2019 Report to the Virginia General Assembly

Data-Driven Action Steps and Statewide Capacity Building Pursuant of Stroke Care Quality Improvement in Virginia

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Executive Summary

The 2018 General Assembly passed and the Governor signed legislation, HB1197 and SB867, to amend the Code of Virginia § 32.1-111.15:1 requiring the Virginia Department of Health (VDH) to implement systems for data collection and information sharing, apply evidence-based guidelines for community-based follow-up care, and implement quality improvement initiatives to improve the quality of stroke care. VDH convened a Virginia Stroke Care Quality Improvement (VSCQI) Advisory Group to provide recommendations for quality improvement across the Commonwealth.

In order to gather data to inform interventions, VDH gathered data from the VSCQI Advisory Group through a Stroke Priority Metrics Survey that facilitated ranking metrics by category and subcategory along the continuum of stroke care: prevention/risk factors, pre-hospital, in-hospital, and post-hospital. VDH will use these priority metrics to inform data sources and the respective systems to collect the data from hospitals and emergency medical services (EMS), as well as direct quality improvement initiatives. Hospital and EMS capacity surveys will provide additional data to inform where resources and supports should be focused.

In this report, we outline implementation processes and promising practices under the following requirements of this legislation:

- Implement systems to collect data and information about stroke care;
- Facilitate data sharing and collaboration;
- Apply guidelines for transitioning patients to community-based follow-up care; and
- Establish a process for continuous quality improvement.

History and Overview of Organized Approaches to Improving Stroke Care in Virginia

The Commonwealth of Virginia has strengthened its approach to improving stroke care and systems over the past decade. In 2006, VDH and the American Heart Association/American Stroke Association (AHA/ASA) followed the Recommendations for the Establishment of Stroke Systems of Care to spearhead the development of a work plan to be a strategic roadmap for improving stroke systems (Task Force, 2005). In 2007, the Joint Commission on Health Care (JCHC) conducted a study to develop strategies to address stroke prevention and care across the Commonwealth. The JCHC staff convened a cross-sectional subject matter expert workgroup that met several times to review stroke systems of care in Virginia. Notably, the JCHC approved a recommendation to require VDH to convene a standing Virginia Stroke Systems Task Force (VSSTF) (Virginia Stroke Systems, 2007).

Since its creation in 2007, the VSSTF has addressed improvement in Virginia's stroke systems. VSSTF Membership includes: hospitals, EMS, government entities, not-for-profit organizations, professional associations, legislators, telemedicine and pharmaceutical companies, as well as healthcare professionals. The professions represented include, but are not limited to, neurologists, nurses, emergency medicine physicians, pharmacists, physical therapists, and speech-language pathologists. With the large number of hospital-designated stroke coordinators within VSSTF, the Virginia Stroke Coordinator Consortium (VSCC) emerged in 2009 to promote evidence-based care in hospitals, improve statewide and local collaborative partnerships, and serve as mentors, coaches, and resources for hospitals throughout Virginia (Virginia Stroke Coordinators, 2009). With a commitment to improving the quality of stroke care and building effective stroke systems, VSCC has raised awareness of stroke center certification and acute stroke treatments in hospitals. In recent years, VSCC has focused on improving acute ischemic stroke care by reducing door-to-needle times for eligible patients treated with

intravenous tissue plasminogen activator (tPA) among hospitals statewide. In 2015, the VSSTF, VSCC, and VDH created the Southwest Stroke Task Force (SWSTF) to support geographic regions with high mortality due to stroke but low access to healthcare services. Primary quality improvement initiatives of the SWSTF included increasing stroke center certification, implementing EMS triage protocols, decreasing door-to-needle times, and expanding use of tele-stroke consultation.

In addition to ongoing stroke improvement efforts through the VSSTF and VSCC, the VDH Office of Emergency Medical Services (VA OEMS) maintains the Virginia Stroke Triage Plan pursuant to the Code of Virginia § 32.1-111.3 (§ 32.1-111.3, 2018). The 2017 Virginia Stroke Triage Plan establishes a strategy through formal regional stroke triage plans that incorporate each region's geographic variations and acute stroke care capabilities and resources. This strategy sets forth a uniform set of criteria for the prehospital and inter-hospital triage and transport of acute stroke patients. The eleven EMS regional councils developed regional stroke triage plans using these statewide criteria, accounting for local variation of resources and capacity among EMS and hospitals.

The 2018 General Assembly passed legislation, HB 1197 and SB 867, which enabled VDH to establish the VSCQI Advisory Group. The summary of the legislation states:

> ***Stroke care quality improvement.*** *Provides that the Department of Health shall be responsible for stroke care quality improvement initiatives in the Commonwealth. Such initiatives shall include (i) establishing systems to collect data and information about stroke care in the Commonwealth, (ii) facilitating information and data sharing and collaboration among hospitals and health care providers to improve the quality of stroke care in the Commonwealth, (iii) requiring the application of evidence-based treatment guidelines for transitioning patients to community-based follow-up care following acute treatment for stroke, and (iv) establishing a process for continuous quality improvement for the delivery of stroke care by the statewide system for stroke response and treatment. The bill also directs the Department of Health to convene a group of stakeholders, which shall include representatives of (a) hospital systems, including at least one hospital system with at least six or more stroke centers in the Commonwealth, recommended by*

> *the Virginia Hospital and Healthcare Association; (b) the Virginia Stroke Systems Task Force; and (c) the American Heart Association/American Stroke Association, to advise on the implementation of stroke care quality improvement initiatives. The provisions of the bill making the Department of Health responsible for stroke care quality improvement initiatives in the Commonwealth have a delayed effective date of January 1, 2019.*

The Code of Virginia was amended by adding in Article 2.1 of Chapter 4 of Title 32.1 a section numbered 32.1-111.15:1 (Appendix A). This report details the progress to date and future plans to be implemented by VDH and the VSCQI Advisory Group as required by the Code.

Background on Stroke Burden and Preliminary Action Steps

Stroke Burden

Stroke is the fifth leading cause of death in the United States, and the fourth leading cause of death in Virginia. Stroke of various types, notably ischemic and hemorrhagic, lead to 140,000 deaths in the United States each year, or 1 of every 20 deaths[1] (Yang, 2015). In Virginia, there were a combined 7,557 total deaths between 2016 and 2017 due to stroke at an age-adjusted rate of 37.9 per 100,000 population, compared to the 37.4 age-adjusted rate nationally (Stroke Mortality by State, 2019). Three percent of Virginians have had a stroke and are living with disability or are at risk for a second stroke (VDH Division of Population Health Data, 2015). According to the Virginia inpatient hospital database for 2016-2017, there were 28,647 hospitalizations due to stroke with a crude rate of 171.8 per 100,000 population (VHHA Inpatient Discharge Database, 2019). Stroke costs the United States $34 billion annually, of which over $881 million dollars is spent in Virginia on total inpatient hospital charges (Benjamin, 2017 and VDH Division of Population Health Data, 2014).

Hospitalizations and deaths due to stroke varied significantly by county and city from 2016 to 2017. Some counties and cities reported crude rates as high as 576.3 per 100,000 population.

Conversely, other counties and cities either had a crude rate as low as 69.9 per 100,000 population or little to no reported hospitalizations due to stroke (VHHA Inpatient Discharge Database, 2019). The two maps below display the geographic distribution of hospitalizations and deaths, overlaid with EMS regional council boundaries and hospitals by stroke certification type (Figures 1 and 2).

