialists for services provided through telemedicine as when they are provided face to face.***

- $30 to $220 for consultations, depending on the length and type of the consultation
- $55 to $145 for individual psychotherapy, depending on the length and type of the psychotherapy session
- $45 to $55 for medication management

### i. State Agency Findings

Since 1996, there have been at least nine different studies conducted by State entities regarding telehealth and telemedicine. In addition, various VDH reports addressing the health care workforce and access to health care comment on the status of telehealth activity around the State. Findings and recommendations from some of the key telehealth reports produced within the past ten years are summarized below. VDH staff indicate that many of the recommendations in these reports were implemented, though some were not due to budget constraints and others have become out of date.

In 2002, the Center for Health Policy, Research, and Ethics at George Mason University provided a *Report to the Virginia Department of Health on Improvements Needed in Current Telemedicine Initiatives and Opportunities to Enhance Access and Quality.* The report recommended that Virginia (1) implement a statewide telehealth infrastructure strategic planning process, (2) establish specific roles for State agencies and other State entities regarding infrastructure, (3) ensure interoperability among various entities with responsibility for health data, (4) coordinate processes for data management, and (5) create a framework for the evaluation of future telehealth activities.

VDH submitted two reports to the General Assembly in 2000 and 2001 on telemedicine in response to Senate Bill 1214 (1999) and Item 333j of the 1999 Appropriation Act. The 2000 *Telemedicine Study* provided a brief background on telemedicine and discussed the methods that would be used for the 2001 VDH study. VDH's 2001 *Report on Telemedicine Initiatives* provided uniform study instruments to collect detailed data on telemedicine programs throughout the State, including program expenditures, utilization, quality assessment, and patient satisfaction. The report also found that a sufficient volume of medical procedures was not available at that time to evaluate cost effectiveness of telemedicine in Virginia and that the four primary barriers confronting telemedicine were lack of adequate reimbursement and financing, technology integration needs, operational design, and physician acceptance of telemedicine. To address these barriers and improve the evaluation process, the report recommended (1) the use of the report's recommended evaluation instruments to assess telemedicine programs, (2) continuation of the Telemedicine Program Working Group at VDH, (3) the use of a technology integrator for VDH telemedicine sites, and (4) community involvement, especially local physicians, in the development of telemedicine programs.

In 1999, the Department of Technology Planning and the Secretary of Health and Human Resources conducted *A Joint Study to*

The costs for these services would not create a large financial hardship for most people if utilized one time. Based on estimated 2009 median household income in Virginia of $59,064, all of the costs above would be less than one percent of median household income. However, several issues may increase the financial burden on individuals and their families. Most notably, patients may need services, such as individual psychotherapy, multiple times. This could quickly drive up the financial hardship faced by individuals and their families. In addition, patients may be required to pay a small fee to local providers for the use of their facility. Further, some types of telemedicine, such as telesurgery, could be significantly more expensive than the examples given above.

### f. Prevalence/ Incidence of Condition

**Prevalence**
Prevalence is defined as the total number of cases of the condition in the population at a specific time.

Due to the wide range of medical conditions that can be treated using telemedicine, it is difficult to determine comprehensive prevalence or incidence rates. Prevalence rates are available for some of the medical areas for which telemedicine is most commonly used, such as telepsychiatry, or is an emerging practice, such as stroke care. For example, the National Institute of Mental Health indicates that approximately one in four Americans ages 18 and older suffer from a diagnosable mental disorder in a given year and about six percent suffer from a serious mental illness. Also, the Centers for Disease Control and Prevention reports that, in 2005, approximately 2.6 percent of noninstutionalized U.S. adults had a history of stroke. However, as indicated in *Utilization*, only a very small proportion of individuals with these conditions receive treatment via telemedicine.

### g. Demand for Proposed Coverage

It is difficult to estimate the demand for the proposed coverage due to the wide range of patients that could potentially make use of telemedicine services. Demand would likely be strongest in rural areas that do not have access to specialists and for those specialty areas with a shortage of practitioners. For example, the American Heart Association reports that there are approximately four neurologists per 100,000 persons in the U.S. to provide stroke care, and there are many parts of the U.S. that are without access to a neurologist entirely.

### h. Labor Union Coverage

Unions do not appear to have advocated specifically for the inclusion of telehealth services in their health benefit packages. Typically, unions advocate for broader benefits rather than benefits as specific as coverage for telehealth.

*Establish Guidelines for Ensuring Compatibility Among Telemedicine Equipment.* The study found that existing standards were sufficient to provide the compatibility and connectivity between hardware and software necessary to support the practice of telemedicine in the Commonwealth. However, applications standards, such as the minimum bandwidth necessary to support specific uses of telemedicine like teleradiology and telemental health, were missing. The study concluded that further efforts in telemedicine standardization should be focused on such applications standards.

Also in 1999, the Joint Commission on Health Care released the *Study of Reimbursement and Quality of Care Issues Regarding Telemedicine Pursuant to HJR 210.* The study concluded that limited third party reimbursement is one obstacle to the growth of telemedicine, but that third party payers are willing to pay for telemedicine when it is cost-effective and can be used to provide quality care. The study also found that the Commonwealth could encourage third party reimbursement by using its own telemedicine projects to demonstrate cost effectiveness and quality of care. It further determined that a need for coordination existed to ensure telemedicine equipment purchases by state agencies were compatible, and that the Commissioner of Health should monitor the State's progress in telemedicine initiatives.

### j. Public Payer Coverage

Medicare and Medicaid in Virginia provide coverage for telemedicine services in certain situations. The coverage for both programs is largely restricted to real-time telemedicine services, although Medicare includes certain store-and-forward services. Both programs follow a similar reimbursement model in which the originating site where the patient is located receives a telehealth facility fee and the specialist at the hub site receives reimbursement based on the medical procedure code that would have been used in a traditional, non-telemedicine setting. In contrast to Medicare and Medicaid, the State employee health plan does not provide coverage of telemedicine services.

***Medicare.*** Medicare coverage for telemedicine is limited to rural settings. To receive coverage through Medicare, beneficiaries must reside in or utilize a telemedicine system in a federally designated rural Health Professional Shortage Area in a county that is not included in a Metropolitan Statistical Area, or they must receive services from an entity that participates in a federal telemedicine demonstration project. Medicare requires that the patient be present and the encounter involve interactive audio and video telecommunications that provide real-time communication between the provider and the beneficiary.

If the above conditions are met, Medicare provides reimbursement for the following types of telemedicine services:

- Consultations
- Office or other outpatient visits
- Psychiatric diagnostic interview examination
- Individual psychotherapy
- Pharmacologic management
- Individual medical nutrition therapy
- End Stage Renal Disease related services
- Neurobehavioral status exam

Medicare also covers x-rays, diagnostic ultrasound, electrocardiogram, electroencephalogram, and cardiac pacemaker analysis regardless of the above criteria because these services do not normally require in-person interaction between the provider and patient.

***Medicaid.*** Virginia was one of the first states to allow reimbursement of telemedicine services through Medicaid and has had a Medicaid telemedicine pilot project in place since 1995. Currently, there are at least 27 states, including Virginia, that provide reimbursement for telemedicine services through Medicaid. According to the DMAS, the objectives for covering telemedicine through Medicaid are (1) improved recipient access to health care services; (2) improved recipient compliance with treatment plans; (3) medical services rendered at an earlier stage of disease, thereby improving long-term patient outcomes; and (4) reduced costs for covered services such as hospitalizations and transportation.

Virginia Medicaid currently covers telemedicine for real-time or near real-time exchange of information for diagnosing and treating medical conditions. It does not cover telemedicine when used in the store-and-forward or home health monitoring capacity, though DMAS is currently assessing whether to expand coverage to these forms of telemedicine. There are also limitations on the types of providers and procedures that are covered when provided through telemedicine. DMAS indicates that physicians, nurse practitioners, nurse midwives, clinical nurse specialists, clinical psychologists, clinical social workers, Community Service Boards, and licensed professional counselors may utilize telemedicine for the delivery of

covered services. The telemedicine procedures that are covered by Medicaid include the following:

- Consultations
- Office visits
- Individual psychotherapy
- Pharmacologic management
- Colposcopy
- Obstetric ultrasound
- Echocardiography, fetal
- Cardiography interpretation and report only
- Echocardiography

### k. Public Health Impact

**Public Health**

The role of public health is to protect and improve the health of a community through preventive medicine, health education, and control of communicable diseases.

Medical experts consulted for this review and staff at VDH stated that there are positive public health impacts associated with the proposed mandate related to improving access to care, especially in rural areas. In particular, medical experts indicated that telemedicine could help with disease management in these areas. For example, experts stated that there are significant problems with diabetes and hypertension in the far southwestern region of the State. Diabetes has reached epidemic proportions in Appalachian Virginia, and it is difficult to find specialists to treat patients. Telemedicine has been deployed to assist with the management of diabetes in theses areas by improving patient access to endocrinologists specializing in diabetes treatment.

Staff at VDH indicated that telemedicine is a large part of the State's Rural Health Plan for addressing access issues, and the 2005-2006 *VDH Primary Care Workforce and Health Access Initiatives Annual Report* provides an example of how telemedicine can play a role in controlling infectious diseases in areas without access to specialty care. The report found that it was not uncommon for tuberculosis (TB) patients to find that their primary care physicians were hesitant or even unwilling to provide care for them after their diagnoses. The report indicated that this was because primary care providers are often ill equipped to deal with TB in their practices, do not have adequate experience in the management of the disease, and do not have easy access to specialty care consultative services. In this example, access to a telemedicine

consultation with a pulmonology or infectious disease specialist can help ensure that TB patients receive appropriate care and increase local practitioners' comfort with administering that care.

## FINANCIAL IMPACT

The proposed mandate is not expected to significantly increase utilization of telemedicine because lack of reimbursement is not the only barrier preventing increased use of these services. Other barriers include an unwillingness to participate in telemedicine by both specialists and local providers for reasons other than reimbursement and technology considerations. Concerns over whether the mandate would require coverage of out-of-state health care providers does not appear founded because the mandate does not require insurers to change the providers that they cover; they just could not exclude coverage for services *solely* because they are provided via telemedicine. However, a valid concern may be that the mandate's current definition of telehealth could be construed to require coverage of services that are not traditionally reimbursed by health insurance. The premium costs associated with mandated coverage of telemedicine services are expected to be low and less than that of many existing mandates. Also, telemedicine appears to have the potential to reduce health care costs by ensuring that patients get the proper diagnosis and appropriate care when needed, and there is evidence that home telemedicine can be cost effective.

### a. Effect on Cost of Treatment

The proposed mandate is not expected to have a significant impact on the cost of the treatments provided. It may have an impact on the overall cost of health, as discussed under *Total Cost of Healthcare.* However, most payers, such as Medicare and Medicaid, reimburse specialists the same amount for a service that is provided through telemedicine as when it is provided face to face. There may be an increase in costs to both local and specialist providers for additional equipment required to conduct telemedicine encounters. However, federal grants are available to help cover technical and equipment costs (though grant funding may not necessarily cover ongoing maintenance costs). There may also be a slight increase in cost for a given procedure as a result of the reimbursement the local provider receives for conducting a telemedicine encounter. However, the reimbursement to local providers is typically quite small; Medicaid data show local reimbursements to range from $10 to $20 per encounter. In some cases, any additional costs experienced by private insurers may be offset in the long term by the savings that may result from increased use of telemedicine (discussed under *Total Cost of Healthcare).*

### b. Change in Utilization

The proposed telehealth mandate is not expected to significantly increase the utilization of telemedicine services in Virginia. Several states that have already adopted mandates for telemedicine services were contacted for this review to determine how the mandate impacted utilization in their states. Although Georgia reported increased utilization after passage of a mandate, most other states, including Kentucky, Hawaii, Louisiana, and Oklahoma, reported that utilization did not increase or increased very little. Mercer Health and Benefits LLC, which was retained to assist with the premium estimates for this review, also determined that utilization would likely remain low, at least initially, if the mandate were enacted.

