



VIRGINIA DEPARTMENT OF HEALTH 2024 HOSPITAL STROKE INVENTORY SURVEY SUMMARY REPORT

August 23, 2024

Please email stroke@vdh.virginia.gov for any questions.

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Executive Summary

Background

In accordance with the Code of Virginia §32.1-111.15:1, the Virginia Department of Health (VDH) collected data and information from hospitals and emergency medical services (EMS) agencies through the stroke inventory survey to facilitate the evaluation and improvement of stroke care in Virginia. The results of the survey will be used to inform quality improvement initiatives, identify interventions in specific geographic areas of the commonwealth, and support appropriate allocation of resources throughout the commonwealth. The survey was first introduced in April 2022.

The 2024 hospital inventory survey collected responses between April 16, 2024 and May 10, 2024. A total of 110 responses, 106 complete and four (4) partial, were obtained from a possible 111 sites resulting in a response rate of 99.1%. Respondents included Virginia hospitals and free-standing emergency departments (FSEDs).

Key Findings

Certification

- Out of the 110 facilities who responded, 64 (58.2%) facilities are currently stroke certified.
- Common barriers of current non-stroke certified facilities becoming stroke certified include having a facility nearby that is certified, lack of CT scanner, and lack of plan to become certified.

Acute Stroke Care

- Over half of facilities (68 of 109, 62.4%) reported they have an average door-to-thrombolytic time of less than 60 minutes, the recommended American Heart Association/American Stroke Association (AHA/ASA) door-to-thrombolytic time.
- Less than one-third of facilities that transfer thrombectomy-eligible patients (29 of 96, 30.2%) reported an average door-in to door-out time of less than 120 minutes, the AHA/ASA recommended door-in to door-out time.

Telemedicine

- Most facilities (87 of 109; 78.8%) responded to receive consultation services from a neurology telemedicine provider; 64 hospitals and 23 FSEDs.
- Half of the facilities (45 of 87; 51.7%) reported to receive performance reports from the telemedicine providers.

Emergency Medical Services Integration

- Of the 108 respondents, 93 (86.1%) reported to accept suspected stroke patients from EMS; 75 hospitals and 18 FSEDs.
- Patient care reports are always included in the patient's medical record, reported by half of the responding facilities (49 of 95, 51.6%).

Stroke Quality and Data Usage

- A majority of responding facilities (89 of 110, 80.9%) reported to have implemented changes to improve stroke care practices and patient care within the past year.

- Of the 89 facilities that reported implementing changes to stroke care, 81 (97.5%) have seen improvements after identifying performance gaps and quality improvement activities.

Transitions of Care

- Only 14 hospitals (20.3%; N=69) reported use of a referral tracking system to support transitions of care post-discharge for all stroke patients.
- Half of responding hospitals (34 of 69, 49.3%) reported they conduct post-discharge follow-up interactions with patients after being discharged home.

Community Resources/Disparities of Care

- Use and distribution of Stroke Smart materials for education differed between format and language. The most common used Stroke Smart material was the English language magnet (61 of 110, 55.4%) and least common was the Spanish language wallet card (41 of 110, 37.2%).
- Half of responding hospitals (46 of 81, 56.8%) monitor disparities among patients impacted by stroke or are at high risk for stroke.

Background

In accordance with the Code of Virginia §32.1-111.15:1, the Virginia Department of Health (VDH) collected data and information from hospitals and EMS agencies through stroke inventory surveys to facilitate the evaluation and improvement of stroke care in Virginia. The results of the survey will be used to inform quality improvement initiatives, identify interventions in specific geographic areas of the state, and support appropriate allocation of resources throughout the state. The survey was introduced in April 2022.

Survey distribution:

On April 16, 2024, an online REDCap survey was distributed to 111 stroke coordinators at Virginia hospitals and free-standing emergency departments (FSEDs) via email. The survey collected responses through May 10, 2024.

Virginia Department of Health 2023 Hospital Stroke Survey Results

RESPONSES

A total of 110 responses were obtained with a total response rate of 99.1% of the possible 111 responding facilities. Of the 110 responses, 83 (75.5%) were submitted by hospitals and 27 (24.5%) were submitted by FSEDs, shown in Figure 1.

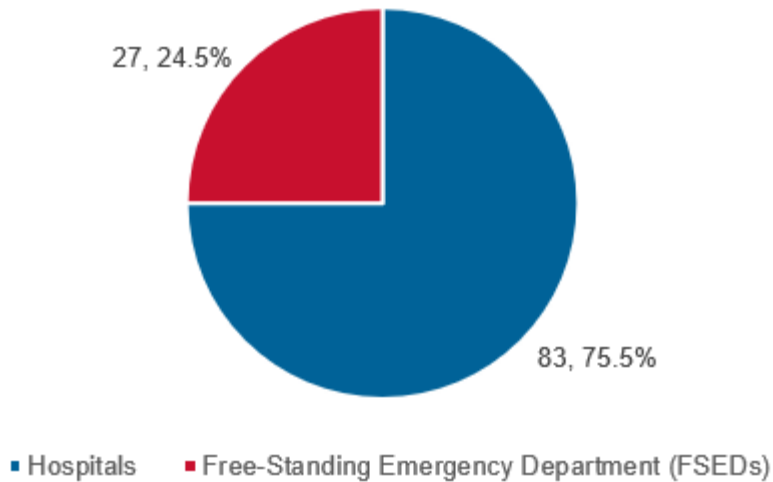


Figure 1. Survey Question: Is your facility a hospital or free-standing emergency department?

Overall, 58.2% of responding facilities (64) are stroke certified. The response rate to the 2024 survey increased by 42% compared to the 2023 survey, from 57% in 2023 to 99.1% in 2024.

CERTIFICATION

All stroke certification levels have been obtained by hospitals operating in Virginia. The stroke certification levels obtained include Acute Stroke Ready, Primary Stroke Centers, Thrombectomy-Capable Stroke Centers, and Comprehensive Stroke Centers. The Virginia hospitals are certified by one of three certifying bodies – The Joint Commission (TJC), Det Norske Veritas (DNV), and Accreditation Commission for Health Care (ACHC). Veteran health centers receive stroke certification through the Veterans Healthcare Association (VHA, not listed in Table 1 below).

Out of the 110 responses, 64 (58.2%) are currently stroke certified. Of those that are stroke certified, 54 are hospitals (65.1%) and 10 (37.0%) are FSEDs. Of the 64 stroke certified facilities, nine (9) are Comprehensive Stroke Centers, four (4) are Thrombectomy-Capable Stroke Centers, 39 are Primary Stroke Centers, and 12 are Acute Stroke Ready Hospitals. Of those not certified for stroke, 29 were hospitals and 17 were FSEDs. Table 1 shows the number of responding facilities by certification level and accrediting bodies.