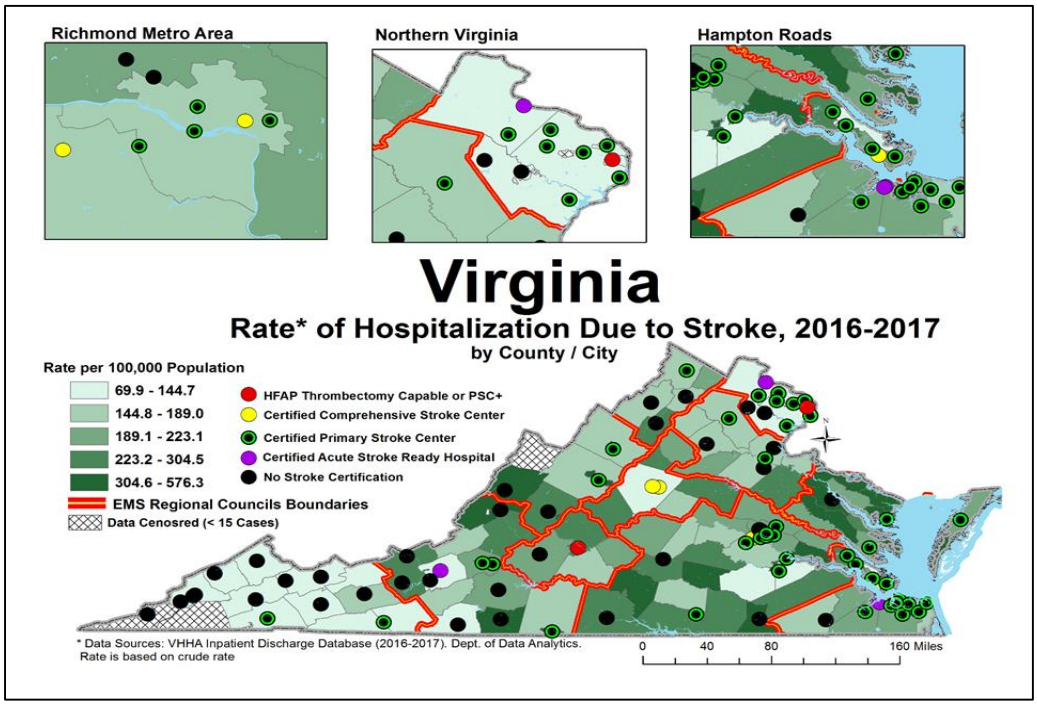

Figure 1. Rate of Hospitalizations Due to Stroke in Virginia by County and City from 2016-2017 (VHHA Inpatient Discharge Database, 2019)

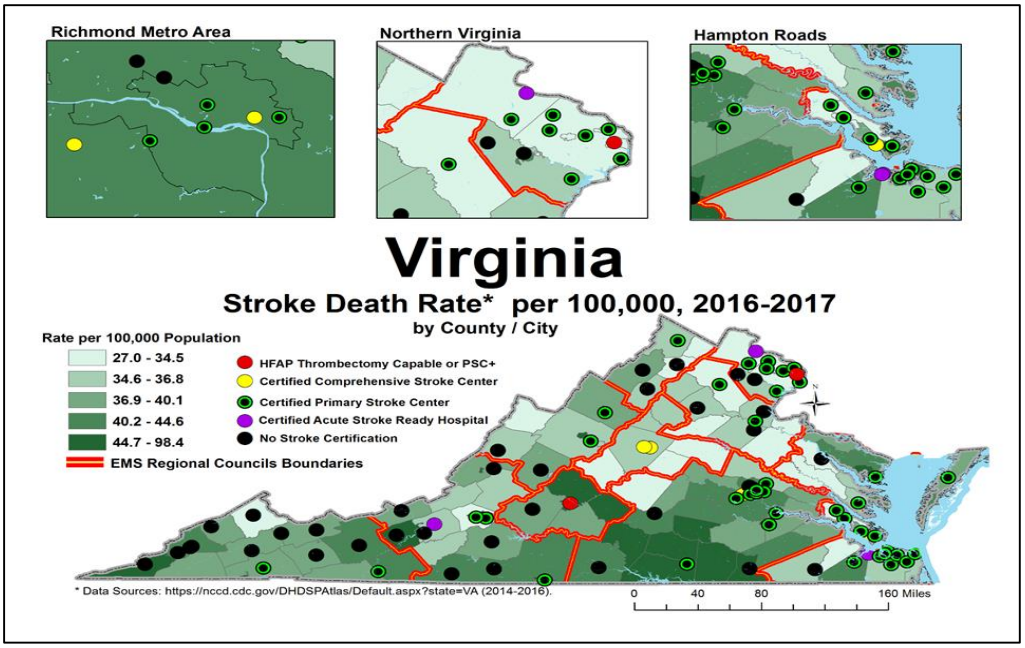

Figure 2. Age-adjusted Rate of Deaths Due to Stroke in Virginia by County and City from 2016-2017 (Stroke Mortality by State, 2019)

The figures show a comparison of the geospatial distribution of hospitalization and death rates by county and city areas of high burden and low burden. Particularly in the southwest region, Figure 1 shows a low rate of hospitalization due to stroke; however, Figure 2 shows high rates of death due to stroke. Contributing factors to these disparities may include a lack of access to healthcare services, transportation barriers, poverty, low access to healthy fruits and vegetables, limited physical activity, or lack of education about the signs and symptoms of stroke. In the south central region, both hospitalization and death rates due to stroke are significantly high. Both maps show a scarcity of hospitals to assess, treat, and prevent strokes in these counties. Densely populated areas, including the Richmond Metropolitan Area, Northern Virginia, and Hampton Roads, show differing rates of hospitalizations and deaths due to stroke, with an abundance of hospitals with varying levels of stroke certification by The Joint Commission (TJC), Det Norske Veritas (DNV), and the Healthcare Facilities Accreditation Program (HFAP).

As of January 1, 2019, 53 out of 91 Virginia hospitals are certified by TJC, DNV, and HFAP. Of those stroke certified, two hospitals are certified Thrombectomy Capable or Primary Stroke Center (PSC) +, six hospitals are certified Comprehensive Stroke Centers (CSC), forty-one hospitals are PSC, and four hospitals are Acute Stroke Ready Hospitals (ASRH) (Virginia Stroke Coordinators, 2018). The VSCC Stroke Certification Survey provides a breakdown below (Figure 3).

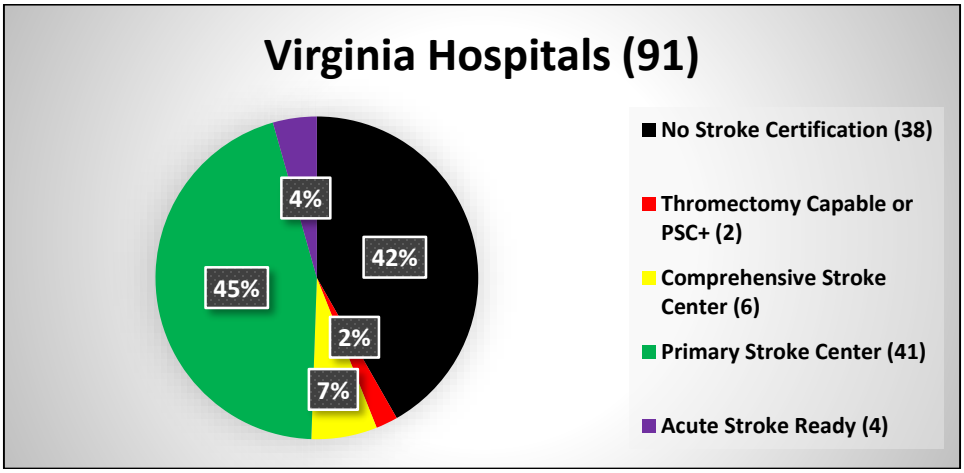

Figure 3. Stroke Certification Breakdown among Virginia Hospitals (Virginia Stroke Coordinators, 2018)

In summary, Figures 1 and 2 reveal geographic areas of high burden and disparities between hospitalizations and death rates due to stroke. Virginia hospitals provide varying levels of stroke care, with advanced levels of stroke care defined by stroke certification type. Additionally, the eleven EMS regional councils provide local EMS agencies coordination and support to improve stroke care. Further investigation using a broad range of data sources is necessary to identify the local factors contributing to the burden and disparities. Geospatial mapping, overlaying burden distribution and resources such as EMS regional council coverage area, and hospital location by stroke certification serve as critical strategic planning tools for data-driven decision-making and partnership development in the VSCQI Advisory Group.