**Mercer, Inc.**

Mercer is a global company providing human resource and related financial advice, products, and services. Mercer Health and Benefits LLC, a division of Mercer, provides health and benefits advice, strategic solutions, and brokerage services. JLARC staff consulted with Mercer Health and Benefits regarding the premium impact of HB 2191/ SB 1458.

The primary reason why utilization has not increased with the adoption of state mandates is that lack of reimbursement is only one of the barriers preventing more widespread use of telemedicine. As explained by staff from the Kentucky Telehealth Network, reimbursement has not been the only issue that has kept telemedicine from significantly expanding and fixing reimbursement alone will not solve telemedicine's problems with respect to utilization

One of the largest barriers to increased use of telemedicine is that many specialists and local practitioners are unwilling or uninterested in becoming involved with it. Specialists are already very busy with their regular patient caseload, and many do not feel they have the time to devote to telemedicine which can take slightly longer per patient and is less convenient from the specialists' standpoint. As indicated by staff from the Kentucky Telehealth Network, if there is a shortage of specialists, that shortage remains even with telemedicine.

Local practitioners may also be unwilling to engage in telemedicine for a variety of reasons. It may be a culture change from delivering care in the conventional face-to-face manner. They may not be comfortable with the telemedicine equipment. In addition, local providers may be unwilling to refer patients for care outside the area instead preferring to rely on local specialists, or they may not realize that telemedicine is an option.

In addition to reimbursement and physician acceptance, the California HelathCare Foundation recently reported that technology issues can also be a barrier to widespread adoption of telemedicine. Technology can be a barrier both in terms of the cost of the telemedicine equipment (though federal grant funding has assisted with equipment costs in Virginia) and slow data transmission in rural areas.

Another factor affecting the proposed mandate's impact on utilization is that State mandates only affect a portion of the population—those covered by individual and fully insured health plans. Approximately 30 percent of Virginians are estimated to be covered by these types of plans. However, legislation passed by the 2009 General Assembly allows insurers to sell policies to employers with 50 or fewer employees that do not include State mandates. As a result, some portion less than 30 percent of Virginia's population would gain coverage for telemedicine services through a mandate. Moreover, rural areas, which stand to benefit most from telemedicine, may have higher rates of uninsured individuals or individuals on Medicaid, both of who would not benefit from a mandate.

One concern raised by insurance companies is whether the proposed mandate would require them to cover out-of-state practitioners and the licensure issues that could ensue. This does not appear to be a valid concern, at least as a result of the mandate. The proposed mandate requires that insurers not exclude a service for coverage *solely* because the service is provided through telehealth and is not provided through face-to-face consultation or contact between a health care provider and patient. Therefore, it does not appear to require insurers to change which health care providers they cover; it just requires that they cannot exclude a covered benefit or provider solely on the grounds that the service is provided via telemedicine.

Virginia's licensure regulations do not specifically address telemedicine. However, a 2006 report by the Virginia Board of Medicine stated that providers practicing telehealth must be licensed and are under the jurisdiction of the Board. The Board also indicated that it follows the Federation of State Medical Boards' Model Guidelines for the Appropriate Use of the Internet in Medical Practice (2002) which state that "treatment and consultation recommendations made in an online setting, including issuing a prescription via electronic means, will be held to the same standards of appropriate practice as those in traditional (face-to-face) settings." The Board further said that it has taken the stance that practice occurs in the state where the patient is located. This requires that an out-of-state physician providing an evaluation, consultation, or treatment to a patient in Virginia needs to be licensed in Virginia to be practicing medicine lawfully. Virginia does have a consultant exemption which allows patients to consult with out-of-state doctors as long as a Virginia doctor takes responsibility for the patient. However, staff at the Board of Medicine stated that Virginia does not seem to have a great need for telemedicine access from outside the state, so cross-state physician licensure issues have not been a large problem.

While the proposed mandate would not create particular licensure issues, a valid concern is that the bill could be construed to require coverage of services that are not typically covered by health insurance. The definition of telehealth services in the bill includes the use of "electronic media for consultation relating to the health care diagnosis or treatment of the patient, transfer of medical data, and medical education." As indicated previously, transfer of medical data and medical education could be interpreted to include activities not typically covered by insurance, such as transfer of administrative data and continuing medical education for physicians. Revising the bill language so that it only covers the clinical care provided to patients, such as requiring coverage of telemedicine services rather than the broader definition of telehealth, would help ensure that the mandate does not expand the scope of services covered by insurance, just the way services are delivered.

### c. Serves as an Alternative

According to medical experts and information from other states, the alternative to a patient not accessing care from a specialist via telemedicine may be to not receive specialist care in a timely fashion or to forgo specialty care altogether. This may result in an individual receiving an incorrect diagnosis from a local practitioner and/or delays in accessing proper medical care. Incorrect diagnoses or delays in treatment may ultimately lead to worsened health outcomes. In time sensitive cases, such as stroke or a high risk pregnancy, the delay of proper care for even a few minutes or hours can result in vastly different health outcomes. For example, in ischemic stroke, thrombolytic therapy must be delivered within three hours to improve outcomes. Failure to receive appropriate care in a high risk pregnancy may result in a premature birth (estimated to cost $51,600 per birth in 2005, according to the CDC), and a lifetime of costly medical issues and developmental delay for the child. However, even in cases that are not as time sensitive, medical experts indicate that delaying the proper treatment can ultimately be more costly. Further, patients who do not receive timely and appropriate care are more likely to receive care in an emergency room.

There have also been studies supporting improved health outcomes and reduced costs as a result of telehome care compared to conventional means of delivering care. For example, studies of telewoundcare provided to homebound patients and home monitoring of congestive heart failure patients found that those patients receiving home care via telemedicine had fewer emergency department visits, fewer hospital readmissions, and shorter lengths of stay than patients receiving conventional care and monitoring. A recent report in the *New England Journal of Medicine* indicated that approximately 20 percent of Medicare beneficiaries are read-

mitted within 30 days, costing Medicare billions of dollars. Chronic disease management via telemedicine has been shown to reduce readmission, and potentially the associated costs.

### d. Effect on Providers

As indicated in *Change in Utilization*, reimbursement is not the only reason providers are unwilling to participate in telemedicine. Therefore, while mandated health insurance coverage may increase participation by providers to some extent, it is not expected to have a large impact on the number of telemedicine providers in the Virginia. However, one potential concern is how to ensure uniformity of care for services provided through telemedicine, particularly if the State requires insurance coverage of such services. Another consideration is whether there is a need to require adherence to technical or practice standards, guidelines, or certifications to be eligible for coverage by a mandate. Differing schools of thought exist on this topic.

Many individuals within the telemedicine community believe that tying such guidelines or requirements to a mandate is not needed and would only hinder the advancement of telemedicine. These include some medical experts consulted for this review, the federal Office for the Advancement of Telemedicine (OAT), and many of the states that already have telemedicine mandates in place. As indicated by staff at the OAT, physicians must meet the clinical guidelines designated for their specialty area. If telemedicine technology does not allow them to meet their clinical guidelines, clinicians will not render care, in large part, due to the liability issues involved. No states with existing telemedicine mandates were identified as having designated guidelines or requirements that telemedicine providers must adhere to, though Colorado reports it is in the process of developing patient care guidelines

Other medical experts consulted for this review, staff at DMAS, and a minority of states with telemedicine mandates indicated some level of guidelines or certification could be useful in establishing a uniform level of care. Required adherence to existing guidelines or a state telemedicine certification could increase the comfort level of physicians and insurers with telemedicine. Further, DMAS staff report that they have turned away a few practitioners requesting to become Medicaid telemedicine providers because DMAS determined that their equipment, which was for the consumer market, was not adequate for conducting telemedicine services.

If the State were to link a uniformity of care requirement with mandated coverage of telemedicine services, several options exist. First, the Board of Medicine could require a special certification for

health care providers wishing to practice telemedicine based on receiving a required level of training in telemedicine (for example, a set number of training units). Medical experts indicated that the State medical schools would likely develop the needed coursework to support such a certification. Another option would be to require providers to adhere to existing telemedicine guidelines, where they exist, to be eligible for coverage under the mandate. The national professional organizations for certain specialties, particularly those making the most use of telemedicine such as dermatology, radiology, and psychiatry, have developed practice guidelines for telemedicine. In many cases, these guidelines address the technology that should be in place and how care should be delivered to achieve the best results. In addition, the American Telemedicine Association released core standards for telemedicine operations in 2008. There is a general consensus, even among those supporting the consideration of uniformity of care guidelines, that any requirements should not impede the advancement of telemedicine but rather help ensure that those physicians practicing telemedicine are well-trained in the technology and utilizing best practices.

### e. Administrative and Premium Costs

The administrative expenses for insurance companies resulting from the proposed mandate are expected to be negligible. Similarly, the premium impact of the proposed mandates is expected to be low and less than that of many existing mandates. A primary reason for the initial low premium impact is low expected utilization of telemedicine benefits. However, the premium impact could increase over time as the telemedicine industry grows. Also, the current version of the proposed mandate could include activities that are typically outside the scope of health insurance, such as the transfer of administrative data or physician education, which could also increase the premium impact.

***Administrative Expenses of Insurance Companies.*** The administrative expenses for insurance companies would likely be negligible and less than that of other State mandates. Insurance companies do not provide estimates on the administrative expenses of proposed mandates in their responses to an annual BOI survey on the premium impacts of proposed mandates. However, the proposed mandate would not require insurers to revise their coverage policies or modify their networks in terms of the types of medical services and providers that they cover. A negligible administrative expense is also consistent with information provided in a recent Texas Department of Insurance report which indicated that the administrative costs for the telemedicine mandate in Texas were less than one one-hundredth of a percent of total claims paid.

***Premium and Administrative Expenses of Policyholders.*** JLARC retained Mercer to provide an independent evaluation of the potential premium impact of the proposed mandate (Appendix G). As shown in Table 3, Mercer estimates the monthly premium cost per policy to be $0.83 for both individual and group policies when coverage is provided as a standard benefit. If provided as an optional benefit, the monthly premium estimates increase to $2.00 for individual policies and $1.67 for group policies.

**Average Individual Insurance Premiums**

In October 2008, the Virginia Bureau of Insurance reported an average annual health insurance premium (with current mandated benefits) for an individual contract, single coverage, of $4,124.07 or approximately $344 per month.

**Table 3: Independent Monthly Premium Estimates Per Policy for HB 2191/SB 1458**

| Type of Coverage | Standard Benefit | Optional Benefit |
|---|---|---|
| Individual Policyholders | $0.83 | $2.00 |
| Group Policyholders | $0.83 | $1.67 |

Source: Mercer estimates of annual premium impact.

**Impact of Premiums on Employers' Decisions to Offer Health Insurance**

"Elasticity of offer" indicates how sensitive employers are to changes in premiums in their decisions to offer health insurance. The Congressional Budget Office and others have reported an elasticity of offer of approximately -0.25 across all employers, meaning that a ten percent increase in the average premium is predicted to decrease the likelihood of an employer offering health insurance by about 2.5 percent. Small employers are more sensitive to price and have a higher elasticity of offer. In addition to premiums, other factors affect employer decisions to offer health insurance including the availability of public coverage, such as Medicaid, nongroup coverage alternatives for employees, the type of industry, and the employer's location.