Certification Level	Accrediting Bodies			
	TJC	DNV	ACHC	Total
Acute Stroke Ready	9	3	0	12
Primary Stroke Center	24	15	0	39
Thrombectomy-Capable Stroke Center	4	0	0	4
Comprehensive Stroke Center	5	3	1	9
<i>Total</i>	<i>42</i>	<i>21</i>	<i>1</i>	<i>64</i>

*Table 1. Number of Facilities by Certification Level and Accrediting Body.
Survey Question: What is your facility's current certification status?*

Facilities that reported not being stroke certified were asked to list the barriers to stroke certification. Common barriers include a certified facility exists nearby, lack of participation in a stroke registry, low volume of cases, and lack of staffing (specifically the roles of a stroke coordinator and stroke medical director).

Of the 46 non-stroke certified facilities, eight (8) facilities (seven hospitals and one FSED) indicated they were planning to pursue stroke certification within the next year. Of the eight planning to pursue stroke certification, two (2) hospitals indicated plans to pursue stroke certification in the 2023 survey and are still working through the stroke certification process.

Care Guideline:

Stroke center certification recognizes a health care facility's commitment to improving stroke outcomes for their patients and their community through adherence to a recognized set of standardized care measures based upon recommended Clinical Practice Guidelines (Centers for Disease Control and Prevention, 2022; Powers, et al., 2019). A 2019 study by Jasne found that stroke certified centers followed evidence-based care guidelines better than non-certified stroke centers. A more recent study by Towfighi, et al. (2023) recognized stroke certification as a needed strategy to reduce inequities in health care delivery for those at highest risk for stroke.

The inclusion of facilities that are not stroke certified allows VDH to capture information on stroke care measure performance that may not routinely collected and/or analyzed by the facility. Participation in an audited stroke registry is a requirement for stroke certification and allows facilities to routinely collect patient data needed to fulfill stroke certification-required program measures and benchmark their data to nationally recognized standards and other facilities in their health system, region, state and/or nationwide (Jasne, et al., 2019).

Recommendations:

- The Virginia Stroke Coordinators Consortium (VSCC) shall provide encouragement and recognition to non-stroke certified facilities who participated in the 2023-2024 Virginia Hospital and Healthcare Association (VHHA) Stroke collaborative to continue their path towards stroke certification.
- The VSCC shall continue to seek representatives at non-stroke certified stroke centers willing to step into the role of stroke champion and to receive mentorship through the VSCC.

- The VSCC shall continue to support and encourage all Virginia hospitals to participate in education sessions through networking opportunities, such as the VSCC, the Virginia Stroke Systems Task Force (VSSTF), and the AHA/ASA.

ACUTE STROKE CARE

Facilities were asked to report on the average of several “door-to” times over the past one year. The sections below report the findings from these questions. A copy of the AHA/ASA suggested time interval goals is included in Appendix C.

Average Door-to-Thrombolytic Times

Of 109 responding facilities, over half (68, 62.4%) reported an average door-to-thrombolytic time of less than 60 minutes, the AHA/ASA recommended door-to-thrombolytic time, with 36 facilities (33.0%) reporting an average time of less than 45 minutes. A small number of facilities (17, 15.6%) reported an average time of greater than 60 minutes, which is above the recommended thrombolytic medication administration time. Additionally, almost one quarter (24, 22.0%) report not tracking this data point. These results are shown in Figure 2.

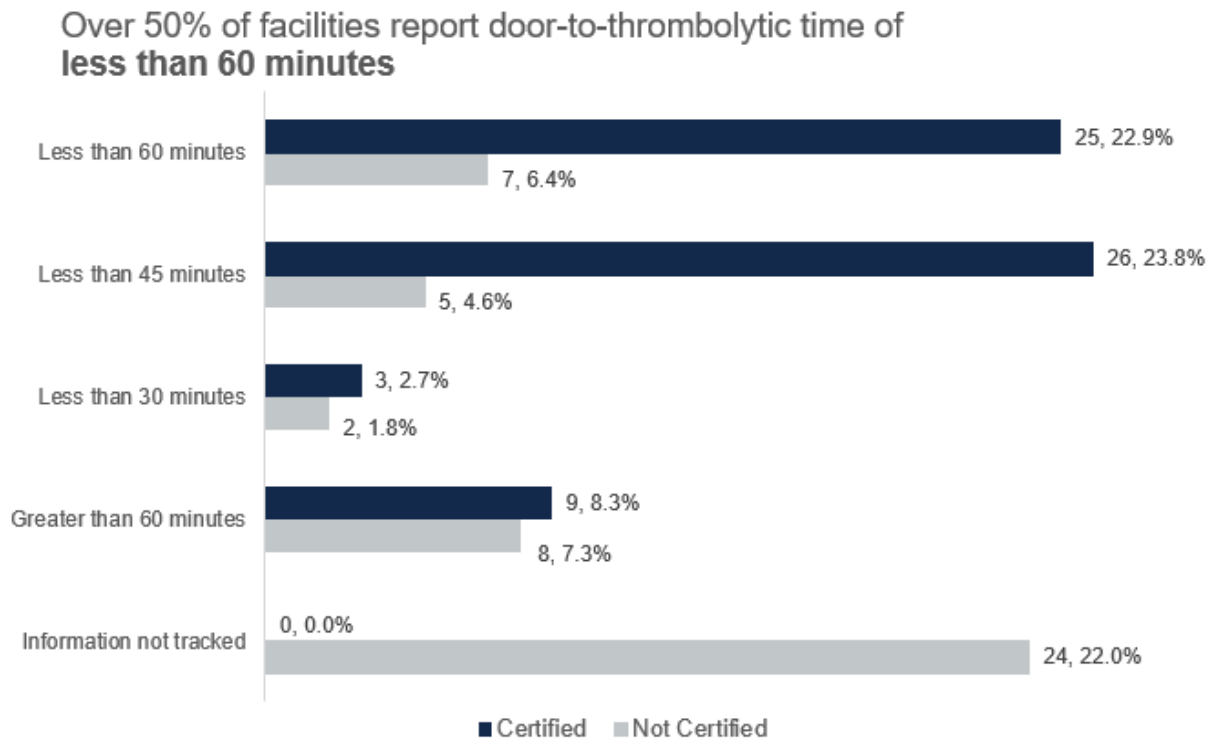


Figure 2. Note: Total number of responses was 109.

Survey Question: In 2023, what was your facility’s average door-to-thrombolytic time for eligible stroke patients?