Preliminary Action Steps

Prior to the legislation's January 1, 2019 effective date, VDH took preliminary action steps to build capacity among stakeholders. The first preliminary action step was to identify stakeholder members for the VSCQI Advisory Group. VDH formed the initial consortium of VSCQI advisory group members in June 2018, based on suggested lists of hospital and EMS regional council contacts recommended by VHHA and VA OEMS, respectively. Stakeholder entities were identified based on their role in the continuum of stroke care and expertise to move the advisory group forward (Table 1).

Table 1. List of VSCQI Advisory Group Stakeholders and Roles

Stakeholder	Role(s)
VDH	Convenes the VSCQI Advisory Group and collaborates with stakeholders to implement Code of Virginia § 32.1-111.15:1
VA OEMS	Provides statewide VDH leadership for the planning and coordination of an effective and efficient EMS system
VHHA	Provide access to hospital data and leadership to their hospital members
AHA / ASA	Through their quality improvement programs such as Get with the Guidelines® Stroke (GWTG-Stroke) and Target Stroke^{SM}, provide technical support to hospitals and EMS participating in GWTG-Stroke
Hospitals	Receive, treat, and refer patients for assessment, clinical care, and rehabilitation, with varying levels of hospitals certified to provide advanced levels of stroke care
EMS Regional Councils	Coordinate with local EMS agencies and provide community education
U.S. Department of Veterans Affairs	Provide comprehensive healthcare services to eligible military veterans at VA medical centers in Virginia

Physical Rehabilitation Centers	Provide comprehensive physical rehabilitation services and education; inclusive of skilled-nursing facilities
VSSTF and VSCC Co-Chairs	Provide leadership and coordinate VSSTF and VSCC initiatives

Representatives of these stakeholder entities include public health practitioners, data analysts, quality improvement coordinators, EMS medical directors and field coordinators, and healthcare professionals including, but not limited to, neurologists, neurosurgeons, radiologists, emergency medicine physicians, nurses, stroke coordinators, physical therapists, and telemedicine coordinators.

On August 10, 2018, VDH facilitated the initial VSCQI Advisory Group meeting with stakeholder representation from VHHA, AHA/ASA, VA OEMS, eight EMS regional councils, and ten hospitals. VDH presented geospatial maps of stroke burden across Virginia, and facilitated a discussion on data collection, information sharing, and quality improvement initiatives. Stakeholders highlighted the need to select priority stroke measures across the continuum of stroke care in order for the VSCQI Advisory Group to identify areas of high need or gaps in care, monitor outcomes, and inform recommendations for quality improvement initiatives.

At the VSSTF quarterly meeting held on October 19, 2018, VDH invited all VSSTF members to propose and submit stroke-related metrics of interest to VDH no later than December 2018. These proposed, preliminary metrics provided VSSTF members an opportunity to explore population health indicators and analyses that describe Virginia's progress in improving stroke outcomes both statewide and regionally. Various stakeholders, including neurologists, stroke coordinators, EMS field coordinators, and Get Ahead of Stroke (GAOS) representatives,

proposed metrics grouped into four categories – prevention/risk factors, pre-hospital, in-hospital, and post-hospital.

On January 18, 2019, the VSCQI Advisory Group convened and reviewed the metrics proposed by VSSTF members. Based on the feedback provided during the meeting, VDH then created four draft metric surveys for VSCQI Advisory Group members to prioritize sub-categories and corresponding metrics for each of the four categories. Progress on data collection action steps since creation and dissemination of the metric surveys is further described in the Legislation Implementation Process and Promising Practices section of this report.

In addition to preliminary efforts to compile and prioritize stroke metrics, VDH has built internal capacity to facilitate the successful implementation of the requirements pursuant to the Code. VDH designated existing staff that work in heart disease and stroke prevention to lead facilitation of the VSCQI Advisory Group and collaborate with VHHA, VA OEMS, and AHA/ASA. Additionally, AHA/ASA granted VDH state epidemiologists super-user access to the GWTG-Stroke platform. The GWTG-Stroke super-user access is limited to aggregated, de-identified stroke measures with hospitals enrolled in GWTG-Stroke in accordance with a signed data use agreement with VDH. VDH maintains and recently improved VDH's stroke webpage to allow for future information sharing, monitoring of state and regional stroke metrics, quality improvement best practices, and resources, including information on local stroke support groups and tools or protocols shared by VSSTF and the VSCQI Advisory Group (Virginia Stroke, 2019).

Legislative Requirements – Implementation Process and Promising Practices

Prior to the legislation's effective date of January 1, 2019, VDH developed a work plan with implementation steps assigned to each of the listed requirements of HB 1197 and SB 867. This section describes data-driven action steps, available results, and descriptions of stroke care quality improvement initiatives through a breakdown of the legislation's listed requirements.

Implement Systems to Collect Data and Information about Stroke Care

Legislation Implementation Process

The VSCQI Advisory Group aims to implement systems to collect data on stroke care by first identifying priority stroke metrics along the continuum of care, as requested by members. Prioritizing and selecting agreed upon metrics at the VSCQI Advisory Group level determines the type of data sources and nationally recognized data set platforms necessary for implementing systems for data collection.

From October to December 2018, VSSTF members proposed a preliminary list of stroke-related metrics that were reviewed by the VSCQI Advisory Group in January 2019. VDH grouped the metrics into four categories and subcategories (Table 2).

Table 2. Stroke Metrics Categories and Subcategories List

Category	Subcategory
Prevention / Risk Factors	Medical Risk Factors, Lifestyle Risk Factors, Education, Healthcare Access, Social Determinants of Health, Financial Impact
Pre-Hospital	Transport Time: EMS Home/Scene to Hospital, Transport Time: Interfacility Transport, Type of Stroke Transport and Triage, Stroke Screening, Patient Encounter Documentation and Last Known Well, Stroke Alert Pre-Notification, Patient Monitoring
In-Hospital	Outcomes, Assessment and Screening, Interfacility Transfer, Treatment, Tele-Stroke, Education and Counseling
Post-Hospital	Rehabilitation Outcomes, Transitions of Care, Stroke Patient Supports, Disability, Cost

VDH developed four *Stroke Priority Metrics Surveys* for VSCQI Advisory Group members, including stakeholders from all Virginia hospitals, to rank and prioritize the preliminary metrics. Respondents ranked sub-categories and corresponding metrics for each of the four categories in order of highest priority to lowest priority. Respondents were encouraged to consider importance, feasibility, and impact as they ranked the metrics. Using the results of the *Stroke Priority Metrics Surveys*, the following data-driven action steps will take place in 2019-2020:

- VDH will identify data sources for selected stroke metrics per category and subcategory;
- VDH will identify and implement nationally recognized data set platforms with confidentiality standards approved by the Centers for Medicare and Medicaid Services (CMS) or consistent with the GWTG-Stroke registry platform;
- VDH will engage all Virginia hospitals to participate in data collection and quality improvement initiatives to improve outcomes for selected stroke metrics;
- VDH will enter into data sharing agreements with participating hospitals; and
- VDH will increase the number of GWTG-Stroke super-user data sharing agreements with hospitals participating in GWTG as AHA/ASA continues to enroll hospitals in GWTG-Stroke.