A premium increase of $0.83 for individual standard coverage would result in a monthly premium increase of 0.24 percent based on the estimated average monthly premium cost for a single coverage, individual contract, as defined in BOI's 2008 report on the financial impact of mandated health insurance benefits. This is within the range of existing Virginia mandates, but less expensive than many mandates according to the BOI report. The report indicates that existing Virginia mandates make up anywhere from .09 percent to 1.91 percent of the overall premium for single coverage, individual contracts. Data is not available on the monthly premium estimate for group plans, so it is not possible to calculate the percent increase in premium costs for group plans resulting from the mandate. However, the cost should be less than for individual plans given the larger insurance pool that allows for spreading costs among a large number of plan members.

As indicated, BOI annually surveys the top Virginia health insurers on the premium impact of proposed health insurance mandates. Two companies provided estimates of the premium impact for individual policies and nine companies provided estimates for the impact for group policies. The estimates reported by these companies were largely in the range of those developed by Mercer, though several companies providing estimates for group policies submitted estimates that were substantially higher than Mercer. For individual policies, estimates ranged from $0.00 to $1.00 per month for standard coverage and $0.00 to $3.00 per month for optional coverage. For group policies, estimates ranges from $0.00 to $9.07 per month for standard coverage and $0.00 to $6.05 per month for optional coverage. (Survey responses provided on a per member per month basis were converted to per policy per month for comparison purposes based on an estimate of 2.4 enrollees per

policy. Those estimates at the top of the range for group policies were initially provided as per member per month estimates.)

Mercer indicates that the relatively low cost associated with coverage of telemedicine is largely due to the low utilization of telemedicine services. However, the expected initial low cost of adding telemedicine services could become more substantial over time as the telemedicine industry grows. Further, the premium estimates developed by Mercer are based on utilization of telehealth services provided for direct patient care, in other words, telemedicine. If the broader definition of telehealth services were included, the premium cost could increase.

### f. Total Cost of Health Care

In general, it appears that telemedicine could reduce the total cost of health care, or at least would not significantly increase health care costs. Medical experts assert that savings would occur through decreased misdiagnoses and earlier provision of appropriate care. Most of the literature found addressing telemedicine's impact on health care costs relates to savings from improved monitoring through the use of home telemedicine. For example, a 2008 study of patients receiving care through the Veterans Health Administration's home telehealth program showed a 25 percent reduction in the number of bed days of care and a 19 percent reduction in numbers of hospital admissions. Other examples include a 2003 study of patients with congestive heart failure which found that the national cost for congestive heart failure hospitalizations could be cut in half with increased use of home telemedicine care, and a 2001 study of high-risk pregnancies which found that the average cost for patients receiving home telemedicine care to monitor their pregnancy was only a third of that of the control group.

However, there have been a number of studies since 2001, most recently by the California Telemedicine and eHealth Center in 2009, which have reviewed the literature addressing the cost effectiveness of telemedicine and determined that the literature is not conclusive to demonstrate its cost-effectiveness. In general, the conclusion in these studies has been that existing cost effectiveness studies are not of sufficient quality or generalizable enough to confirm the cost effectiveness of telemedicine. In most cases, they have not directly challenged the premise that telemedicine could reduce health care costs. Medical experts and staff at DMAS indicate that, cost effectiveness considerations aside, the primary impetus behind telemedicine is increased access to care.

## BALANCING MEDICAL, SOCIAL, AND FINANCIAL CONSIDERATIONS

There is significant support from the medical community, VDH, the federal Office for the Advancement of Telehealth, and the federal Agency for Healthcare Research Quality for the expansion of telemedicine services. Telemedicine increases access in underserved areas and can bring significant positive public health impacts. A mandate requiring coverage for telemedicine services is not expected to significantly increase the utilization of telemedicine, but it would remove one of the barriers faced by telemedicine and is expected to have only a minimal impact on premiums. Focusing the mandate on coverage of telemedicine services, rather than the broader definition of telehealth, would ensure that the scope of medical services for which coverage is required would not be a change from the services typically covered by health insurance.

### a. Social Need/ Consistent With Role of Insurance

Based on the premise that the role of health insurance is to promote public health, encourage the use of preventive care, and provide protection from excessive financial expenses from unexpected illness, it is unclear whether the current version of the proposed mandate is consistent with insurance due to some of the activities that could be interpreted to be included in the bill's definition of telehealth. However, limiting the bill to cover telemedicine services would be consistent with the role of health insurance because it would not change the providers or services covered by insurance, just how these services are delivered. Medicare and Medicaid also provide reimbursement for telemedicine services further confirming their legitimacy as a covered service.

Medical experts consulted for this review and VDH stated that there are significant positive public health impacts associated with telemedicine by increasing access to medical services. Indeed, the primary impetus behind telemedicine is generally to increase access to needed and appropriate health care services in rural or underserved areas. Without appropriate access to specialists, patients may receive delayed or incorrect diagnoses, inappropriate treatments, and in some cases may end up in local emergency departments.

### b. Need Versus Cost

The expected premium impact of mandating coverage of telemedicine services is low. In addition, telemedicine is not expected to significantly increase overall health care costs, and there is evidence to show that it may even decrease costs. While mandating

coverage alone would probably not have a large impact in increasing utilization because of the other barriers faced by telemedicine, such as physician acceptance, it would remove one of the hurdles faced by telemedicine. Medical experts consulted for this review, VDH, and staff at the federal OAT and AHRQ were, without exception, supportive of efforts to increase the utilization and acceptance of telemedicine in the long run.

One action that could help address some of the concerns of local physicians and insurers surrounding telemedicine would be to implement uniformity of care guidelines or regulations. However, there is not a consensus as to whether such guidelines or recommendations would be useful. While some experts and states thought efforts to address uniformity of care could help ensure best practices are followed, other medical experts, staff at the federal OAT, and a number of states with mandates suggested that such guidelines or recommendations are not needed and would only serve to hinder the advancement of telemedicine.

### c. Mandated Offer

**Mandated Offer**
A mandated offer requires health insurers to offer for purchase the coverage described in the mandate for an additional fee.

A mandated offer could be appropriate for telemedicine services because individuals know whether they live in medically underserved areas and, therefore, would likely make use of the benefit. However, a mandated offer would result in higher premiums, which could impact the take-up rate of the benefit.

## ACKNOWLEDGMENTS

JLARC staff would like to acknowledge the expertise, assistance, and information provided by staff at Virginia Commonwealth University and the University of Virginia Health System. JLARC staff would also like to thank Mercer for developing an independent premium estimate and the research provided supporting the estimate. In addition, JLARC would like to thank the Virginia State Corporation Commission Bureau of Insurance, the Virginia Association of Health Plans, the Department of Health, the Board of Medicine, and the Department of Medical Assistance Services.

Appendix A

# Statutory Authority for JLARC Evaluation of Proposed Mandated Health Insurance Benefits

§ 2.2-2503. Special Advisory Commission on Mandated Health Insurance Benefits; membership; terms; meetings; compensation and expenses; staff; chairman's executive summary.

A. The Special Advisory Commission on Mandated Health Insurance Benefits (the Commission) is established as an advisory commission within the meaning of § 2.2-2100, in the executive branch of state government. The purpose of the Commission shall be to advise the Governor and the General Assembly on the social and financial impact of current and proposed mandated benefits and providers, in the manner set forth in this article.

B. The Commission shall consist of 18 members that include six legislative members, 10 nonlegislative citizen members, and two ex officio members as follows: one member of the Senate Committee on Education and Health and one member of the Senate Committee on Commerce and Labor appointed by the Senate Committee on Rules; two members of the House Committee on Health, Welfare and Institutions and two members of the House Committee on Commerce and Labor appointed by the Speaker of the House of Delegates in accordance with the principles of proportional representation contained in the Rules of the House of Delegates; 10 nonlegislative citizen members appointed by the Governor that include one physician, one chief executive officer of a general acute care hospital, one allied health professional, one representative of small business, one representative of a major industry, one expert in the field of medical ethics, two representatives of the accident and health insurance industry, and two nonlegislative citizen members; and the State Commissioner of Health and the State Commissioner of Insurance, or their designees, who shall serve as ex officio nonvoting members.

C. All nonlegislative citizen members shall be appointed for terms of four years. Legislative and ex officio members shall serve terms coincident with their terms of office. All members may be reappointed. However, no House member shall serve more than four consecutive two-year terms, no Senate member shall serve more than two consecutive four-year terms, and no nonlegislative citizen member shall serve more than two consecutive four-year terms. Vacancies occurring other than by expiration of a term shall be filled for the unexpired term. Vacancies shall be filled in the manner as the original appointments. The remainder of any term to which a member is appointed to fill a vacancy shall not constitute a term in determining the member's eligibility for reappointment.

D. The Commission shall meet at the request of the chairman, the majority of the voting members or the Governor. The Commission shall elect a chairman and a vice-chairman, as determined by the membership. A majority of the members of the Commission shall constitute a quorum.

E. Legislative members of the Commission shall receive such compensation as provided in § 30-19.12, and nonlegislative citizen members shall receive such compensation for the performance of their duties as provided in § 2.2-2813. All members shall be reimbursed for all reasonable and

necessary expenses incurred in the performance of their duties as provided in §§ 2.2-2813 and 2.2-2825. Funding for the compensation and costs of expenses of the members shall be provided by the State Corporation Commission.

F. The Bureau of Insurance, the State Health Department, and the Joint Legislative Audit and Review Commission and such other state agencies as may be considered appropriate by the Commission shall provide staff assistance to the Commission. The Joint Legislative Audit and Review Commission shall conduct assessments, analyses, and evaluations of proposed mandated health insurance benefits and mandated providers as provided in subsection D of § 30-58.1, and report its findings with respect to the proposed mandates to the Commission.

G. The chairman of the Commission shall submit to the Governor and the General Assembly an annual executive summary of the interim activity and work of the Commission no later than the first day of each regular session of the General Assembly. The executive summary shall be submitted as provided in the procedures of the Division of Legislative Automated Systems for the processing of legislative documents and reports and shall be posted on the General Assembly's website.

§ 30-58.1. Powers and duties of Commission.

The Commission shall have the following powers and duties:

A. Make performance reviews of operations of state agencies to ascertain that sums appropriated have been, or are being expended for the purposes for which such appropriations were made and to evaluate the effectiveness of programs in accomplishing legislative intent;

B. Study on a continuing basis the operations, practices and duties of state agencies, as they relate to efficiency in the utilization of space, personnel, equipment and facilities;

C. Make such special studies and reports of the operations and functions of state agencies as it deems appropriate and as may be requested by the General Assembly;

D. Assess, analyze, and evaluate the social and economic costs and benefits of any proposed mandated health insurance benefit or mandated provider, including, but not limited to, the mandate's predicted effect on health care coverage premiums and related costs, net costs or savings to the health care system, and other relevant issues, and report its findings with respect to the proposed mandate to the Special Advisory Commission on Mandated Health Insurance Benefits; and

E. Make such reports on its findings and recommendations at such time and in such manner as the Commission deems proper submitting same to the agencies concerned, to the Governor and to the General Assembly. Such reports as are submitted shall relate to the following matters:

1. Ways in which the agencies may operate more economically and efficiently;

2. Ways in which agencies can provide better services to the Commonwealth and to the people; and

3. Areas in which functions of state agencies are duplicative, overlapping, or failing to accomplish legislative objectives or for any other reason should be redefined or redistributed.