Average Door-in to Door-out Times by Stroke Patient Type

Less than one-third of facilities that transfer patients (29 of 96, 30.2%) reported an average door-in to door-out time for thrombectomy-eligible patients as less than 120 minutes, the AHA/ASA recommended door-in to door-out time. Facilities reported both thrombolytic and hemorrhagic stroke patient types had more frequently reported average transfer times of greater than 120 minutes (25, 22.9% and 38, 34.8%, respectively; N=109). Figure 3 shows the number

of responses for each stroke patient type by time category, including reports of facilities not tracking this information.

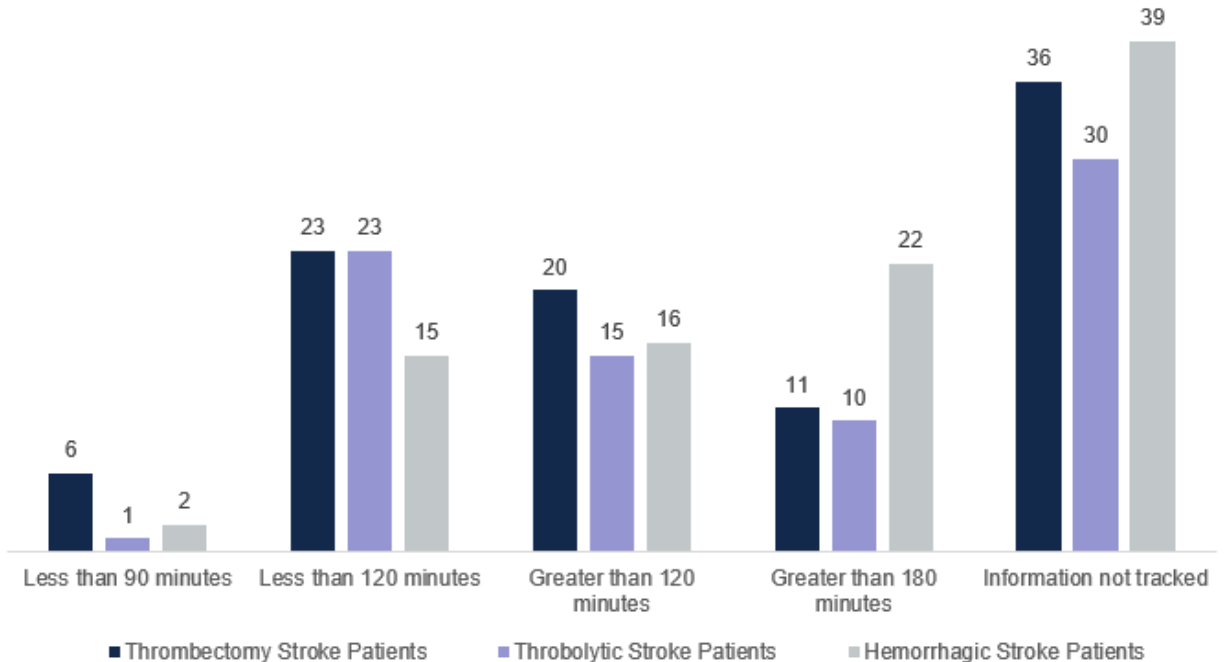


Figure 3. Note: There were 109 responses for each patient type. Hospitals that do not provide treatment for the stroke type listed responded “Information not tracked.”

Survey Question: In 2023, what was your facility’s average door-in to door-out time for (1) thrombectomy stroke patients, (2) thrombolytic stroke patients, and (3) hemorrhagic stroke patients.

Facilities also reported door-in to door-out times for non-urgent stroke patients, with 13 out of 31 facilities (41.9%) reporting an average time of greater than 240 minutes, closely followed by an average time greater than 180 minutes (12, 38.7%).

Other “Door-to” Times

Almost half of responding facilities (52 of 109) reported an average door-to-doctor time of less than 10 minutes (47.7%), 20 facilities (18.3%) reported an average time of 11-15 minutes, and 31 (28.4%) reported to not track this metric.

Less than 50% of facilities report door-to-doctor time of less than 10 minutes

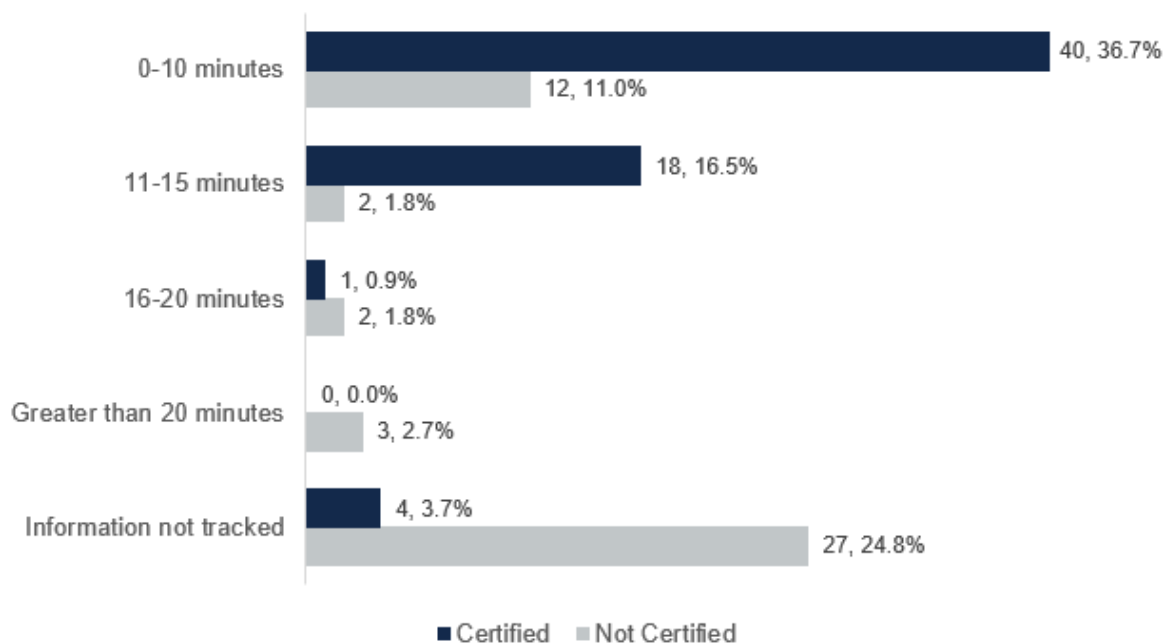


Figure 4. Note: Total number of responses was 109.

Survey Question: What was your facility's average door-to-doctor/provider time in 2023?