Promising Practices

GWTG-Stroke

As of January 1, 2019, 40 out of 91 Virginia hospitals participate in GWTG-Stroke. GWTG-Stroke is a quality improvement program through AHA/ASA that helps hospitals follow up-to-date, research-based treatment guidelines, reducing gaps and disparities in the delivery of quality care. GWTG-Stroke collects patient level data on characteristics, diagnostic testing, treatments,

adherence to quality measures, and in-hospital outcomes in patients hospitalized with stroke and transient ischemic attack (TIA). Collection of comprehensive, continuous stroke data supports data analysis and the development of interventions to improve stroke care. Since the program's start in 2003, over 2,000 hospitals nationwide have participated in GWTG-Stroke; data has been collected from over 5 million patient encounters for stroke (Get With The Guidelines, 2019).

The primary goal of the GWTG-Stroke program is to improve the quality of care and outcomes for patients hospitalized with stroke and TIA. GWTG-Stroke helps achieve this goal in a variety of ways, including enabling high caliber stroke research; promoting stroke center designation; supporting hospital level quality improvement; and driving the creation of regional stroke systems. The GWTG-Stroke program is also an important scientific resource for stroke research. Many studies about the quality of care and outcomes for stroke patients have been limited by the data available. For instance, limitations exist in the examination of only select populations, in the lack of detailed data on diagnosis and care, and in incomplete data on contraindications to recommended therapies. In contrast, as a result of its size, scope, duration, and prospective collection of patient level data, the GWTG-Stroke program allows for the investigation of many of these factors, which improves the quality of research for participating hospitals (Get With The Guidelines, 2019).

While such a data platform and quality improvement initiative would benefit hospitals, only 40 out of 91 Virginia hospitals participate in GWTG-Stroke. Several barriers and challenges to enrolling in GTWG-Stroke include affordability, capacity, and autonomy. Stroke certified hospitals participating in GWTG-Stroke pay an annual module-pricing fee, with additional costs for supplemental measure sets, forms, modules, and reports, to improve quality of stroke care for patients. A number of hospitals, particularly in rural or low-resourced areas across Virginia,

identify cost as a barrier to purchase GWTG-Stroke. Additionally, such hospitals may lack the capacity and staffing for data reporting. Lastly, a number of other hospitals not participating in GWTG-Stroke prefer alternative platforms and methods for stroke care quality improvement. Despite these barriers to participation, AHA/ASA affiliates in Virginia continue to provide support and aim to increase the number of hospitals participating in GWTG-Stroke.

Facilitate Data Sharing and Collaboration

Legislation Implementation Process

VDH maintains a data warehouse, yet historically has not collected aggregate, chronic disease and stroke-related data from hospitals. Data sharing agreements between VDH and hospitals are necessary for providing direct, process-level data and information to hospitals collaborating in the initiative. The stroke data metrics selected by the VSCQI Advisory Group will identify the types of data sources necessary for data sharing. Platforms for data sharing, such as VDH's stroke webpage, GWTG-Stroke, and Multi-state EHR-based National Disease Surveillance (MENDS), are avenues for data and information sharing between VDH and hospitals. The webpage currently features general stroke information, statewide and national stroke data, resources, and dedicated VSSTF and VSCC update pages. Future iterations of the webpage will include selected stroke metric data and information aggregated at the state and regional levels, geospatial maps, quality improvement best practices, and tools and resources for stroke awareness, patient supports, and program implementation (Virginia Stroke, 2019).

As VDH continues to update the VDH Virginia Stroke webpage and increase the number of data sharing agreements with hospitals, the following data-driven action steps will take place in 2019-2020:

- VDH will continue to update hospitals, EMS, and stroke stakeholders on progress pursuant to § 32.1-111.15:1 during VSSTF and VSCC quarterly meetings;
- VDH will convene a subcommittee to maintain, refine, and update VDH's stroke webpage;
- VDH will facilitate data sharing with and between hospitals and EMS regional councils through the platforms identified and implemented in the "Implement Systems to Collect Data and Information about Stroke Care" requirement; and
- VDH will support and participate in local and regional stroke committees through data and information sharing, by request.

Promising Practices

Multi-state EHR-based National Disease Surveillance

The Centers for Disease Control and Prevention (CDC) has awarded the National Association of Chronic Disease Directors (NACDD) funds to coordinate the development of a chronic disease surveillance system called MENDS. In February 2019, VDH was selected as one of two state health departments to shadow states/regions with an existing disease surveillance system and receive technical assistance on partner engagement and capacity building. VDH has been slated to receive funding to implement such a system in the third quarter of fiscal year 2019. MENDS uses a gatekeeper model that keeps the raw data stored behind the data owner's firewall and only aggregated information is released to State Health Department users. To foster partnerships between data owners and data users, legal governance will be drafted and signed. To ensure that MENDS becomes a part of routine operations for both hospitals and VDH, data

owners and users will be trained by NACDD MENDS state mentors on how to use the information for public health and stroke care quality improvement purposes (Evans, 2019).

MENDS bridges the capability for hospital electronic health records (EHR) data collection by hospitals and quality improvement for population health by state health departments. Currently, there is no national surveillance system of chronic diseases based on EHR data collected in clinical settings. The Behavioral Risk Factor Surveillance System (BRFSS) captures sociodemographic, health-related risk behaviors, chronic health conditions, and use of preventive services data across all 50 states.

Government-required, meaningful use reports are based on EHR data, but these reports cannot be de-duplicated. The BRFSS provides critically important information about health risk behavior that can complement data found in EHRs and meaningful use reports, allowing better understanding of the expansion of technology and adherence to national standards. However, because the BRFSS relies on self-report, major limitations include measurement error, recall bias, and selection bias. Additionally, the BRFSS has limited use for local-level analyses and research. Data collection and analyses of BRFSS data take time, making “real time” data availability a challenge (Institutes of Medicine, 2011). Likewise, meaningful use reports do not provide timely data for tracking chronic diseases and evaluating programs and policies. Since EHR data is gathered daily for clinical purposes, MENDS can be used to track small and significant shifts in treatment and prevalence related to health, particularly stroke, its risk factors, and complications. The MENDS pilot presents opportunity for a timely, promising system that will build a bi-directional data and information-sharing platform between VDH and Virginia hospitals.

VHHA Data Portal

VDH and VHHA have partnered to develop predictive modeling dashboards for VHHA member hospitals utilizing predictive analytics and hot spot analysis to inform data-driven quality improvement for improving diabetes, heart disease, and stroke outcomes across Virginia. Through two, five-year grants awarded to VDH by the CDC, VDH partnered with VHHA to receive up-to-date hospital data necessary for implementing innovative and evidence-based interventions for heart disease, stroke, and diabetes prevention and management (Innovative State and Local, 2019).

The VHHA predictive modeling dashboards for chronic conditions, including but not limited to heart disease, hypertension, high blood cholesterol, and diabetes, build additional insights around the causal influence of chronic conditions on health outcomes and common risk factors (such as clinical, behavioral, social, and geographic factors) that influence the likelihood of developing these chronic conditions. These factors influence the quality of stroke care along the continuum of care. Priority stroke metrics selected by the VSCQI Advisory Group can be integrated into the predictive modeling dashboards through the use of hospital data reported to VHHA.