Appendix **B**

# Proposed Mandated Benefit Requiring Coverage for Telehealth Services

---

**HOUSE BILL NO. 2191**
Offered January 14, 2009
Prefiled January 14, 2009

*A BILL to amend and reenact § 38.2-4319 of the Code of Virginia and to amend the Code of Virginia by adding a section numbered 38.2-3418.15, relating to health insurance coverage for telehealth services.*

---

Patron-- Phillips

---

Referred to Committee on Commerce and Labor

---

Be it enacted by the General Assembly of Virginia:

1. That § 38.2-4319 of the Code of Virginia is amended and reenacted and that the Code of Virginia is amended by adding a section numbered 38.2-3418.15 as follows:

*§ 38.2-3418.15. Coverage for telehealth services.*

*A. Notwithstanding the provisions of § 38.2-3419, each insurer proposing to issue individual or group accident and sickness insurance policies providing hospital, medical and surgical, or major medical coverage on an expense-incurred basis; each corporation providing individual or group accident and sickness subscription contracts; and each health maintenance organization providing a health care plan for health care services shall provide coverage for the cost of telehealth services, as provided in this section.*

*B. As used in this section: "telehealth services" means the use of interactive audio, video, or other telecommunications technology by a health care provider to deliver health care services within the scope of the provider's practice at a site other than the site where the patient is located, including the use of electronic media for consultation relating to the health care diagnosis or treatment of the patient, transfer of medical data, and medical education. "Telehealth services" do not include an audio-only telephone conversation, electronic mail message, or facsimile transmission between a health care provider and a patient.*

*C. An insurer, corporation, or health maintenance organization shall not exclude a service for coverage solely because the service is provided through telehealth and is not provided through face-to-face consultation or contact between a health care provider and a patient for services appropriately provided through telehealth services.*

*D. No insurer, corporation, or health maintenance organization shall impose any annual or lifetime dollar maximum on coverage for telehealth services other than an annual or lifetime dollar maximum that applies in the aggregate to all items and services covered under the policy, or impose upon any person receiving benefits pursuant to this section any copayment, coinsurance, or deductible amounts, or any policy year, calendar year, lifetime, or other durational benefit limitation or maximum for benefits or services, that is not equally imposed upon all terms and services covered under the policy, contract, or plan.*

*E. The requirements of this section shall apply to all insurance policies, contracts, and plans delivered, issued for delivery, reissued, or extended in the Commonwealth on and after January 1, 2010, or at any time thereafter when any term of the policy, contract, or plan is changed or any premium adjustment is made.*

*F. This section shall not apply to short-term travel, accident-only, limited or specified disease, or individual conversion policies or contracts, nor to policies or contracts designed for issuance to persons eligible for coverage under Title XVIII of the Social Security Act, known as Medicare, or any other similar coverage under state or federal governmental plans.*

§ 38.2-4319. Statutory construction and relationship to other laws.

A. No provisions of this title except this chapter and, insofar as they are not inconsistent with this chapter, §§ 38.2-100, 38.2-136, 38.2-200, 38.2-203, 38.2-209 through 38.2-213, 38.2-216, 38.2-218 through 38.2-225, 38.2-229, 38.2-232, 38.2-305, 38.2-316, 38.2-322, 38.2-400, 38.2-402 through 38.2-413, 38.2-500 through 38.2-515, 38.2-600 through 38.2-620, Chapter 9 (§ 38.2-900 et seq.), §§ 38.2-1016.1 through 38.2-1023, 38.2-1057, Article 2 (§ 38.2-1306.2 et seq.), § 38.2-1306.1, § 38.2-1315.1, Articles 3.1 (§ 38.2-1316.1 et seq.), 4 (§ 38.2-1317 et seq.) and 5 (§ 38.2-1322 et seq.) of Chapter 13, Articles 1 (§ 38.2-1400 et seq.) and 2 (§ 38.2-1412 et seq.) of Chapter 14, §§ 38.2-1800 through 38.2-1836, 38.2-3401, 38.2-3405, 38.2-3405.1, 38.2-3407.2 through 38.2-3407.6:1, 38.2-3407.9 through 38.2-3407.16, 38.2-3411.2, 38.2-3411.3, 38.2-3411.4, 38.2-3412.1:01, 38.2-3414.1, 38.2-3418.1 through ~~38.2-3418.14~~ *38.2-3418.15*, 38.2-3419.1, 38.2-3430.1 through 38.2-3437, 38.2-3500, subdivision 13 of § 38.2-3503, subdivision 8 of § 38.2-3504, §§ 38.2-3514.1, 38.2-3514.2, 38.2-3522.1 through 38.2-3523.4, 38.2-3525, 38.2-3540.1, 38.2-3542, 38.2-3543.2, Article 5 (§ 38.2-3551 et seq.) of Chapter 35, Chapter 52 (§ 38.2-5200 et seq.), Chapter 55 (§ 38.2-5500 et seq.), Chapter 58 (§ 38.2-5800 et seq.) and § 38.2-5903 of this title shall be applicable to any health maintenance organization granted a license under this chapter. This chapter shall not apply to an insurer or health services plan licensed and regulated in conformance with the insurance laws or Chapter 42 (§ 38.2-4200 et seq.) of this title except with respect to the activities of its health maintenance organization.

B. For plans administered by the Department of Medical Assistance Services that provide benefits pursuant to Title XIX or Title XXI of the Social Security Act, as amended, no provisions of this title except this chapter and, insofar as they are not inconsistent with this chapter, §§ 38.2-100, 38.2-136, 38.2-200, 38.2-203, 38.2-209 through 38.2-213, 38.2-216, 38.2-218 through 38.2-225, 38.2-229, 38.2-232, 38.2-322, 38.2-400, 38.2-402 through 38.2-413, 38.2-500 through 38.2-515, 38.2-600 through 38.2-620, Chapter 9 (§ 38.2-900 et seq.), §§ 38.2-1016.1 through 38.2-1023, 38.2-1057, § 38.2-1306.1, Article 2 (§ 38.2-1306.2 et seq.), § 38.2-1315.1, Articles 3.1 (§ 38.2-1316.1 et seq.), 4 (§ 38.2-1317 et seq.) and 5 (§ 38.2-1322 et seq.) of Chapter 13, Articles 1 (§ 38.2-1400 et seq.) and 2 (§ 38.2-1412 et seq.) of Chapter 14, §§ 38.2-3401, 38.2-3405, 38.2-

3407.2 through 38.2-3407.5, 38.2-3407.6 and 38.2-3407.6:1, 38.2-3407.9, 38.2-3407.9:01, and 38.2-3407.9:02, subdivisions 1, 2, and 3 of subsection F of § 38.2-3407.10, 38.2-3407.11, 38.2-3407.11:3, 38.2-3407.13, 38.2-3407.13:1, and 38.2-3407.14, 38.2-3411.2, 38.2-3418.1, 38.2-3418.2, 38.2-3419.1, 38.2-3430.1 through 38.2-3437, 38.2-3500, subdivision 13 of § 38.2-3503, subdivision 8 of § 38.2-3504, §§ 38.2-3514.1, 38.2-3514.2, 38.2-3522.1 through 38.2-3523.4, 38.2-3525, 38.2-3540.1, 38.2-3542, 38.2-3543.2, Chapter 52 (§ 38.2-5200 et seq.), Chapter 55 (§ 38.2-5500 et seq.), Chapter 58 (§ 38.2-5800 et seq.) and § 38.2-5903 shall be applicable to any health maintenance organization granted a license under this chapter. This chapter shall not apply to an insurer or health services plan licensed and regulated in conformance with the insurance laws or Chapter 42 (§ 38.2-4200 et seq.) of this title except with respect to the activities of its health maintenance organization.

C. Solicitation of enrollees by a licensed health maintenance organization or by its representatives shall not be construed to violate any provisions of law relating to solicitation or advertising by health professionals.

D. A licensed health maintenance organization shall not be deemed to be engaged in the unlawful practice of medicine. All health care providers associated with a health maintenance organization shall be subject to all provisions of law.

E. Notwithstanding the definition of an eligible employee as set forth in § 38.2-3431, a health maintenance organization providing health care plans pursuant to § 38.2-3431 shall not be required to offer coverage to or accept applications from an employee who does not reside within the health maintenance organization's service area.

F. For purposes of applying this section, "insurer" when used in a section cited in subsections A and B of this section shall be construed to mean and include "health maintenance organizations" unless the section cited clearly applies to health maintenance organizations without such construction.

**SENATE BILL NO. 1458**

Offered January 20, 2009

*A BILL to amend and reenact § 38.2-4319 of the Code of Virginia and to amend the Code of Virginia by adding a section numbered 38.2-3418.15, relating to health insurance coverage for telehealth services.*

---

Patron-- Wampler

---

Referred to Committee on Commerce and Labor

---

Be it enacted by the General Assembly of Virginia:

1. That § 38.2-4319 of the Code of Virginia is amended and reenacted and that the Code of Virginia is amended by adding a section numbered 38.2-3418.15 as follows:

*§ 38.2-3418.15. Coverage for telehealth services.*

*A. Notwithstanding the provisions of § 38.2-3419, each insurer proposing to issue individual or group accident and sickness insurance policies providing hospital, medical and surgical, or major medical coverage on an expense-incurred basis; each corporation providing individual or group accident and sickness subscription contracts; and each health maintenance organization providing a health care plan for health care services shall provide coverage for the cost of telehealth services, as provided in this section.*

*B. As used in this section: "telehealth services" means the use of interactive audio, video, or other telecommunications technology by a health care provider to deliver health care services within the scope of the provider's practice at a site other than the site where the patient is located, including the use of electronic media for consultation relating to the health care diagnosis or treatment of the patient, transfer of medical data, and medical education. "Telehealth services" do not include an audio-only telephone conversation, electronic mail message, or facsimile transmission between a health care provider and a patient.*

*C. An insurer, corporation, or health maintenance organization shall not exclude a service for coverage solely because the service is provided through telehealth and is not provided through face-to-face consultation or contact between a health care provider and a patient for services appropriately provided through telehealth services.*

*D. No insurer, corporation, or health maintenance organization shall impose any annual or lifetime dollar maximum on coverage for telehealth services other than an annual or lifetime dollar maximum that applies in the aggregate to all items and services covered under the policy, or impose upon any person receiving benefits pursuant to this section any copayment, coinsurance, or deductible amounts, or any policy year, calendar year, lifetime, or other durational benefit limitation or maximum for benefits or services, that is not equally imposed upon all terms and services covered under the policy, contract, or plan.*

*E. The requirements of this section shall apply to all insurance policies, contracts, and plans delivered, issued for delivery, reissued, or extended in the Commonwealth on and after January 1,*

*2010, or at any time thereafter when any term of the policy, contract, or plan is changed or any premium adjustment is made.*

*F. This section shall not apply to short-term travel, accident-only, or limited or specified disease policies or contracts, nor to policies or contracts designed for issuance to persons eligible for coverage under Title XVIII of the Social Security Act, known as Medicare, or any other similar coverage under state or federal governmental plans.*

§ 38.2-4319. Statutory construction and relationship to other laws.