Of 109 respondents, over half (58, 53.2%) reported to have an average door-to-CT time of less than 20 minutes. The remaining respondents reported to have an average door-to-CT time of over 20 minutes or are not tracking this metric (24, 22.0% and 27, 24.7% respectively). The percentage of facilities with an average door-to-CT complete time under 25 minutes, the AHA/ASA recommendation, is 38.5% (42 facilities).

Hospital-Specific Questions

The following data were collected from questions that were asked only to the 83 hospital respondents.

Over half of responding hospitals reported to admit ischemic stroke patients (47, 56.6%) more than 75% of the time; of note, 18 (21.7%) of responding hospitals reported not tracking this information. Of responding hospitals that are stroke certified (54, 65.1%), the patient types included in an audited stroke registry varied, as displayed in Table 2.

Patient Type	Included	Not Included
Stroke In-patient	53	1
Stroke Observation	42	12
Stroke Transfer	45	9
TIA In-patient	45	9
TIA Observation	39	15
TIA Transfers	26	28
ICH In-patient	39	15
ICH Transfers	41	13
aSAH In-patient	31	23
aSAH Transfers	37	17

Table 2. Patient types included in audited stroke registry by the 54 responding stroke certified hospitals. Survey Question: Indicate all of the patient types included in your audited stroke registry.

Hospitals that accept transfers (34, 41.0%) were asked about neurological services. Of these hospitals, 15 (44.1%) have neurointerventional/endovascular capabilities with 14 of these hospitals reporting these services are available all day, year-round (93.3%). All hospitals that accept transfers provide feedback to the sending facility.

Most Virginia hospitals that responded to the survey met time-recognized goals for stroke care delivery. However, feedback received from non-stroke certified facilities is that collection of “door-to” time metrics are not routinely performed. This highlights disparities of stroke care among populations served by stroke-certified compared with non-stroke certified facilities in Virginia.

Care Guideline:

Prompt recognition of patients experiencing a stroke is crucial as therapies for stroke are time dependent (Powers, et al., 2019). The establishment of goals based upon certain time expectations, notably time of arrival to care decisions/interventions, has long been part of the acute stroke care process (Centers for Disease Control and Prevention, 2022). *Target: Stroke*, launched in 2010 by the AHA/ASA, led the way in recommending specific “door-to-needle” time parameters for the delivery of thrombolytics (American Heart Association, 2023). *Target: Stroke* Phase II and Phase III further refined specific time parameters surrounding the delivery of thrombolytics and added additional parameters and recommendations for mechanical thrombectomy (American Heart Association, 2019; American Heart Association/American Stroke Association, 2017). A Phase III *Target: Stroke* document provided updated recommended time parameters regarding most of the “door-to” times (American Heart Association, 2019). Additional time parameters and recommendations have been established for when a patient transfers to another hospital of higher certification level. The recommended goals range from less than 120

minutes to less than 90 minutes for less than or equal to 50% all patient transfers (American Heart Association, n.d.).

Recommendations:

- The VDH Stroke team shall provide encouragement and support to non-stroke certified facilities in gathering stroke data at even the most rudimentary levels, including participation in the AHA’s GWTG®-Stroke Rural Initiative or the future Virginia Stroke Registry.
- VSCC leadership and hospital representatives shall provide mentorship opportunities to new stroke coordinators and newly identified stroke representatives.

TELEMEDICINE

Eighty-seven (87 of 109, 79.8%) facilities responded receiving consultation services from a neurology telemedicine provider; 64 hospitals and 23 FSEDs. The majority of facilities (34, 39.1%) report having an internal system or on-call staff for telemedicine. The most reported external provider was Adjacent Health (16, 18.4%), followed by University of Virginia (9, 10.3%) and Sentara (6, 6.9%). Other telemedicine providers included Eagle, Duke, Medstar, Sevaro, SOC, Telespecialists, Patronus, Access, and Teledoc. Half of the facilities, (45, 51.7%), reported receiving feedback from their telemedicine vendor.

Fifty (50 of 110, 45.5%) facilities reported their average contact times to teleneurology on camera. Over half of responding facilities (26, 52.0%) report to have a teleneurology provider on camera on average in under 10 minutes; 14 facilities (28.0%) reported to have a provider on camera between 11-15 minutes on average; and six (6; 12.0%) reported not tracking this metric. All times to contact teleneurology on camera are shown in Figure 5.

Over half of facilities reported an average contact time to teleneurology on camera of 0 - 10 minutes

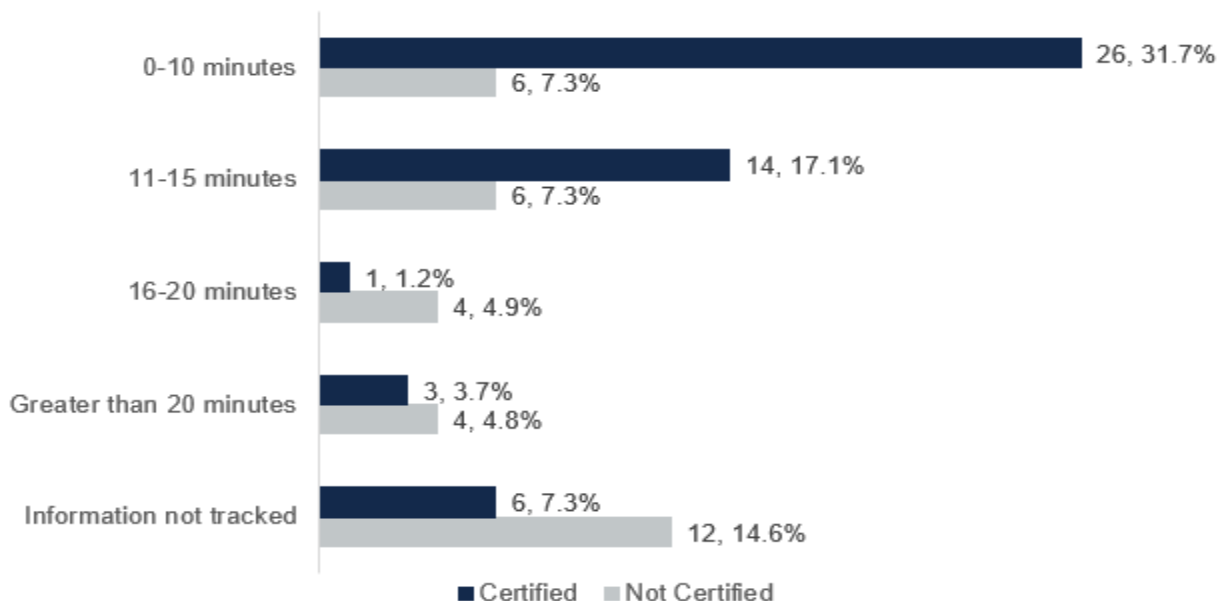


Figure 5. Note: Total number of responses was 50.