Development, implementation, and evaluation of predictive modeling is currently underway in three phases. First, condition-specific, patient-level predictive models will be developed to ascertain the influence that social, clinical, and behavioral characteristics have on a patient's likelihood of experiencing hospital-diagnosed stroke, heart disease, diabetes, hypertension, kidney disease, and other chronic conditions of interest. Second, hot spot analysis, or the strategic use of data and mapping techniques to identify a concentrated subset of high-needs, high-cost patients (hot spot communities), using geographic-level forecast models will be

developed through a pilot program. The forecast models will be designed and developed to project the burden of chronic conditions among Virginia communities in three to five year increments to help optimize the allocation of scarce population improvement resources. Third, an evaluation of the effects of chronic conditions on patients' likelihood of experiencing a 30-day hospital readmission across five subclinical cohorts will be provided through odds ratios and algorithms specified by CMS. Altogether, the hospital dashboards present platforms for sharing hospital data and sending information back to the hospitals in an actionable way to identify hot spot communities within hospital service areas; identify patients at risk for stroke or 30-day readmission; coordinate care among clinical and community-based stakeholders; and deploy innovative solutions to improve stroke outcomes.

GWTG-Stroke

By providing hospitals with timely feedback on their stroke care performance, the GWTG-Stroke registry also supports hospitals' stroke care quality improvement efforts for hospitals enrolled in GWTG-Stroke. More specifically, data from the registry allows hospitals to identify problems with stroke care, develop quality improvement interventions based on the identified problems, and monitor progress after implementation of a chosen intervention. As a result, hospitals participating in the GWTG-Stroke program should show improvement in adherence to stroke performance measures.

In addition to supporting overall stroke care quality improvement, the GWTG-Stroke registry can help hospitals reduce disparities in the care they deliver. Evidence suggests that not only are minorities at higher risk of suffering a stroke, but they also receive lower quality of care and

have worse health outcomes. Hospitals participating in GWTG-Stroke improved care for black, Hispanic, and white patients (Get With The Guidelines, 2019).

GWTG-Stroke can catalyze systems changes on a regional or statewide basis to promote a more comprehensive and coordinated approach to stroke care. Regional participation in GWTG-Stroke can help illuminate problems that exist in the stroke system of care. For instance, data may show poor patient education about stroke symptoms, geographical differences in the quality of stroke care received, or problems with adherence to stroke treatment guidelines. The data can then catalyze stakeholders to find solutions to the challenges encountered. For example, data from Maryland's stroke registry using GWTG-Stroke showed that some of the state's hospitals were reluctant to administer tPA – a drug used to treat thrombotic and embolic stroke – to stroke patients. Having identified this concern, stakeholders were able to investigate its cause and determined that these hospitals were wary of mixing and preparing tPA because of the drug's cost. Consequently, Maryland developed a system that allows hospitals to return unused tPA to the manufacturer to reduce overall costs and minimize unnecessary waste; this has promoted the delivery of tPA to appropriate stroke patients (Get With The Guidelines, 2019).

Apply Guidelines for Transitioning Patients to Community-Based Follow-up Care

Legislation Implementation Process

Upon the selection of the priority stroke metrics by the VSCQI Advisory Group, members focused on the post-hospital category will engage in a strategic planning meeting to identify local, regional, and state partners and models to implement guidelines for transitioning patients to community-based follow-up care for patients with stroke or TIA. Upon the determination of

best practice models, evidence-based guidelines, and partners, the following data-driven action steps will take place in 2019 to 2020:

- VDH will make available a listing of guidelines on the VDH Virginia Stroke webpage;
- VDH will facilitate clinical-community linkages that enable healthcare providers to transition patients to community-based follow-up care;
- VDH will continue to identify and engage with physical rehabilitation programs to increase referral, participation and retention in programs in traditional and non-traditional settings, including at-home rehabilitation programs; and
- VDH will collaborate with stakeholders on the expansion of telehealth and tele-stroke technology to apply evidence based treatment guidelines for community-based follow-up care in select geographic regions of Virginia where healthcare access is limited.

Promising Practices

2018 Stroke Rehabilitation Survey

Physical rehabilitation is a critical part of stroke recovery. Rehabilitation services can help stroke survivors: a) re-learn basic skills such as talking, eating, dressing and walking; b) increase strength, flexibility, and endurance; and c) regain as much independence as possible. In Virginia, 355 facilities provide rehabilitation services, including 27 inpatient rehabilitation facilities, 88 outpatient rehabilitation facilities and 240 skilled nursing facilities. Rehabilitation facilities vary in the type and range of services provided, the frequency in which they offer services, and the setting where the services are provided (e.g., inpatient rehabilitation facility vs. skilled nursing facility).

Following an exhaustive review of the literature, rehabilitation subject matter experts from Sheltering Arms and the University of Virginia (UVA) designed a 40-question survey to assess rehabilitation services statewide. The purpose of this survey was to conduct a statewide assessment of the type and range of services provided by inpatient, outpatient and skilled nursing facilities. Home health agencies were not included in this survey. The questionnaire collected facility information (type of facility, visiting hours, room accommodations, etc.), staffing (type of staff, patient/staff ratios, etc.), services (type, frequency, etc.), patient demographics (age, insurance status, referral source, etc.), and capacity (total parenteral nutrition or bariatric capabilities). Since email addresses for the 355 facilities were not available, a postcard stating the survey purpose and a link to the survey was mailed to the administrator at each facility. To access the survey, administrators had two options: 1) input the link on the postcard into a browser; or 2) call the number provided to receive an email with a live link to the survey. As an incentive, respondents who completed the survey were entered into a prize drawing. VDH mailed the postcards on March 19, 2018 with a survey close date of April 13, 2018. Due to a low response rate, the survey close date was delayed until May 4, 2018 (Virginia Stroke, 2019).

The results from the stroke physical rehabilitation survey provides meaningful information when referring patients in need of rehabilitation services to appropriate skilled nursing facilities and inpatient or outpatient rehabilitation facilities (Appendix B). Notably, many respondents reported diverse teams inclusive of physical, occupational and speech therapists; less commonly included were social workers, psychologists and case managers. The VSCQI Advisory Group members who are focused on the post-hospital category will apply the survey findings to determine referral guidelines that provide patients with informed options for rehabilitation services and locations.

UVA Tele-Stroke Follow-up Clinic Model

There is a need for follow-up care after a patient experiences a stroke; however, there is no consensus about the way to organize this care. One method for applying guidelines for community-based follow-up care is through tele-health services under a follow-up clinic model. Many stroke patients experience motor, cognitive and psycho-emotional deficits or problems with daily activities. Their caregivers are also affected by the consequences of stroke. Allen, et al (2002) evaluated a standardized assessment of stroke patients one month after being discharged home, followed by an individual care plan developed by a multidisciplinary team. They found that quality of life had improved after three months. With UVA being the only comprehensive stroke center in Charlottesville and the Shenandoah Valley, a number of stroke patients need to travel a significant distance for follow-up. UVA aims to improve post-stroke care in the region by providing ways to reduce some of the limitations related to distance and mobility. UVA is currently developing a tele-stroke program to include refining the model description, resources needed and workflow. Identified needs to implement this model include a tele-stroke follow-up clinic coordinator, equipment, data plan, telemedicine application and telemedicine tech support (UVA Stroke Center, 2017).

Establish a Process for Continuous Quality Improvement

Legislation Implementation Process

Continuous processes for quality improvement require thorough data collection on priority stroke metrics, capacity building where resources are scarce, and platforms that both continually educate practitioners and enable them to develop, test, and evaluate quality improvement initiatives. In addition to the priority stroke metrics data collected from hospitals, VDH will

simultaneously develop and conduct a hospital capacity survey and an EMS capacity survey on stroke. Results from these two sets of capacity surveys will inform where resources are needed to improve the capacity of a hospital or EMS agency to provide quality stroke response, assessment, treatment, and follow-up.