A. No provisions of this title except this chapter and, insofar as they are not inconsistent with this chapter, §§ 38.2-100, 38.2-136, 38.2-200, 38.2-203, 38.2-209 through 38.2-213, 38.2-216, 38.2-218 through 38.2-225, 38.2-229, 38.2-232, 38.2-305, 38.2-316, 38.2-322, 38.2-400, 38.2-402 through 38.2-413, 38.2-500 through 38.2-515, 38.2-600 through 38.2-620, Chapter 9 (§ 38.2-900 et seq.), §§ 38.2-1016.1 through 38.2-1023, 38.2-1057, Article 2 (§ 38.2-1306.2 et seq.), § 38.2-1306.1, § 38.2-1315.1, Articles 3.1 (§ 38.2-1316.1 et seq.), 4 (§ 38.2-1317 et seq.) and 5 (§ 38.2-1322 et seq.) of Chapter 13, Articles 1 (§ 38.2-1400 et seq.) and 2 (§ 38.2-1412 et seq.) of Chapter 14, §§ 38.2-1800 through 38.2-1836, 38.2-3401, 38.2-3405, 38.2-3405.1, 38.2-3407.2 through 38.2-3407.6:1, 38.2-3407.9 through 38.2-3407.16, 38.2-3411.2, 38.2-3411.3, 38.2-3411.4, 38.2-3412.1:01, 38.2-3414.1, 38.2-3418.1 through ~~38.2-3418.14~~ *38.2-3418.15*, 38.2-3419.1, 38.2-3430.1 through 38.2-3437, 38.2-3500, subdivision 13 of § 38.2-3503, subdivision 8 of § 38.2-3504, §§ 38.2-3514.1, 38.2-3514.2, 38.2-3522.1 through 38.2-3523.4, 38.2-3525, 38.2-3540.1, 38.2-3542, 38.2-3543.2, Article 5 (§ 38.2-3551 et seq.) of Chapter 35, Chapter 52 (§ 38.2-5200 et seq.), Chapter 55 (§ 38.2-5500 et seq.), Chapter 58 (§ 38.2-5800 et seq.) and § 38.2-5903 of this title shall be applicable to any health maintenance organization granted a license under this chapter. This chapter shall not apply to an insurer or health services plan licensed and regulated in conformance with the insurance laws or Chapter 42 (§ 38.2-4200 et seq.) of this title except with respect to the activities of its health maintenance organization.

B. For plans administered by the Department of Medical Assistance Services that provide benefits pursuant to Title XIX or Title XXI of the Social Security Act, as amended, no provisions of this title except this chapter and, insofar as they are not inconsistent with this chapter, §§ 38.2-100, 38.2-136, 38.2-200, 38.2-203, 38.2-209 through 38.2-213, 38.2-216, 38.2-218 through 38.2-225, 38.2-229, 38.2-232, 38.2-322, 38.2-400, 38.2-402 through 38.2-413, 38.2-500 through 38.2-515, 38.2-600 through 38.2-620, Chapter 9 (§ 38.2-900 et seq.), §§ 38.2-1016.1 through 38.2-1023, 38.2-1057, § 38.2-1306.1, Article 2 (§ 38.2-1306.2 et seq.), § 38.2-1315.1, Articles 3.1 (§ 38.2-1316.1 et seq.), 4 (§ 38.2-1317 et seq.) and 5 (§ 38.2-1322 et seq.) of Chapter 13, Articles 1 (§ 38.2-1400 et seq.) and 2 (§ 38.2-1412 et seq.) of Chapter 14, §§ 38.2-3401, 38.2-3405, 38.2-3407.2 through 38.2-3407.5, 38.2-3407.6 and 38.2-3407.6:1, 38.2-3407.9, 38.2-3407.9:01, and 38.2-3407.9:02, subdivisions 1, 2, and 3 of subsection F of § 38.2-3407.10, 38.2-3407.11, 38.2-3407.11:3, 38.2-3407.13, 38.2-3407.13:1, and 38.2-3407.14, 38.2-3411.2, 38.2-3418.1, 38.2-3418.2, 38.2-3419.1, 38.2-3430.1 through 38.2-3437, 38.2-3500, subdivision 13 of § 38.2-3503, subdivision 8 of § 38.2-3504, §§ 38.2-3514.1, 38.2-3514.2, 38.2-3522.1 through 38.2-3523.4, 38.2-3525, 38.2-3540.1, 38.2-3542, 38.2-3543.2, Chapter 52 (§ 38.2-5200 et seq.), Chapter 55 (§ 38.2-5500 et seq.), Chapter 58 (§ 38.2-5800 et seq.) and § 38.2-5903 shall be applicable to any health maintenance organization granted a license under this chapter. This chapter shall not apply to an insurer or health services plan licensed and regulated in conformance with the insurance

laws or Chapter 42 (§ 38.2-4200 et seq.) of this title except with respect to the activities of its health maintenance organization.

C. Solicitation of enrollees by a licensed health maintenance organization or by its representatives shall not be construed to violate any provisions of law relating to solicitation or advertising by health professionals.

D. A licensed health maintenance organization shall not be deemed to be engaged in the unlawful practice of medicine. All health care providers associated with a health maintenance organization shall be subject to all provisions of law.

E. Notwithstanding the definition of an eligible employee as set forth in § 38.2-3431, a health maintenance organization providing health care plans pursuant to § 38.2-3431 shall not be required to offer coverage to or accept applications from an employee who does not reside within the health maintenance organization's service area.

F. For purposes of applying this section, "insurer" when used in a section cited in subsections A and B of this section shall be construed to mean and include "health maintenance organizations" unless the section cited clearly applies to health maintenance organizations without such construction.

Appendix C

# Evaluation Topic Areas and Criteria for Assessing Proposed Mandated Health Insurance Benefits

| Topic Area | Criteria |
|---|---|
| **1. Medical Efficacy** | |
| a. Medical Efficacy of Benefit | The contribution of the benefit to the quality of patient care and the health status of the population, including the results of any clinical research, especially randomized clinical trials, demonstrating the medical efficacy of the treatment or service compared to alternatives or not providing the treatment or service. |
| b. Medical Effectiveness of Benefit *JLARC Criteria** | The contribution of the benefit to patient health based on how well the intervention works under the usual conditions of clinical practice. Medical effectiveness is not based on testing in a rigid, optimal protocol, but rather a more flexible intervention that is often used in broader populations. |
| c. Medical Efficacy of Provider | If the legislation seeks to mandate coverage of an additional class of practitioners:<br><br>1) The results of any professionally acceptable research, especially randomized clinical trials, demonstrating the medical results achieved by the additional class of practitioners relative to those already covered.<br><br>2) The methods of the appropriate professional organization to assure clinical proficiency. |
| d. Medical Effectiveness of Provider *JLARC Criteria** | The contribution of the practitioner to patient health based on how well the practitioner's interventions work under the usual conditions of clinical practice. Medical effectiveness is not based on testing in a rigid, optimal protocol, but rather more flexible interventions that are often used in broader populations. |
| **2. Social Impact** | |
| a. Utilization of Treatment | The extent to which the treatment or service is generally utilized by a significant portion of the population. |
| b. Availability of Coverage | The extent to which insurance coverage for the treatment or service is already generally available. |
| c. Availability of Treatment *JLARC Criteria** | The extent to which the treatment or service is generally available to residents throughout the state. |
| d. Availability of Treatment Without Coverage | If coverage is not generally available, the extent to which the lack of coverage results in persons being unable to obtain necessary health care treatments. |
| e. Financial Hardship | If the coverage is not generally available, the extent to which the lack of coverage results in unreasonable financial hardship on those persons needing treatment. |
| f. Prevalence/Incidence of Condition | The level of public demand for the treatment or service. |
| g. Demand for Coverage | The level of public demand and the level of demand from providers for individual or group insurance coverage of the treatment or service. |

| | |
|---|---|
| h. Labor Union Coverage | The level of interest of collective bargaining organizations in negotiating privately for inclusion of this coverage in group contracts. |
| i. State Agency Findings | Any relevant findings of the state health planning agency or the appropriate health system agency relating to the social impact of the mandated benefit. |
| j. Public Payer Coverage *JLARC Criteria** | The extent to which the benefit is covered by public payers, in particular Medicaid and Medicare. |
| k. Public Health Impact *JLARC Criteria** | Potential public health impacts of mandating the benefit. |
| **3. Financial Impact** | |
| a. Effect on Cost of Treatment | The extent to which the proposed insurance coverage would increase or decrease the cost or treatment of service over the next five years. |
| b. Change in Utilization | The extent to which the proposed insurance coverage might increase the appropriate or inappropriate use of the treatment or service. |
| c. Serves as an Alternative | The extent to which the mandated treatment or service might serve as an alternative for more expensive or less expensive treatment or service. |
| d. Impact on Providers | The extent to which the insurance coverage may affect the number and types of providers of the mandated treatment or service over the next five years. |
| e. Administrative and Premium Costs | The extent to which insurance coverage might be expected to increase or decrease the administrative expenses of insurance companies and the premium and administrative expenses of policyholders. |
| f. Total Cost of Health Care | The impact of coverage on the total cost of health care. |
| **4. Effects of Balancing Medical, Social, and Financial Considerations** | |
| a. Social Need/Consistent with Role of Insurance | The extent to which the benefit addresses a medical or a broader social need and whether it is consistent with the role of health insurance. |
| b. Need Versus Cost | The extent to which the need for coverage outweighs the costs of mandating the benefit for all policyholders. |
| c. Mandated Option | The extent to which the need for coverage may be solved by mandating the availability of the coverage as an option for policy holders. |

*Denotes additional criteria added by JLARC staff to criteria adopted by the Special Advisory Commission on Mandated Health Insurance Benefits.

Source: Special Advisory Commission on Mandated Health Insurance Benefits and JLARC staff analysis.

Appendix D

# Bibliography

## PEER-REVIEWED RESEARCH

**Belmont JM, Mattioli LF. (2003).** Accuracy of Analog Telphonic Stethoscopy for Pediatric Telecardiology. Pediatrics, 112(4): 780-786.

**Darkins A, Ryan P, Kobb R, Foster L, Edmonson E, Wakefield B, Lancaster AE. (2008).** Care Coordination/Home Telehealth: The Systematic Implementation of Health Informatics, Home Telehealth, and Disease Management to Support the Care of Veteran Patients with Chronic Conditions. Telemedicine and e-Health, 14(10): 1118-1126.

**Demaerschalk BM, Miley ML, Kiernan TJ, Bobrow BJ, Corday DA, Wellik KE, Aguilar MI, Ingall TI, Dodick DW, Brazdys K, Koch TC, Ward MP, Richemont PC. (2009).** Stroke Telemedicine. Mayo Clinic Proceedings, 84(1): 53-64.

**Dimmick SL, Burgiss SG, Robbins S, Black D, Jarnagin B, Anders M. (2003).** Outcomes of an Integrated Telehealth Network Demonstration Project. Telemedicine Journal and e-Health, 9(1): 13-23.

**Eadie LH, Seifalien AM, Davidson BR. (2003).** Telemedicine in Surgery. British Journal of Surgery, 91(6): 647-658. *Abstract.*

**Hailey D, Roine R, Ohinmaa A. (2008).** The Effectiveness of Telemental Health Applications: A Review. The Canadian Journal of Psychiatry, 53(11): 769-778.

**Jackson KM, Scott KE, Zivin JG, Bateman DA, Flynn JT, Keenan JD, Chiang MF. (2008).** Cost-Utility Analysis of Telemedicine and Ophthalmoscopy for Retinopathy of Prematurity Management. Archives of Ophthalmology, 126(4): 493-499.

**Jerant AF, Azari R, Martinez C, Nesbitt TS. (2003).** A Randomized Trial of Telenursing to Reduce Hospitalization for Heart Failure: Patient-Centered Outcomes and Nursing Indicators. Home Health Care Services Quarterly, 22(1): 1-20.

**Leggett P, Graham L, Steele K, Gilliland A, Stevenson M, O'Reilly D, Wootton R, Taggart A. (2001).** Telerheumatology – diagnostic accuracy and acceptability to patient, specialist, and general practitioner. British Journal of General Practice, September: 746-748.