Survey Question: How long (on average) did it take to get a teleneurology provider on camera in 2023?

Care Guideline:

Use of video teleneurology services to evaluate and assess acute stroke patients has been identified as a best practice for those facilities who lack the ability to have on-site neurology providers. Using video teleneurology services has been recognized as “feasible and safe” (Powers, et al., 2019). The 2023 paper *Ideal Foundations Requirements for Stroke Program Development and Growth* recognizes the role of telesneurology in diagnosis, treatment, and ongoing patient management in ensuring the highest level of recommended evidence-based care is provided to those suffering from an acute neurologic event (Dusenbury, et al., 2023). Utilization of a telemedicine provider in the stroke patient transfer process has been recognized as a door-in-door-out best practice strategy (American Heart Association, n.d.). Additionally, utilization of a teleneurology service has increased the ability of smaller community hospitals to better determine which patients are acceptable to keep in their facility versus transferring to another facility for care (Schwamm, 2023). Acute stroke care via telehealth delivery has also been recognized as a strategy to reduce stroke healthcare inequities (Towfighi, et al., 2023).

In 2024, the VSSTF Teleneurology Workgroup researched and wrote recommendations for teleneurology care. This document was presented at the July 2024 VSSTF meeting and subsequently received approval by VSSTF voting members (Appendix D). The Teleneurology Workgroup recommendations fit into two groups: 1) Best Practices for Teleneurology/Telestroke Programs and 2) Common Metrics to Report. One of the key best practices recommended by the workgroup is a process for metric data sharing between the facility and telemedicine vendor. According to the report, the facility and telemedicine vendor should agree upon and establish a process for data sharing.

Recommendations:

- VSCC leadership shall explore additional barriers for facilities to receive feedback from paid services, such as a teleneurology provider.
- VSSTF leadership shall disseminate the VSSTF Teleneurology Workgroup Recommendations to the stroke representatives at Virginia hospitals and FSEDs to allow evaluation of current teleneurology services and/or consideration of future improvements in teleneurology services.

EMERGENCY MEDICAL SERVICES (EMS) INTEGRATION

Of 108 respondents, 93 (88.5%) accept suspected stroke patients from EMS; 75 hospitals and 18 FSEDs. Out of those 93, over half (53, 57.0%) report that pre-notification from incoming EMS providers leads to policy activation over 75% of the time.

Over one-third of responding facilities report EMS personnel taking patients directly to the CT scanner over 75% of the time (32, 34.4%) while under one-third indicate EMS personnel never taking patients directly to the CT scanner (29, 31.2%), as depicted in Figure 6. Reported barriers for EMS personnel taking patients directly to the CT scanner include: not part of the facility’s protocol, the preference of emergency department (ED) physicians to not utilize EMS Direct to CT protocols, location of the CT scanner, and needing patient weight prior to CT imaging.

One-third of responding facilities report suspected stroke patients **directly** to the CT scanner **more than 75%** of the time by EMS personnel.

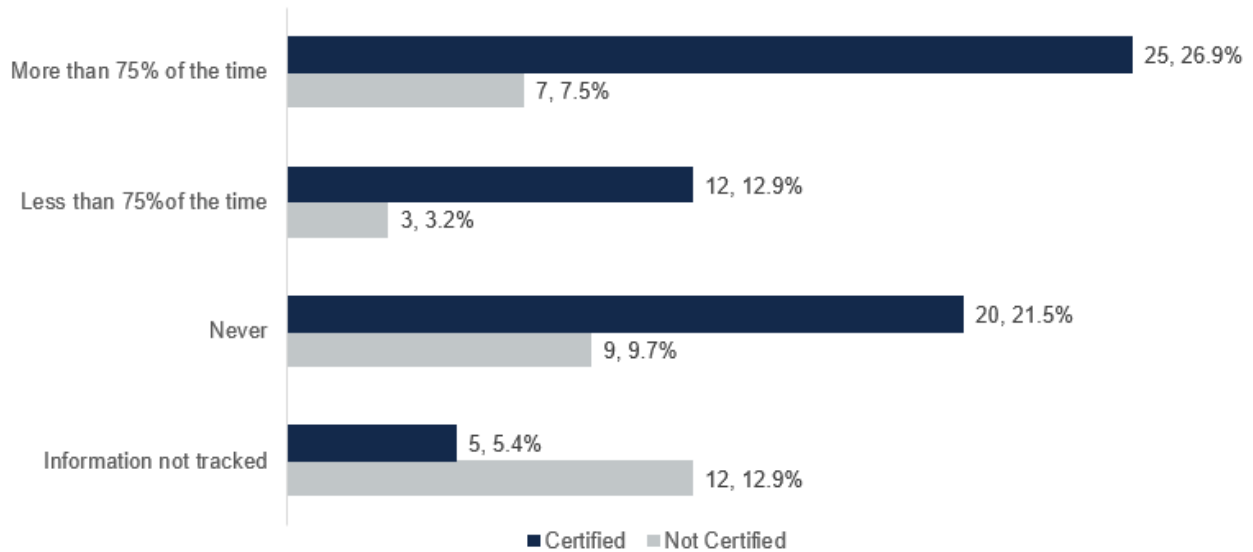


Figure 6. Note: There were 93 responses.

Survey Question: How often does EMS personnel take suspected stroke patients directly to the CT scanner?

Half of the responding facilities (49, 52.7%) always include EMS patient care reports (PCRs) into the patient’s medical record, shown in Figure 7. Barriers to including EMS PCRs into the medical record include: not having a process for integration, scanning records, and the accessibility of records.

Half of responding facilities report **always** including EMS PCRs into patient medical records.