In partnership with VSSTF and VSCC, VDH will develop a hospital capacity survey modeled after the national CDC Paul Coverdell Program's survey (Paul Coverdell Program, 2018). The hospital capacity survey will assess a hospital's structure, process, and utilization with regards to stroke care. Other capacity assessment questions will include hospital stroke certification, stroke care protocols and workflows, stroke care supports offered, local stroke support group information, data collection and reporting capabilities, and ongoing quality improvement efforts. In partnership with VA OEMS and the EMS regional councils, VDH will also develop an EMS capacity survey that asks about structure, process, and utilization. Additional questions relate to protocols, triage plans, community paramedic programs, community education, stroke scale use, 911 dispatcher information, funding, and ongoing quality improvement efforts.

Using the results of the *Stroke Priority Metrics Surveys* and hospital and EMS capacity surveys, the following data-driven action steps will take place from 2019 to 2020:

- VDH will disseminate hospital and EMS capacity surveys bi-annually to identify areas of need and monitor progress on building stroke care capacity;
- VDH will continue to support interprofessional healthcare teams in the rapid development, implementation, and evaluation of quality improvement projects through *SYNC: Transforming Healthcare Leadership*;

- VDH will engage state agencies and professional associations to establish a process for continuous quality improvement and education through the Project ECHO™ model (details included in the following Promising Practices section); and
- VDH will align quality improvement initiatives of the VSCQI Advisory Group with ongoing efforts of the VSSTF and VSCC for scalability, reach, and sustainability.

Promising Practices

SYNC: Transforming Healthcare Leadership

SYNC: Transforming Healthcare Leadership is an innovative, team-based learning experience that teaches collaboration and leadership through hands-on problem solving. This six-month program walks interprofessional healthcare teams through concepts of 21st century healthcare, design thinking, interprofessional leadership, and a guided capstone project to address a challenge their healthcare team is facing. The quality, impact, and reach of SYNC is a testament to the state level leadership and partnership between the Medical Society of Virginia Foundation (MSVF), Virginia Nurses Association (VNA), VHHA, and VDH (SYNC, 2019).

In 2015, VDH began supporting teams that utilized data-driven actions for select stroke, heart disease, diabetes, and cancer related capstone projects. To date, 26 interprofessional healthcare teams have completed VDH-sponsored, data-driven care projects that have shown tremendous impacts in the hospitals and communities they serve. The types of projects range from in-hospital quality improvement to clinical-community partnership models that address the needs identified by the hospital, clinic, local health department, or community-based organization. In the 2019 SYNC cohort, four interprofessional teams representing hospitals and an EMS agency are collaborating to improve stroke outcomes in their respective patient populations. (SYNC, 2019).

Hospital and EMS collaborative teams can implement another promising practice in future SYNC cohorts, including the mobile ambulance-based tele-stroke program, iTREAT, implemented by UVA Health System. Mobile ambulance-based tele-stroke presents a novel solution to improving accuracy of prehospital stroke diagnosis and timeliness of treatment. This innovative program of mobile prehospital video teleconferencing will improve patient satisfaction, early prehospital stroke diagnosis, adequate referral of patients to specialized hospitals, and identification of patients eligible for thrombolysis throughout the Commonwealth. Improvement in these areas should lead to decreased mortality and morbidity due to stroke.

A proof of concept for iTREAT, completed in 2016, showed that a tele-stroke assessment is both technically feasible and clinically reliable for ambulance-based assessment. This was demonstrated with a 0.96 correlation coefficient between the iTREAT National Institute of Health Stroke Scale (NIHSS) and the NIHSS performed in the emergency department (ED). (Innovative iTREAT Toolkit, 2019). Further, the UVA iTREAT model is being used in other health systems such as Hendricks Regional Health in Indiana as a primary method of acute stroke care and UVA Special Event Medical Management is currently utilizing a similar prehospital telemedicine platform. Since original iTREAT studies, the equipment, workflow, and training materials have been updated based on feedback from all stakeholders. UVA has also partnered with VCU and the Richmond Ambulance Authority to extend the project to the Richmond area.

Project ECHO™ (Extension for Community Healthcare Outcomes) for Stroke

Virginia's Project ECHO™ is an interactive, videoconference educational program to help better equip medical providers, pharmacists, care coordinators, social workers and others who

work in the health field of opioid use disorder treatments. The heart of the ECHO™ model is its knowledge-sharing networks, led by expert teams who use multi-point videoconferencing to conduct virtual clinics with community providers. The experts use visual and auditory interactive technology (i.e., Zoom™) to engage in case consultations combined with didactic presentations on evidence-based practices in the field. In this way, physicians, nurses, and other clinicians learn to provide excellent specialty care to patients in their own communities. The ECHO™ model for exporting medical expertise to underserved areas for addressing complex treatment needs was originated by the University of New Mexico's Health Sciences Center (Project ECHO, 2019).

ECHO™ methodology is not telemedicine, which helps one patient at a time and transfers care to the remote care provider. In the ECHO™ model, the participating health care providers retain responsibility for patient care, as the goal is to increase the confidence and independence of participants through strengthening their skills. The participating providers submit de-identified real patient cases via the interactive Zoom™ technology platform that allows all participants to exchange ideas on the case with each other, relying on the "hub" for specialty expertise, while engaging all parties. The network of ongoing support that is developed is another benefit that can help prevent burnout and strengthen care capacity.

VDH first piloted the model with Carilion, VCU, and UVA health systems by establishing a Virginia-specific opioid and disease prevention Project ECHO™. The UVA Karen S. Rheuban Center for Telehealth has recently expanded the model to include diabetes, prediabetes, heart disease, hypertension, and cholesterol focus areas. UVA has also begun expanding the model for stroke to connect UVA stroke specialists to primary care providers across Virginia. This is a way to train primary care and other healthcare providers, including EMS agencies, to provide

specialty care services. UVA plans to recruit a cohort of participants for regular remote mentoring sessions. Each session will have a brief didactic presentation by either a stroke expert, cardiologist, or tele-stroke coordinator, followed by the presentation and discussion of de-identified cases. Participants will also benefit from the ability to receive continuing education credits.

Ongoing VSCC Initiative for Utilization of tPA Data Collection and Improvement

The VSCQI Advisory Group will support ongoing efforts of VSSTF and VSCC. VSCC brought together stroke leaders of 14 hospitals from across the Commonwealth to collect and report the utilization of tPA. The VSCQI Advisory Group can support this effort by increasing the number of participating hospitals and initiating quality improvement processes through SYNC: Transforming Healthcare Leadership and Project ECHO™. VSCC has compiled two years' worth of data from 14 Virginia hospitals, covering the full spectrum of certified hospitals, including ASRH, PSC, PSC+, and CSC hospitals. The data collected includes all patients treated with intravenous (IV) tPA for suspected ischemic stroke between October 2016 and September 2018 (Table 3) (Virginia Stroke Coordinators, 2018).

Table 3. VSCC Utilization of tPA Results of 938 Patients within 14 Virginia Hospitals Compared to National Benchmarks

Utilization of TPA Metrics	14 Virginia Hospitals	National Comparison* (2013 data)
Median arrival to IV tPA treatment time for all patients	47m	--
Median arrival to IV tPA treatment time for ischemic stroke only	46m	67m
Percent treated within 60m of arrival	72.0%	41.3%

*Fonarow GC, Zhao X, Smith EE, et al. Door-to-Needle Times for Tissue Plasminogen Activator Administration and Clinical Outcomes in Acute Ischemic Stroke Before and After a Quality Improvement Initiative. JAMA.2014;311(16):1632–1640. doi:10.1001/jama.2014.3203

The VSCC focused on final diagnosis, looking at the rate of patients treated who did not have a final diagnosis of ischemic stroke or TIA and at the rate of complications in that patient population. Among the 938 patients reported in the study, the median arrival to IV tPA treatment time for all patients was 47 minutes; a national comparison for this measure is not available. The median arrival to IV tPA for ischemic stroke only was 46 minutes, compared to 67 minutes nationally. Fourteen participating hospitals reported favorable arrival to treatment times and a higher percentage of patients treated with IV tPA. These favorable results are indicative of the hospitals' leadership and commitment to improve the quality of care for stroke patients. Their leadership and commitment are demonstrated by attaining hospital stroke certification, collecting and reporting stroke-related data, and aiming to reduce arrival to IV tPA treatment time (Virginia Stroke Coordinators, 2018).