**Marescaux J, Leroy J, Rubino F, Smith M, Vix M, Simone M, Mutter D. (2002).** Transcontinental Robot-Assisted Remote Telesurgery: Feasibility and Potential Applications. Annals of Surgery, 235(4): 487-492.

**Morrison J, Bergauer NK, Jacques D, Coleman SK, Stanziano GJ. (2001).** Telemedicine: Cost-Effective Management of High-Risk Pregnancy. Managed Care, November 2001: 42-49.

**Rees RS, Bashshur N. (2007).** The Effects of TeleWound Management on Use of Service and Financial Outcomes. Telemedicine and e-Health, 13(6): 663-674.

**Roine R, Ohinmaa A, Hailey D. (2001).** Assessing telemedicine: a systematic review of the literature. Canadian Medical Association Journal, 165(6): 765-771.

**Rojas SV, Gagnon MP. (2008).** A Systematic Review of the Key Indicators for Assessing Telehomecare Cost-Effectiveness. Telemedicine and e-Health, 14(9): 896-904.

**Ruskin PE, Silver-Aylaian M, Kling MA, Reed SA, Bradham DD, Hebel JR, Barrett D, Knowles F, Hauser P. (2004).** Treatment Outcomes in Depression: Comparison of Remote Treatment Through Telepsychiatry to In-Person Treatment. The American Journal of Psychiatry, 161: 1471-1476.

**Schwamm LH, Holloway RG, Marenco P, Audebert HJ, Bakas T, Chumbler NR, Handschu R, Jauch EC, Knight WA, Levine SR, Mayberg M, Meyer BC, Meyers**

**PM, Skalabrin E, Wechsler LR. (2009).** A Review of the Evidence for the Use of Telemedicine Within Stroke Systems of Care. Stroke. *Forthcoming in July 2009 Issue.*

**Whitten PS, Mair FS, Haycox A, May CR, Williams TL, Hellmich S. (2002).** Systematic review of cost effectiveness studies of telemedicine interventions. British Medical Journal, 324: 1434-1437.

## OTHER RESEARCH

**California HealthCare Foundation. (2008).** Telemedicine in California: Progress, Challenges, and Opportunities. July 2008.

**California Telemdicine and eHealth Center. (2009).** Telemedicine Reimbursement: A National Scan of Current Policies and Emerging Initiatives. April 2009.

**California Telemedicine and eHealth Center. (2009).** If You Bill It, They Will Come. A Literature Review on Clinical Outcomes, Cost-Effectiveness, and Reimbursement for Telemedicine. January 2009.

**Hersh WR, Hickam DH, Severance SM, Dana TL, Krages KP, Helfand M. (2006).** Telemedicine for the Medicare Population: Update. Evidence Report/Technology Assessment No. 131. (Prepared by the Oregon Evidence-based Practice Center under Contract No. 290-02-0024.) AHRQ Publication No. 06-E007. Rockville, MD, Agency for Healthcare Research and Quality. February 2006.

**Hersh WR, Wallace JA, Patterson PK, Kraemer DF, Nichol WP, Greenlick MR, Krages KP, Helfand M. (2001).** Supplement. Telemedicine for the Medicare Population: Pediatric, Obstetric, and Clinician-Indirect Home Interventions in Telemedicine No. 24, Supplement. (Prepared by the Oregon Evidence-based Practice Center under Contract No. 290-97-0018.) AHRQ Publication No. 01-E060. Rockville, MD, Agency for Healthcare Research and Quality. August 2001.

Appendix E

# State Telehealth/Telemedicine Health Insurance Mandates

| State | Year Enacted | Covered Benefit | Coverage Limitations | Other Provisions |
|---|---|---|---|---|
| California | 1996 | Shall not require face-to-face contact for services appropriately provided through telemedicine. | Coverage not required for consultation provided by telephone or facsimile. | |
| Colorado | 2001 | For individuals in a county with 150,000 or fewer residents, may not require face-to-face contact for services appropriately provided through telemedicine. | Coverage not required for consultation provided by telephone or facsimile. | Any benefits provided through telemedicine shall meet the same standard of care as for in-person care. |
| Georgia | 2005 | Payment must be provided for services that are covered under the health benefit policy and appropriately provided through telemedicine. | Standard telephone, facsimile transmissions, unsecured electronic mail, or a combination thereof do not constitute telemedicine. | |
| Hawaii | 1999, 2009 | Shall not require face-to-face contact between a health care provider and a patient for services appropriately provided through telehealth. | Standard telephone, facsimile transmissions, or email text, in combination or by itself, does not constitute telehealth. | Treatment recommendations made via telemedicine shall be held to the same standards of appropriate practice as those in traditional physician-patient settings that do not include a face to face visit but in which prescribing is appropriate, including on-call telephone encounters.<br><br>Physician must have a Hawaii license to use telemedicine to establish a physician-patient relationship. Once relationship is established, the patient or physician may use telemedicine for any purpose, including consultation with an out-of-state provider. |

| State | Year Enacted | Covered Benefit | Coverage Limitations | Other Provisions |
|---|---|---|---|---|
| Kentucky | 2000 | Shall not exclude a service from coverage solely because the service is provided through telehealth and not provided through a face-to-face consultation if the consultation is provided through the telehealth network established by the state Telehealth Board. | A telehealth consultation shall not be reimbursable if it is provided through the use of an audio-only telephone, facsimile machine, or electronic mail. | Deductibles, copayments, or coinsurance for services provided through telehealth shall not exceed those required by the health benefit plan for the same services provided through face-to-face consultation. |
| Louisiana | 1995 | Whenever reimbursement is provided for any health care service and such health care service is performed via transmitted electronic imaging or telemedicine, reimbursement shall not be denied to a licensed physician conducting or participating in the transmission at the originating health care facility who is physically present with the patient and is contemporaneously communicating and interacting with a licensed physician at the receiving terminus of the transmission. | | Reimbursement to the physician at the originating facility shall not be less than 75% of the payment which that licensed physician receives for an intermediate visit.<br><br>Any health care service performed via transmitted electronic imaging or telemedicine shall be subject to the applicable utilization review criteria and requirements of the insurer.<br><br>Terminology in a policy that either discriminates against or prohibits transmitted electronic imaging or telemedicine shall be against the public policy of providing the highest quality health care to the citizens of the state. |
| Maine | 2009 | Must provide coverage for health care services provided through telemedicine if the service would be covered were it provided through in-person consultation between the covered person and a health care provider. | Telemedicine does not include the use of audio-only telephone, facsimile machine or e-mail. | Insurers may limit coverage to those health care providers in a telemedicine network approved by the insurer.<br><br>Contracts may contain a deductible, copayment or coinsurance for services provided through telemedicine as long as it does not exceed the deductible, copayment, or coninsurance applicable to an in-person consultation. |

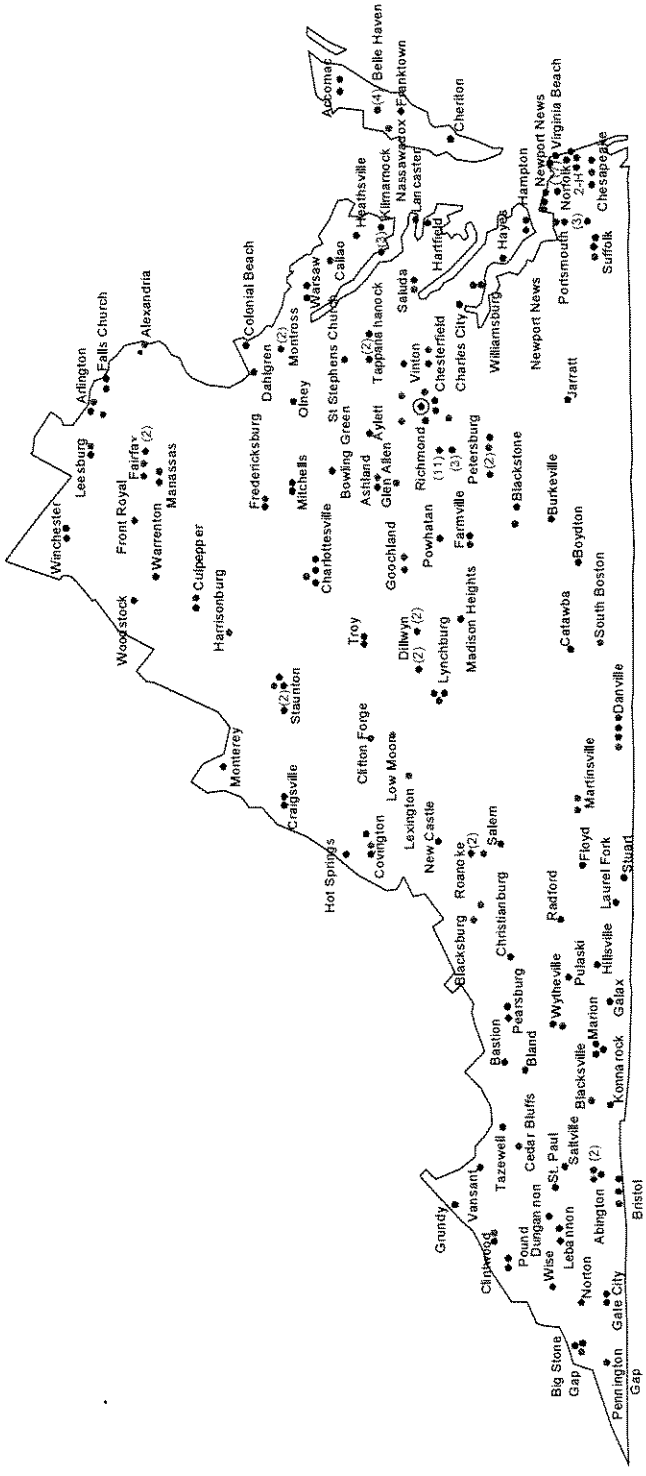
| State | Year Enacted | Covered Benefit | Coverage Limitations | Other Provisions* |
|---|---|---|---|---|
| Oklahoma | 1997 | For services that a health care practitioner determines to be appropriately provided by means of telemedicine, shall not require person-to-person contact between a health care practitioner and a patient shall not be required. | Telemedicine is not a consultation provided by telephone or facsimile. | Telemedicine means the practice of health care delivery, diagnosis, consultation, treatment, transfer of medical data, or exchange of medical education information.<br><br>The health care practitioner in physical contact with the patient shall have authority over the care of the patient & shall obtain informed consent for telemedicine from the patient. |
| Oregon | 2009 | Must provide coverage of telemedical health services if:<br>(a) the plan provides coverage of the service when provided in person;<br>(b) the service is medically necessary & supported by evidence-based medical criteria; and<br>(c) the service does not duplicate or supplant a health service that is available to the patient in person. | | Health plans may not distinguish between originating sites that are rural and urban in providing coverage.<br><br>Plans may subject coverage of telemedical services to all terms of the plan, including but not limited to deductible, copayment or coinsurance requirements that are applicable to coverage of a comparable service provided in person. |
| Texas | 2003 | May not exclude a telemedicine medical service or a telehealth service from coverage under the plan solely because the service is not provided through a face-to-face consultation. | | Any deductible, copayment, or coinsurance for telemedicine or telehelath services may not exceed that which is required for a comparable medical service provided through a face-to-face consultation. |

* Note: Does not include all 'other' provisions in the various state laws.

Source: Applicable state laws.

Appendix F

# Virginia Sites With Telehealth Capacity (2004)




Source: Modified from Virginia Telehealth Network Infrastructure Work Group White Paper: May 26, 2005.