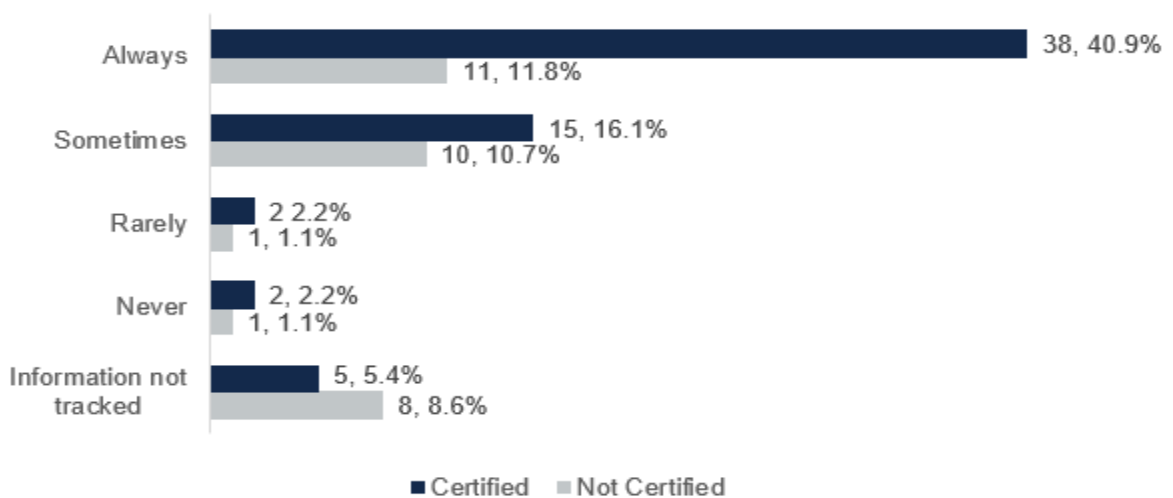


Figure 7. Note: There were 93 responses.

Survey Question: How often does your facility integrate EMS patient care reports into the patient health medical record?

Most facilities (93) provide multiple metrics as feedback to EMS agencies. The most common type of feedback provided to EMS agencies is patient outcome and door-to-needle time (58, 62.3% of responding facilities for both metrics), closely followed by an opportunity for improvement/after action summary (53, 57.0%).

Care Guideline:

EMS providers transferring patients directly to the CT scanner and bypassing hospital beds is a recommended best practice strategy from *Target: Stroke Phase II 12 Key Best Practice Strategies* (American Heart Association/American Stroke Association, 2017). The need to obtain patient weight was listed as one of the barriers of EMS taking suspected stroke patients directly to CT. There are multiple established methods of obtaining patient weight, such as a ground-level scale, weighted stretchers, weighted CT tables, or a rapid transfer of patient to weighted ED bed following imaging (Ragoschke-Schumm, et al., 2017). Moreover, a 2021 study by Cheng, et al. demonstrated that estimated weight calculations for intravenous (IV) alteplase did not produce significant negative patient outcomes.

Regarding integration of EMS patient care reports into the hospital electronic medical record, Short and Goldstein (2022) recommend utilizing these reports as a written record of the initial patient assessment and as a guide to inform in-patient care.

Recommendations:

- VSCC leadership shall utilize the VSCC quarterly meetings and the VSCC Stroke Coffee Hour to provide examples of hospital acute stroke protocols that incorporate EMS providers taking suspected stroke patients directly to CT and weight obtainment methods to optimize acute stroke care delivery.
- The VSCC shall further explore barriers preventing EMS providers taking suspected stroke patients directly to CT to determine methods to improve acute stroke patient care delivery.
- The VSCC shall explore methods to improve communication between hospitals and EMS providers to ensure clear alerting of incoming suspected stroke patients.
- The VSCC shall continue to encourage facilities to integrate EMS patient care reports into the patient's electronic medical record.

STROKE QUALITY AND DATA USAGE

Facilities were asked whether they implemented changes to improve stroke care practices and patient care over the past year. Virginia hospitals continue to report improvements in stroke care through stroke quality tracking, measurement, benchmarking, and process improvement measures.

Eighty-nine (89, 80.9%) facilities reported at least one change in one of the following topic areas: EMS, stroke/ED process, door-to-times, documentation, system/community, and technology. Some common responses of the changes made include receiving regular stroke pre-arrival alerts from EMS, implementing in-patient stroke alerts, development of standard order sets and policies, improved documentation changes for dysphasia and neurochecks, and implementation of an AI (artificial intelligence) platform for reading images.

For each topic area where changes were made to stroke care practices and patient care, facilities also reported on the impact of changes made – positive, negative, or unknown/unsure.

Of the facilities that reported implementing changes, 81 (97.5%) shared seeing a positive impact from the change. Overall, changes to improve stroke care practices and patient care were favorable with positive impact of 73.1% across all topic areas. Of the six areas for improvement, documentation changes were reported to have positive impact (81.8%), followed by door-to time improvements (78.7%). The most frequent comments for areas of improvement focused on staff education and guideline changes.

Care Guideline:

The 2019 Stroke Guidelines (Powers, et al.) recommend tracking and evaluating stroke performance and quality measures, as well as adopting protocols based upon clinical practice guidelines as best practices to reduce door-in-door-out times (American Heart Association, n.d.). These best practices have been shown to reduce inequities in stroke patient care (Towfighi, et al., 2023). The 2023 *Ideal Foundational Requirements for Stroke Program Development and Growth* calls quality improvement “essential to stroke program development and evolution” (Dusenbury, et al., 2023, p. e8).

Recommendations:

- The VDH Stroke Team shall utilize data captured from the future Virginia Stroke Registry to allow evaluation of acute care hospital performance measures and disseminate to facilities through monthly or quarterly meetings with stroke representatives.
- The VSCC shall continue to coordinate with facilities who have successfully implemented process improvement changes to encourage sharing and mentoring through the VSCC Stroke Coffee Hour, the VSCC quarterly meetings, and VSSTF quarterly meetings.
- The VSCC shall utilize the VSCC Stroke Coffee Hour, VSSC quarterly meetings, and VSSTF quarterly meetings to highlight successful acute stroke performance improvement projects and provide those projects as resources to hospitals and FSEDs in Virginia.

TRANSITIONS OF CARE

Referral tracking systems provide hospitals, clinics, and other healthcare providers a way to connect with social care providers (i.e., food banks, housing, transportation coordinators) to assist patients in need of support to continue treatment, receive follow-up care, or to maintain a healthy lifestyle. Of 69 responding hospitals, 14 (20.3%) report using a referral tracking system to support transitions of care for stroke patients following discharge from the hospital.

Having future appointments scheduled before discharge is important for patients to receive continued care after a stroke event. Over two-thirds of responding hospitals (48, 69.6%) ensure stroke patients have an appointment with a primary care provider at time of discharge, while over half (40, 58.0%) ensure an appointment with a neurologist at time of discharge.

Responses to post-discharge follow-up performance by hospitals are split between hospitals that conduct follow-up (34, 49.3%) and those that do not (35, 50.7%). Of the hospitals that report post-discharge follow-up, nine hospitals (26.5%) report successful contact over half the time while 14 hospitals (41.2%) report successful contact 25-50% of the time. Hospitals were also asked to report how often the caregiver is assessed for their perceived level of preparation at time of patient discharge. Of 34 responding hospitals, most all report completing this assessment always (14, 41%) or sometimes (17, 50%); only three (8.8%) report rarely completing this assessment.