Furthermore, the 14 participating hospitals willingly collaborated to collect and share data in an effort to improve stroke care collectively across Virginia. The VSCC and participating hospitals also shared data on the rate of patients treated without a final diagnosis of ischemic stroke or TIA and the rate of complications in that patient population. The robust study design aims to show the minimal number of complications attributed to tPA utilization among patients (Table 4) (Virginia Stroke Coordinators, 2018).

Table 4. The Rate of Patients Treated Without a Final Diagnosis of Ischemic Stroke or TIA and the Rate of Complications in that Patient Population

	Final Diagnosis of Ischemic Stroke		**Final Diagnosis NOT Ischemic Stroke (Mimic)**	
Number of Patients	819	(87.3%)	119	(12.7%)
Complications (Total)	41	(5.0%)	0	(0.0%)
Symptomatic Intracranial Hemorrhage	37	(4.5%)	0	(0.0%)
Other bleeding	2	(0.2%)	0	(0.0%)
Anaphylaxis	1	(0.1%)	0	(0.0%)
Cardiac arrest after tPA administration	1	(0.1%)	0	(0.0%)
Most Common Non-Stroke Diagnoses				

Migraine	--	34 (28.6%)
Seizure	--	16 (13.4%)
Conversion Disorder	--	13 (10.1%)
Weakness, not specified	--	7 (5.9%)
Vertigo	--	3 (2.5%)
Infection	--	3 (2.5%)
Other, specified	--	15 (12.6%)
Other, not specified	--	28 (23.5%)

Ongoing efforts such as VSCC utilization of the tPA study serves as an example of the potential of the VSCQI Advisory Group. Statewide participation can scale this study and inform quality improvement across all Virginia hospitals. The VSCQI Advisory Group will continue to support ongoing initiatives of local, regional, and statewide entities leveraging quality improvement processes and activities pursuant to § 32.1-111.15:1.

Ongoing EMS Initiative for Triage of Emergent Large Vessel Occlusion (ELVO) Stroke

The vast majority (87%) of strokes are ischemic strokes caused by a blood clot in the brain. A revolutionary treatment known as mechanical thrombectomy and/or neuroendovascular therapy is the new standard of care for those suffering from a severe ELVO stroke. These strokes account for the highest percentage of disability and death for those suffering a stroke. However, less than 10% of ischemic stroke patients receive neuroendovascular stroke surgery because stroke systems of care have fallen behind. Life expectancy improves five years for patients who receive neuroendovascular stroke surgery versus those who do not. The minimally invasive nature of neuroendovascular stroke surgery helps stroke patients get back on their feet so they are able to live independently and work again. There are hospitals across the Commonwealth that offer this type of treatment, but not all patients are getting access in an appropriate time frame. Nearly two million brain cells die every minute that a stroke goes untreated. While some patients may

benefit from stroke treatment up to 24 hours from the initial onset of symptoms, studies have shown improved outcomes when stroke patients are taken to the most appropriate treatment center for their condition (Josephson, et al., 2018).

Over the last year, the GAOS campaign, an initiative of the Society of NeuroInterventional Surgery (SNIS), has been actively working with all of the Virginia EMS regional councils to educate them on the importance of improving ELVO stroke care. A few examples of recent success with individual EMS regional councils include work with the Northern Virginia, Peninsulas, and Southwest Virginia EMS Councils.

Northern Virginia EMS Council: The council published stroke triage plan updates for the Northern Virginia area in June 2018. The Stroke Scales Mobile App for EMS professionals is included in the triage plan. “EMS providers are encouraged to use an app such as STROKE EMS, developed by the GAOS Campaign, to assess stroke patients easily and efficiently in the field without memorizing the scales or instructions for each assessment step (Northern Virginia, 2018). In Northern Virginia, EMS is moving toward in-field ELVO assessment/score with the ultimate intent to take stroke patients directly to endovascular centers. Arlington County EMS has been using the Los Angeles (LA) motor score for over two years and bypasses patients with score >4 to the nearest CSC (currently George Washington University Hospital). In addition, Alexandria EMS recently finalized their decision to move forward with using the LA motor score. Prince William and Fairfax counties are considering prehospital ELVO assessment but have not finalized their decisions yet. As a collective Northern Virginia group, they are moving steadily toward consistent prehospital ELVO assessment and bypass to an endovascular center. It is estimated that this will be a consistent practice within 12-18 months.

Peninsulas EMS Council: The Peninsulas EMS (PEMS) Council published stroke triage plan updates for the Hampton Roads area in 2018. This update broadened the timetable for the window of transport for the stroke patient. Specifically, one change of note is that the Stroke Task Force has extended the window for transport of Rapid Arterial Occlusion Evaluation (RACE) positive patients from six to 24 hours. This change affected the "Stroke Field Triage" and the "Stroke/TIA Protocol" (Peninsulas EMS Protocols, 2018). In the Hampton Roads area, there was a recent pilot program conducted by a hospital pertaining to a community EMS-based bypass protocol using RACE to screen for ELVO stroke.

Southwest Virginia EMS Council: A hospital in Southwest Virginia created a pre-recorded online presentation to be used initially for the area's stroke committee. After finalizing and sharing the presentation with the Southwest Virginia EMS Council, GAOS then circulated it to all EMS regional councils and stakeholders. The presentation includes various resources and data that can be used for improving ELVO stroke care. In Western Virginia, these educational efforts led to the development of one hospital center's stroke triage protocol graphic. This triage plan and presentation has been distributed all across the state. GAOS promoted and distributed the protocol graphic to the local EMS centers in Southwest Virginia.

Conclusion

Prior to the enactment of § 32.1-111.15:1, VDH collaborated with VSSTF, VSCC, VHHA, AHA/ASA and hospitals to select and prioritize stroke metrics along the continuum of care. These shared stroke metrics determine the systems and data sources necessary to collect hospital and EMS data. In turn, data collected from these stroke metrics inform the quality improvement initiatives and processes undertaken by the VSCQI Advisory Group.

In order to effectively collect data and implement quality improvement initiatives, hospital and EMS capacity and resources for stroke care are assessed through a hospital capacity survey and EMS capacity survey. Information provided through these surveys provide VDH and the VSCQI Advisory Group with opportunities to support and assist facilities and agencies in need with funding, resources, and coordination to enhance stroke care.

From 2019 and beyond, both the data collected and information reported to the VSCQI Advisory Group will inform quality improvement recommendations to the Virginia General Assembly. The VSCQI Advisory Group continues to meet as a standing body to review data and inform statewide recommendations to improve stroke care across the Commonwealth.

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Appendix A – Code of Virginia, Section 32.1 – 111.15:1

CHAPTER 276

An Act to amend the Code of Virginia by adding in Article 2.1 of Chapter 4 of Title 32.1 a section numbered 32.1-111.15:1, relating to stroke care quality improvement.

[H 1197]

Approved March 9, 2018

Be it enacted by the General Assembly of Virginia:

1. That the Code of Virginia is amended by adding in Article 2.1 of Chapter 4 of Title 32.1 a section numbered 32.1-111.15:1 as follows:

§ 32.1-111.15:1. Department responsible for stroke care quality improvement; sharing of data and information.