Appendix G

# Mercer Premium Estimate

Attached is a May 29, 2009 letter from Bruce A. Richards of Mercer that contains Mercer's evaluation of the potential impact of House Bill 2191.

**Bruce A. Richards, FSA, MAAA, FCA**
Principal

MERCER

MARSH MERCER KROLL
GUY CARPENTER OLIVER WYMAN

Three James Center
1051 East Cary Street, Suite 900
Richmond, VA 23219
804 344 2620 Fax 804 344 2601
bruce.richards@mercer.com
www.mercer.com

May 29, 2009

Ms. Kimberly Sarte
Principal Fiscal Analyst
Joint Legislative Audit and Review Commission (JLARC)
Suite 1100
General Assembly Building
Capitol Square
Richmond, VA 23219

**Subject:** Telehealth Services - House Bill No. 2191

Dear Kimberly:

JLARC has retained Mercer to provide an independent evaluation and review of the potential impact of House Bill No. 2191.

House Bill No. 2191 proposes that "each individual insurer proposing to issue individual or group accident and sickness insurance policies providing hospital, medical and surgical, or major medical coverage on an expense-incurred basis.....shall provide coverage for the cost of telehealth services, as provided in this section."

As defined in the Bill, "telehealth services" means the use of interactive audio, video or other telecommunications technology by a health care provider to deliver health care services within the scope of the provider's practice at a site other than the site where the patient is located, ....."

In performing our analysis, Mercer has made the following assumptions:

1. The term health care provider includes only licensed providers
2. Telehealth services exclude any equipment (computers, telephones, monitoring, devices) necessary for the provider to perform electronic media consultation

Mercer has reviewed literature and programs which are currently available in other states (TX, CA, KY, NC). Our research indicates that where telehealth services are currently available, utilization of such services has been low. Low utilization of telehealth services has been attributed to the more common reimbursement models in the commercial sector that pay either for increments of care (fee-for-service) or risk-adjusted care for a population (Medicare

Advantage). Additionally, a review of California primary care doctors who have practice patterns and relationships established with local specialists indicated that they were not interested in relationships with remote specialists.

Where telehealth services have generally been acceptable is in rural areas where there is a lack of physicians in close proximity to potential patients. It is our opinion that should Virginia enact House Bill No. 2191, a potential $10 - $24 annual cost for health care coverage would occur.

The expected initial low cost of adding telehealth services could however become more substantial over time as the telehealth industry grows.

It is noteworthy that appropriate claims coding of telehealth services has been problematic. This is likely due to the following:

- Providers not using telemedicine billing modifiers on claims submissions
- Telemedicine services are a part of bundled services (i.e., post-operative care)
- Contracts for services with hospitals/clinics do not break such services out separately

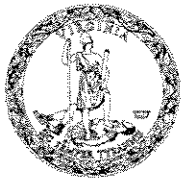
We have reviewed data from other programs and applicable claims data and have determined the approximate annual incremental cost of adding telehealth services to be as follows:

| | **All Policies** | | **Optional Rider Only** |
|---|---|---|---|
| Group Insurance | $10 | - | $20 |
| Individual Insurance | $10 | - | $24 |

If you have any questions about our research or expected cost, please let me know.

Sincerely,

Bruce A. Richards, FSA, MAAA, FCA
Principal



**Joint Legislative Audit and Review Commission**
**Suite 1100**
**General Assembly Building**
**Capitol Square**
**Richmond, Virginia 23219**
804-786-1258 Fax 804-371-0101
http://jlarc.virginia.gov

# Appendix P

# Mandating Telemedicine as a Covered Service Under Federal Health Benefit Plans

**MANDATING TELEMEDICINE AS A COVERED SERVICE UNDER FEDERAL HEALTH BENEFIT PLANS**

Federal health benefit plans should uniformly cover legitimate health services provided via telemedicine, unless there is a specific contrary restriction. In the absence of a specific restriction, there is no reason to deny a telemedicine-provided claim for a service covered using a traditional delivery method.

The federal government has already made such a move for programs providing direct medical care to federal populations. For example, telemedicine has been fully integrated into federal health service programs for veterans, the military, Native Americans, astronauts and even inmates in federal prisons.

State governments have taken the lead in mandating uniform telemedicine coverage for all public and private benefit plans. So far, 12 states require such payments for all insurance plans offered within their state boundaries. For example, the Maine law, enacted last year, specifies—

> *A carrier offering a health plan in this State may not deny coverage on the basis that the coverage is provided through telemedicine if the health care service would be covered were it provided through in-person consultation between the covered person and a health care provider. Coverage for health care services provided through telemedicine must be determined in a manner consistent with coverage for health care services provided through in-person consultation.*

Major holdouts in this trend are the federal health benefit payers. We ask that appropriate federal officials specify that covered services provided under Medicaid, TRICARE, and the Federal Employees Health Benefits Program (FEHBP) be covered when provided by a telemedicine method.

**Specifically, we ask the Obama Administration to direct the Centers for Medicare and Medicaid Services to notify states that Medicaid coverage needs to apply to telemedicine-provided services, unless there is a contrary provision of state law. Also, we ask the Obama Administration to direct the principal federal agencies responsible for TRICARE, FEHPB and any other federal health benefit plans to amend contract arrangements with plan providers to mandate consistent coverage for telemedicine-provided services.**

**MEDICARE COVERAGE FOR TECHNOLOGY-AIDED "PHYSICIAN SERVICES"**

The Center for Medicare and Medicaid Services (CMS) has long covered technology-aided medical services where such services do not require direct interactions with the patient. CMS calls these "physician services," not "telemedicine". This provides coverage for a variety of clinical services that use medical images, such as assessing an MRI, EKG or tissue slides. These services are based on visualization of images provided via "store-and-forward" or asynchronous transmission. No special modifiers, location, institutional setting or payment schedules are needed for such services. Technology has advanced rapidly and now allows specialists to provide a variety of services using digital imaging, video and other data for direct visualization of an aspect of a patient's condition without the need to examine the patient in-person.

CMS's policy on "physician services" includes the following: "*A service may be considered to be a physician's service where the physician either examines the patient in person or is able to visualize some aspect of the patient's condition without the interposition of a third person's judgment. Direct visualization would be possible by means of x-rays, electrocardiogram and electroencephalogram tapes, tissue samples, etc."* (CMS Medicare Benefit Policy Manual Chapter 15 – Covered Medical and Other Health Services," "30 - Physician Services, (Rev. 1, 10-01-03), B3-2020, B3-4142.).

CMS has appropriately left it to various specialists to decide the appropriate means of direct visualization for various types of clinical services. It would be helpful if the current Medicare Benefit Policy Manual provides a reference to other widely used, proven and accepted practices. Therefore, we ask that CMS include a further example of covered physician services related to diabetic retinopathy and dermatologic conditions that can now effectively rely on similar direct visualization. Physicians have been using remote digital imaging for both of these services for many years and their use has been fully integrated into federal programs serving veterans, the military, Native Americans and even federal prisoners. Both have had multiple scientifically-validated studies showing clinical efficacy and cost-effectiveness. Both have approved and validated practice guidelines.

Such a provision is not new. In fact, in 1996 the nation's largest Medicaid program, California's Medi-Cal, approved a very similar provision for both services. In the 14 years since the provision was adopted, quality medical services have been provided to thousands of patients. Importantly, any fear of fraud and abuse has been assuaged and the state has not witnessed any drain on the system as the result of misuse of this provision.

Proposed language incorporating this change in the manual appears below in bold.

***"A. General***

*Physician services are the professional services performed by a physician or physicians for a patient including diagnosis, therapy, surgery, consultation, and care plan oversight. The physician must render the service for the service to be covered. (See Publication 100-1, the Medicare General Information, Eligibility, and Entitlement Manual, Chapter 5, §70, for definition of physician.) A service may be considered to be a physician's service where the physician either examines the patient in person or is able to visualize some aspect of the patient's condition without the interposition of a third person's judgment. Direct visualization*

## IMPROVE PROCESS FOR ADDING MEDICARE TELEMEDICINE SERVICES

CMS created a major barrier to Medicare beneficiary coverage for telemedicine with its stringent administration of Social Security Act section 1834(m)(4)(F)(ii) enacted in 2000: *The Secretary shall establish a process that provides, on an annual basis, for the addition or deletion of services (and HCPCS codes), as appropriate, to those specified in clause (i) for authorized payment under paragraph (1).* In the absence of a Congressional standard for "addition or deletion of services," the Secretary has full discretion in the consideration of services to be added or deleted. In 2002 rulemaking, CMS established an annual process and added 42 CFR 410.78(f) that simply says, "*Process for adding or deleting services.* Changes to the list of Medicare telemedicine services are made through the annual physician fee schedule rulemaking process."

**We request that CMS improve the process for adding a specific service to Medicare's telemedicine coverage with two administrative changes:**

**A.) equalize the standard for adding services with the standard for deleting services; and**
**B.) broaden the factors for consideration**

A. Equalize the standard for adding services with the standard for deleting services

In implementing this provision, CMS has chosen to use a tougher standard than warranted for its missions to protect beneficiaries and treasury. In addition, CMS has peculiarly chosen to use entirely different standards for adding of services than for the deleting of services.

For the addition of services, the standards used by CMS are articulated in the preamble to a proposed rule of June 28, 2002 (67 FR 43862) as follows:

> • "*Category #1: Services similar to office and other outpatient visits, consultation, and office psychiatry services.* We would review these requests to ensure that the services proposed for addition to the list of Medicare telemedicine services are similar to the current telemedicine services. For example, we would look for similarities between the proposed and existing telemedicine services in terms of the roles of, and interactions among, the beneficiary, the physician (or other practitioner) at the distant site and, if necessary, the telepresenter. We would also look for similarities in the telecommunications system used to deliver the proposed service, for example, the use of interactive audio and video equipment. If a proposed service meets the criteria set forth above, we would add it to the list of Medicare telemedicine services."
>
> • "*Category #2: Services that are not similar to the current list of telemedicine services, for example, physical therapy services, endoscopy services, and distant monitoring of patients in intensive care units.* Our review of these requests would include an assessment of whether the use of a telecommunications system to deliver the service produces similar diagnostic findings or therapeutic interventions as compared with a face-to-face 'hands on' delivery of the same service. In other words, the discrete outcome of the interaction between the clinician and patient facilitated by a telecommunications system should correlate well with the discrete outcome of the clinician-patient interaction when performed face-to-face."

For deletion of proposed services, the standards used by CMS are articulated in the preamble to a final rule of June 28, 2002 (67 FR 79988) as follows:

> *"if, upon review of the available evidence, we determine that a telemedicine service is not safe, effective, or medically beneficial when performed as a telemedicine service."*

Unfortunately, the application of the standards for the addition of codes interferes with appropriate physician medical judgment and beneficiary circumstances in a way that conflicts with Social Security Act section 1801 which states: "Nothing in this title shall be construed to authorize any Federal officer or employee to exercise any supervision or control over the practice of medicine or the manner in which medical services are provided…"

**We propose that CMS adopt a consistent policy for both adding and deleting services. For the addition of services, a variation of the deletion standard should be used; one that allows services that are safe, effective, or medically beneficial when performed as a telemedicine service. Since the standards used by CMS are not specified in 42 CFR 410.78(f), they may be subject to change without formal rulemaking.**

B. Broaden the factors for consideration

At present, CMS focuses only on the nature of the specific service, such as requesting the following data:

- If available, data showing that the use of a telecommunications system does not change the diagnosis or treatment plan as compared to the face-to-face delivery of the service.
- If available, data showing that patients who receive this service via a telecommunications system are satisfied with the service that is delivered.