Care Guideline:

Care coordination is essential to ensure adequate medical follow-up and post-hospital rehabilitation of stroke patients at time of discharge (Dusenbury, et al., 2023). The 2023 *Diagnosis, Workup, Risk Reduction of Transient Ischemic Attack in the Emergency Department Setting* research article recognizes the role of primary care providers in the on-going and long-term management of stroke patients (Amin, et al., 2023), while the 2021 *Guideline for the Prevention of Stroke in Patients with Stroke and Transient Ischemic Attack* recognizes the role of shared decision making between patients and care providers (Kleindorfer, et al., 2021). Access to an early primary care follow up appointment has been shown to reduce re-admission rates post-stroke (Towfighi, et al., 2023).

Recommendations:

- The Virginia Stroke Care Quality Improvement (VSCQI) Advisory Group shall explore re-admission rates for hospitals to determine best practice efforts for hospitals who with lower stroke re-admission rates.
- The VDH Stroke Team shall utilize the future Virginia Stroke Registry to capture percentage of patients who have post-discharge appointments scheduled prior to hospital discharge.
- The VDH Stroke Team and VHHA shall utilize existing community health workers (CHWs) and/or stroke navigators at facilities to determine best practices for patient referrals, lowering patient re-admissions, and transitions in patient care.

COMMUNITY EDUCATION/DISPARITIES OF CARE

Responding facilities (N=110) were asked to report on community education, focusing on materials to increase knowledge on the signs of a stroke and ways to reduce the risk of a stroke. The most reported education tools used are the Stroke Smart magnets in the English language (61, 55.5%) and the stroke fact sheets (60, 54.5%). The Spanish version of Stroke Smart magnets was reported to be used by almost half of respondents (47, 42.7%). Stroke Smart wallet cards were reported to be used by almost half of responding facilities with 54 (49.1%) using the English version and 41 (37.2%) using the Spanish version. Common education for addressing stroke risk factors were blood pressure management (44, 40.0%) and smoking cessation through the Quit Now phone line (15, 13.6%).

Hospitals (N=83) were asked to report on processes to identify high-risk patients and monitoring patients for disparities of care. Overall, hospitals most frequently reported to review patient information within the electronic health record (EHR) to identify high-risk patients (62, 74.7%) followed by conducting screening events (45, 54.2%). Over half of responding hospitals indicated to monitor for disparities of care (46, 56.8%) and one-third were uncertain if disparities of care were monitored (26, 32.1%). Community health workers (CHWs) can be used to address social service needs of patients. Of the responding hospitals, almost half were not sure if their facility used CHWs (37, 45.7%), while 22 (27.2%) do use CHWs and 22 (27.2%) do not.

Care Guideline:

Identifying patients at highest risk for a stroke and assisting those who have already had a stroke is imperative in addressing social inequalities in care. The 2023 *Strategies to Reduce Racial and Ethnic Inequities in Stroke Preparedness, Care, Recovery and Risk Factor Control* (Towfighi, et al.) article provides a model for addressing stroke patient inequities through the continuum of stroke care. Towfighi, et al. (2023) emphasizes how the utilization of an

interdisciplinary approach is imperative and the importance of EMS providers, telehealth providers, community education, stroke-center certification, and patient rehabilitation only highlights the need for collaboration along the continuum of stroke care.

Recommendations:

- The VDH Cardiovascular Health Team shall encourage engagement of community partners and local hospitals in areas defined as being at high risk of stroke and cardiovascular events by the Virginia Department of Health, including the Virginia Heart Disease and Stroke Learning Collaborative meetings or other community engagement opportunities.
- The VDH Cardiovascular Health Team shall provide data to CHWs regarding their efforts to improve stroke patient outcomes.

Appendices

Appendix A: Copy of Survey Questionnaire

Virginia Coverdell Hospital Survey 2024

The Virginia Department of Health (VDH) is requesting your assistance with completing the 2024 VDH Hospital Stroke Inventory Survey, a survey about your facility's stroke program.

Please submit one survey for each facility and/or free standing emergency department you oversee. This survey is to be completed in one sitting, as there is no 'Save Now & Return Later' option.

The information provided in this survey is confidential and will only be reported as aggregated results, without identifying your individual facility. Questions about this survey can be directed to the stroke team at stroke@vdh.virginia.gov.

Facility Information

Name of facility

- Augusta Health Hospital
- Ballard Health Dickenson Community Hospital
- Ballard Health Johnston Memorial Hospital
- Ballard Health Lee County Community Hospital
- Ballard Health Lonesome Pine Hospital
- Ballard Health Norton Community Hospital
- Ballard Health Russell County Medical Center
- Ballard Health Smyth County Community Hospital
- Bath Community Hospital
- Bon Secours Emergency Center - Chester
- Bon Secours Emergency Center - Colonial Heights
- Bon Secours Emergency Center - Harbour View
- Bon Secours Emergency Center - Short Pump
- Bon Secours Emergency Center - Westchester
- Bon Secours Mary Immaculate Hospital
- Bon Secours Maryview Medical Center
- Bon Secours Memorial Regional Medical Center
- Bon Secours Rappahannock General Hospital
- Bon Secours Richmond Community Hospital
- Bon Secours Southampton Memorial Hospital
- Bon Secours Southern Virginia Regional Medical Center
- Bon Secours Southside Regional Medical Center
- Bon Secours St. Francis Medical Center
- Bon Secours St. Marys Hospital
- Buchanan General Hospital
- Carilion Franklin Memorial Hospital
- Carilion Giles Memorial Hospital
- Carilion New River Valley Medical Center
- Carilion Roanoke Memorial Hospital
- Carilion Rockbridge Community Hospital
- Carilion Tazewell Hospital
- Centra Bedford Memorial Hospital
- Centra Emergency Center - Gretna
- Centra Lynchburg General Hospital
- Centra Southside Community Hospital
- Chesapeake General Hospital
- Clinch Valley Medical Center
- Fauquier Hospital
- HCA Alleghany Regional Hospital
- HCA CJW Medical Center - Chippenham
- HCA CJW Medical Center - Johnston Willis
- HCA Emergency Center - Cave Spring