A. The Department shall be responsible for stroke care quality improvement initiatives in the Commonwealth. Such initiatives shall include:

1. Implementing systems to collect data and information about stroke care in the Commonwealth in accordance with subsection B;

2. Facilitating information and data sharing and collaboration among hospitals and health care providers to improve the quality of stroke care in the Commonwealth;

3. Requiring the application of evidence-based treatment guidelines for transitioning patients to community-based follow-up care following acute treatment for stroke; and

4. Establishing a process for continuous quality improvement for the delivery of stroke care by the statewide system for stroke response and treatment in accordance with subsection C.

B. The Department shall implement systems to collect data and information related to stroke care (i) that are nationally recognized data set platforms with confidentiality standards approved by the Centers for Medicare and Medicaid Services or consistent with the Get With The Guidelines-Stroke registry platform from hospitals designated as comprehensive stroke centers, primary stroke centers, or acute stroke-ready hospitals and emergency medical services agencies in the Commonwealth and (ii) from every primary stroke center with supplementary levels of stroke care distinction in the Commonwealth. Every hospital designated as a comprehensive stroke center, primary stroke center, or primary stroke center with supplementary levels of stroke care distinction shall report data and information described in clauses (i) and (ii) to the Department. The Department shall take steps to encourage hospitals designated as acute stroke-ready hospitals and emergency medical services agencies to report data and information described in clause (i) to the Department.

C. The Department shall develop a process for continuous quality improvement for the delivery of stroke care provided by the statewide system for stroke response and treatment, which shall include:

1. Collection and analysis of data related to stroke care in the Commonwealth;

2. Identification of potential interventions to improve stroke care in specific geographic areas of the Commonwealth; and

3. Development of recommendations for improvement of stroke care throughout the Commonwealth.

D. The Department shall make information contained in the systems established pursuant to subsection B and data and information collected pursuant to subsection C available to licensed hospitals and the Virginia Stroke Systems Task Force, and, upon request, to emergency medical services agencies, regional emergency medical services councils, the State Emergency Medical Services Advisory Board, and other entities engaged in the delivery of emergency medical services in the Commonwealth to facilitate the evaluation and improvement of stroke care in the Commonwealth.

E. The Department shall report to the Governor and the General Assembly annually on July 1 on stroke care improvement initiatives undertaken in accordance with this section. Such report shall include a summary report of the data collected pursuant to this section.

F. Nothing in this article shall require or authorize the disclosure of confidential information in violation of state or federal law or regulations, including the Health Insurance Portability and Accountability Act, 42 U.S.C. § 1320d et seq.

2. That the provisions of the first enactment of this act shall become effective on January 1, 2019.

3. That the Department of Health shall convene a group of stakeholders, which shall include representatives of (i) hospital systems, including at least one hospital system with at least six or more stroke centers in the Commonwealth, recommended by the Virginia Hospital and Healthcare Association; (ii) the Virginia Stroke Systems Task Force; and (iii) the American Heart Association/American Stroke Association, to advise on the implementation of the provisions of this act.

Appendix B – Stroke Rehabilitation Survey Results and Figures

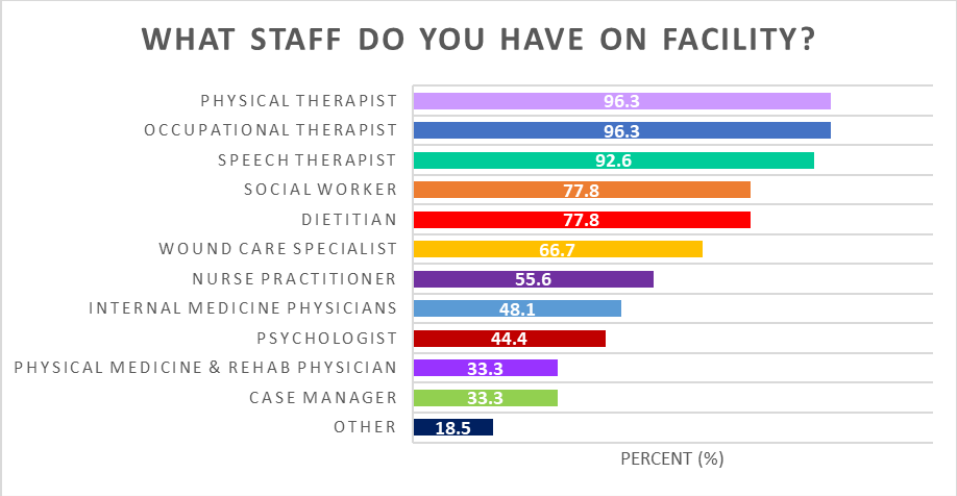

Figure. Staffing structure of rehabilitation facilities.

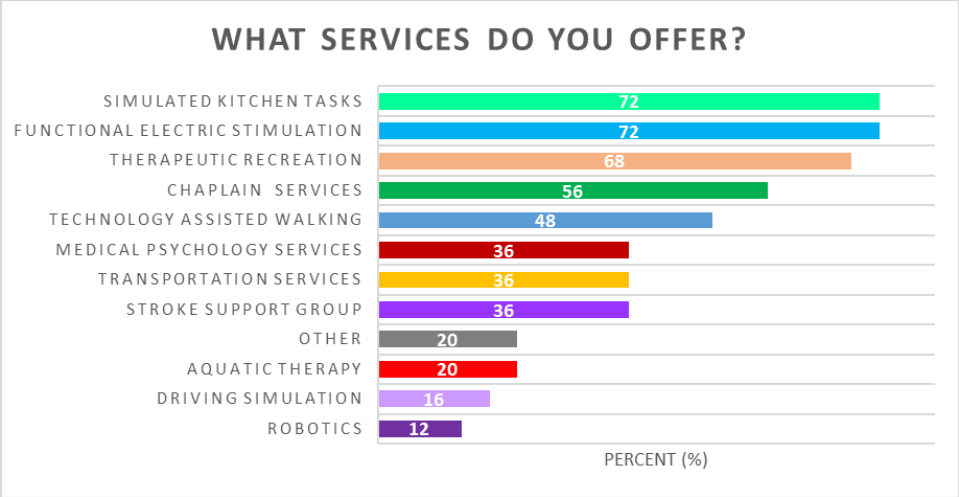

Figure. The types of services offered by rehabilitation facilities.

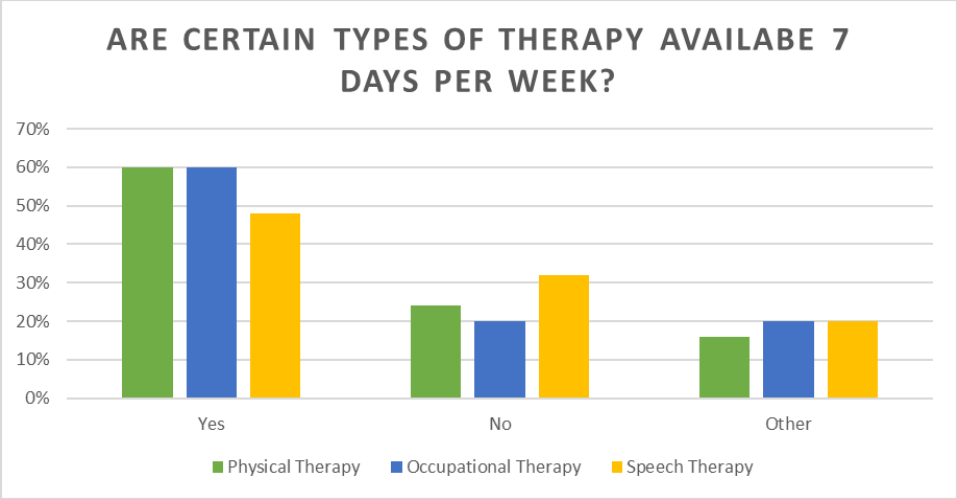

Figure. At 60% of the facilities they offer physical therapy seven days/week. The remaining facilities offer this type of service but less frequently.