In many areas of the country there are not enough health professionals to provide certain in-person visits. When the choice is no service or service by a telemedicine method, Medicare beneficiaries should not be denied the option of telemedicine care by administrative regulation.

Timing should also be an important consideration to cover services. Telemedicine provides a means to reduce delays in beneficiary access to care and the consequences of delayed access, ranging from anxiety to death.

CMS should not preclude beneficiary choice. As evidenced in CMS decision-making in this annual process, there seems to be an idealized and outdated mindset about the quality and convenience of in-person service as well as a view that technology can only diminish, not enhance, service. Patient satisfaction with the use of telemedicine has consistently been very high – especially after the initial experience.

**We recommend that CMS improve this process by considering other factors related to the delivery of the service for Medicare beneficiaries. In particular, we recommend that CMS consider the following factors:**

- **Shortages of health professionals to provide in-person services**
- **Speed of access to in-person services**
- **Beneficiary barriers, inconveniences and preferences from coverage restricted to in-person services**

**TELEMEDICINE PRIORITIES FOR THE**
**CENTER FOR MEDICARE AND MEDICAID INNOVATION**

Congress has identified 20 payment and delivery reform models to be tested by the new Innovation Center, including medical homes, all-payer payment reforms, and arrangements that transition from fee-for-service reimbursement to global fee payments. These models are intended to "test innovative payment and service delivery models to reduce program expenditures...while preserving or enhancing quality of care."[1]

The new Center for Medicare and Medicaid Innovation (CMI) gives the Center for Medicare and Medicaid Services (CMS) a fresh opportunity to determine ways to improve Medicare telemedicine coverage and fulfill the requirements of the 2000 Congressionally-directed study on telemedicine[2]. Since there are still statutory restrictions in SSA §1834(m) for Medicare telemedicine coverage, CMI's authority to waive statutory provisions also provides opportunity to implement mechanisms to pay for and integrate the use of remote health services with more health providers and institutions.

We suggest six priority projects that will help CMI explore ways to incorporate telemedicine services as part of the Congressionally-specified models:

1. Demonstrate the use of video conferencing to deliver services to Medicare-Medicaid beneficiaries in metropolitan areas:

   Consideration should be given to a large scale pilot covering a largely urban state or major metro area. There is no Medicare telemedicine coverage in New Jersey, Rhode Island and the District of Columbia because these jurisdictions are totally in one or more Standard Metropolitan Statistical Area. Six other states have 90% or more of their Medicare beneficiaries living in a metro area: Arizona, California, Connecticut, Florida, Maryland, and New York. Some of these States already have strong Medicaid coverage for telemedicine.

   If a more targeted method is necessary, we suggest to--
   - Focus on key medical services, such as telestroke diagnosis and emergency cardiac care
   - Focus on key providers, such as federally-qualified health centers (FQHCs), Indian Health Service centers, community mental health centers and other federally-funded providers

---

[1] Patient Protection and Affordable Care Act of 2010, PL 111-148, sec. 3021

[2] Medicare, Medicaid, and SCHIP Benefits Improvement and Protection Act (BIPA) section 223(d):

(d) STUDY AND REPORT ON ADDITIONAL COVERAGE-

(1) STUDY- The Secretary of Health and Human Services shall conduct a study to identify--

(A) settings and sites for the provision of telemedicine services that are in addition to those permitted under section 1834(m) of the Social Security Act, as added by subsection (b);

(B) practitioners that may be reimbursed under such section for furnishing telemedicine services that are in addition to the practitioners that may be reimbursed for such services under such section; and

(C) geographic areas in which telemedicine services may be reimbursed that are in addition to the geographic areas where such services may be reimbursed under such section.

(2) REPORT- Not later than 2 years after the date of the enactment of this Act, the Secretary shall submit to Congress a report on the study conducted under paragraph (1) together with such recommendations for legislation that the Secretary determines are appropriate

2. Improve the delivery of Medicare-Medicaid services using store-and-forward technology, particularly for specialist consultations using medical images, for safety net providers:
    - Target key medical conditions, such as diabetic retinopathy screening (Medicare already pays for an annual in-person exam) and wound management
    - Target key providers, such as—
        - FQHCs, IHS and other Federally-funded providers
        - Critical access hospitals and sole community hospitals

3. Create Medicare-Medicaid payment and service models for hospital intensive care unit services from telemedicine intensivsts and other specialists[3].

4. Create Medicare-Medicaid payment and service models for telemedicine outpatient services, notably telerehabilitation (such as for stroke or traumatic brain injury) and telemental health counseling[4].

5. Create Medicare-Medicaid payment and service models supporting the use of telemedicine to provide chronic care coordination for conditions that have not been previously addressed by telemedicine, such as Parkinson's, autism, muscular sclerosis, epilepsy and Alzheimer's[5].

6. Create Medicaid payment and service models for serving at-risk pregnancies, premature infants, and newborn screening.

Relatedly, ATA eagerly awaits implementation of the Medicare demonstrations of Independence at Home (Patient Protection and Affordable Care Act section 3024) and Accountable Care Organization (§3022) that will allow providers full authority to use telemedicine as appropriate. Although the statute does not direct these demonstrations beginning before January 2012, we urge CMS to initiate some of these demonstration projects in early 2011.

Note: Some of these recommended actions are also addressed in other issue briefs and might be achieved by other means than a CMI pilot.

---

[3] One of the Congressional-designated models for CMI is to "facilitate inpatient care, including intensive care, of hospitalized applicable individuals at their local hospital through the use of electronic monitoring by specialists, including intensivists and critical care specialists, based at integrated health systems."

[4] One of the Congressional-designated models for CMI is "promoting greater efficiencies and timely access to outpatient services (such as outpatient physical therapy services) through models that do not require a physician or other health professional to refer the service or be involved in establishing the plan of care for the service, when such service is furnished by a health professional who has the authority to furnish the service under existing State law."

[5] One of the Congressional-designated models for CMI is "supporting care coordination for chronically-ill applicable individuals at high risk of hospitalization through a health information technology-enabled provider network that includes care coordinators, a chronic disease registry, and home tele-health technology."

*would be possible by means of x-rays, electrocardiogram and electroencephalogram tapes, tissue samples, etc.*

*For example, the interpretation by a physician of an actual electrocardiogram or electroencephalogram reading that has been transmitted via telephone (i.e., electronically rather than by means of a verbal description) is a covered service.* ***Similarly, a physician's identification, evaluation and management of diabetic retinopathy or dermatologic conditions, that follow appropriate practice guidelines and standards of care, are also examples of such covered services.***

*Professional services of the physician are covered if provided within the United States, and maybe performed in a home, office, institution, or at the scene of an accident. A patient's home, for this purpose, is anywhere the patient makes his or her residence, e.g., home for the aged, a nursing home, a relative's home."*

## ADMINISTRATION'S FY2012 LEGISLATIVE PROPOSALS

For purposes of serving health care needs, implementing national health reform, deploying broadband services and several other Administration objectives, an important consideration for the administration is to include four telemedicine initiatives within its FY2012 budget proposals.

1. Most needed and of the greatest immediate impact would be a policy where "Feds support Feds." **Federal rules for Medicare, Medicaid, TRICARE, FEHBP, VA, etc. should support and empower Federally-funded health service providers including community health centers and other Federally-qualified health centers, community mental health centers, Indian Health Service facilities, and FCC universal service healthcare program participants by allowing those providers the option of using telemedicine to deliver covered services.** For example, 79% of Medicare beneficiaries are not covered for any telemedicine because they live in a metro county and some state Medicaid programs do not cover telemedicine-provided services.

2. Improve Medicare rural coverage for telemedicine services:
   - **Allow any critical access hospital or sole community hospital to provide store-and-forward services and extend coverage for video conferencing-based services for such a hospital located in a metropolitan county.**
   - **Extend coverage for telemedicine services to facilities located in a relatively small population metropolitan county and grandfather presently covered counties from becoming "metropolitan" as a result of 2010 and future censuses. These areas are metropolitan in designation but share all other appearances with their rural counterparts.** (There are almost 500 counties with less than 75,000 residents.)

3. **Facilitate and fund statewide telemedicine networks through grant mechanisms, for targeted specialty services in areas with high national importance, such as for stroke, high-risk pregnancies and premature infants, school-based clinics, and emergency medical services.**

4. **Fund the development of telemedicine practice evidence-based clinical standards and guidelines for physicians and other providers.**

These initiatives would involve coordinated campaigns by multiple executive agencies, notably CMS, HRSA, SAMSA, IHS, AHRQ, VA and FCC.

# JOINT FEDERAL AGENCY COORDINATION ON TELEMEDICINE

A federal inter-agency coordinating body for telemedicine composed of representatives from the various federal agencies involved in telemedicine is critical to move telemedicine forward by addressing current inefficiencies, duplication and cross purposes of existing federal efforts.

## Background

Over the last two years, ATA has asked several agencies to host such a body. The American Recovery and Reinvestment Act of 2009 specifically sets aside funding for this activity under Section 3011 of the Act ("Infrastructure and tools for the promotion of telemedicine, including coordination among Federal agencies in the promotion of telemedicine.").

Over a dozen Federal agencies have a significant effect on the deployment and use of telemedicine. Four broad areas of federal involvement in telemedicine with examples of Agency involvement are presented below:

1. Payment for covered services under federal insurance programs (CMS, DOD Tricare and FEHBP),
2. Providing telemedicine services directly as part of federal healthcare programs (VA, DOD, Bureau of Prisons and IHS),
3. Regulation of telemedicine devices, services and related applications (FDA, FCC and FTC) and
4. Grants and contracts support telemedicine projects and innovations (DOD, HHS, DOC, FCC and USDA).

There are a number of reasons why the creation of such a body is critical.

- Millions of federal dollars are spent annually and thousands of federal patients are receiving remote services. Each of these programs can have a profound impact on the shape of telemedicine yet they operate with little or no knowledge of the operations and priorities of the other programs.

- Congressional directives for Medicare innovation such as accountable care organizations and various other bundled payment methods, pending rules discouraging high rates of hospital re-admittance and the greater need to provide chronic care alternatives provide ample incentives to foster greater use of remote health services.

- Some agencies have been involved in telemedicine for over 15 years while others are just starting out. Learning from the experience of others can reduce errors, promote efficiencies and lead to greater success.

A formal inter-agency body should be charged with identifying opportunities for synergy, support for uniform approaches and coordination of services. This will greatly increase efficiency and help each of these agencies better manage and make use of the technology.

## Key Purposes

The inter-agency expertise should be tapped to identify and develop Administration policies, programs, and procedures about telehealth to -

Maximize Impact – Identify opportunities to increase the impact of federal actions to improve health care delivery, productivity and performance.

Focus Planning – Address needs and opportunities, current and emerging, to use telehealth to achieve the federal policy goals and national needs. This includes tracking federal investments in telemedicine geographically as well as by other factors in order to facilitate cooperation and avoid duplication among agencies, programs and institutions in the delivery of care

Coordinate Actions – Target current investment and regulation in telehealth and develop specific recommendations to 1) advance the President's policy goals and national needs and 2) avoid duplication or inconsistency among federal agencies and programs.

**Structure and Governance**

The convening member of the body should come from a high governmental post such as the Chief Technology Officer in the White House. Membership should include one or two representatives from all of the agencies/programs mentioned above. As with other interagency groups it should have a charter which describes the overall purpose of the group and some level of detail such as described above.

**First Step**

ATA is willing to host a preparatory meeting to establish the concept and introduce the key players. Of course, ATA is not a federal agency and we do not wish to control such a group. We will secure an appropriate meeting room, identify and invite appropriate federal program directors and work with the agencies to identify a date and time and develop an agenda.