- HCA Emergency Center - Fredericksburg
- HCA Emergency Center - Hanover
- HCA Emergency Center - Prince William (formerly Tricities)
- HCA Emergency Center - Swift Creek
- HCA Emergency Center - Tysons
- HCA Henrico Doctors Hospital - Forest
- HCA Henrico Doctors Hospital - Parham
- HCA Henrico Doctors Hospital - Retreat
- HCA Tricities (formerly John Randolph Medical Center)
- HCA LewisGale Blue Hills ER
- HCA LewisGale Medical Center
- HCA Montgomery Regional Hospital
- HCA Pulaski Community Hospital
- HCA Reston Hospital Center
- HCA Spotsylvania Regional Hospital
- HCA StoneSprings Hospital Center
- Hunter Holmes McGuire Hospital
- Inova Alexandria Hospital
- Inova Emergency Center - Ashburn
- Inova Emergency Center - Fairfax
- Inova Emergency Center - Franconia-Springfield
- Inova Emergency Center - Leesburg
- Inova Emergency Center - Lorton
- Inova Emergency Center - Reston
- Inova Fair Oaks Hospital
- Inova Fairfax Hospital
- Inova Loudoun Hospital
- Inova Mount Vernon Hospital
- Mary Washington Emergency Center - Lee's Hill
- Mary Washington Emergency Center - Harrison Crossing
- Mary Washington Hospital
- Mary Washington Stafford Hospital
- Riverside Doctors' Hospital of Williamsburg
- Riverside Regional Medical Center
- Riverside Shore Memorial Hospital
- Riverside Walter Reed Hospital
- Sentara Care Plex Hospital
- Sentara Emergency Center - Belle Harbour
- Sentara Emergency Center - Independence
- Sentara Emergency Center - Lake Ridge
- Sentara Emergency Center - Martha Jefferson
- Sentara Emergency Center - Port Warwick
- Sentara Halifax Regional Hospital
- Sentara Leigh Hospital
- Sentara Martha Jefferson Hospital
- Sentara Norfolk General Hospital
- Sentara Northern Virginia Medical Center
- Sentara Obici Hospital
- Sentara Princess Anne Hospital
- Sentara RMH Medical Center (Rockingham Memorial)
- Sentara Virginia Beach General Hospital
- Sentara Williamsburg Regional Medical Center
- Sovah Health Danville Regional Medical Center
- Sovah Health Memorial Hospital of Martinsville
- Twin County Regional Hospital
- UVA Culpeper Regional Hospital
- UVA Haymarket Medical Center
- UVA Hospital
- UVA Prince William Medical Center
- Valley Health Page Memorial Hospital
- Valley Health Shenandoah Memorial Hospital
- Valley Health Warren Memorial Hospital
- Valley Health Winchester Medical Center

- VCU Community Memorial Hospital
 - VCU Emergency Center - New Kent
 - VCU Medical Center
 - VCU Tappahannock Hospital
 - Virginia Hospital Center
 - Wythe County Community Hospital
- (If your facility name is not listed, a response your facility may have already been submitted. Please contact stroke@vdh.virginia.gov with any questions.)

Name of respondent _____

Respondent's email address _____

Respondent's role title _____

Is your facility a Hospital or Free-Standing Emergency Department? Hospital Free-Standing Emergency Department

What is your facility's current certification status? TJC CSC TJC TSC TJC PSC TJC ASR DNV CSC DNV PSC+ DNV PSC DNV ASR ACHC CSC

You indicated that your facility is not a certified stroke center. Is your facility planning to pursue stroke certification in the next year? Yes No

What barriers are preventing your facility from seeking certification? Please check all the barrier(s) that apply. Do not have neurology or teleneurology Lack of Stroke Coordinator Lack of Stroke Medical Director Do not participate in a certified stroke registry Lack administrative support Certified facility exists nearby Cost of certification Lack of demand/low volume of cases Other (please briefly describe)

What are the other barriers for your facility to pursue stroke certification? _____

Over the past year, has your facility participated in a clinical trial or research? Yes No

Acute Stroke Care

Does your facility receive any stroke patients from other facilities?	<input type="radio"/> Yes <input type="radio"/> No
Do you provide feedback to the sending facility regarding the outcome of the patient that they sent?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> We do not track that information
In 2023, what was your facility's average door-to-thrombolytic time for eligible stroke patients?	<input type="radio"/> Less than 30 minutes <input type="radio"/> Less than 45 minutes <input type="radio"/> Less than 60 minutes <input type="radio"/> Greater than 60 minutes <input type="radio"/> We do not track this information
In 2023, what was your facility's average door-in to door-out time for thrombectomy stroke patients?	<input type="radio"/> Less than 90 minutes <input type="radio"/> Less than 120 minutes <input type="radio"/> Greater than 120 minutes <input type="radio"/> Greater than 180 minutes <input type="radio"/> My facility does not transfer thrombectomy patients <input type="radio"/> My facility does not track this information
In 2023, what was your facility's average door-in to door-out time for thrombolytic stroke patients?	<input type="radio"/> Less than 90 minutes <input type="radio"/> Less than 120 minutes <input type="radio"/> Greater than 120 minutes <input type="radio"/> Greater than 180 minutes <input type="radio"/> My facility does not transfer thrombolytic patients <input type="radio"/> My facility does not track this information
In 2023, what was your facility's average door-in to door-out time for hemorrhagic stroke patients?	<input type="radio"/> Less than 90 minutes <input type="radio"/> Less than 120 minutes <input type="radio"/> Greater than 120 minutes <input type="radio"/> Greater than 180 minutes <input type="radio"/> My facility does not transfer hemorrhagic stroke patients <input type="radio"/> My facility does not track this information
What was your facility's average door-in to door-out time for non-urgent stroke patients in 2023?	<input type="radio"/> Less than 120 minutes <input type="radio"/> Less than 180 minutes <input type="radio"/> Greater than 180 minutes <input type="radio"/> Greater than 240 minutes <input type="radio"/> My facility does not transfer non-urgent stroke patients <input type="radio"/> My facility does not track this information
What was your facility's average door to doctor/advanced medical provider time in 2023?	<input type="radio"/> 0-10 minutes <input type="radio"/> 11-15 minutes <input type="radio"/> 16-20 minutes <input type="radio"/> Greater than 20 minutes <input type="radio"/> My facility does not track this information
What was your facility's average door to CT time in 2023?	<input type="radio"/> Less than 20 minutes <input type="radio"/> Greater than 20 minutes <input type="radio"/> My facility does not track this information
What was your facility's average door to CT complete time in 2023?	<input type="radio"/> Less than 25 minutes <input type="radio"/> Greater than 25 minutes <input type="radio"/> My facility does not track this information

How often does your facility admit your ischemic stroke patients?

- More than 75% of the time
 Less than 75% of the time
 Never My facility does not track this information
-

Indicate all of the patient types included in your audited stroke registry:

- Stroke In-patient
 Stroke Observation
 Stroke Transfers
 TIA In-patient
 TIA Observation
 TIA Transfers
 ICH In-patient
 ICH Transfers
 aSAH In-patient
 aSAH Transfers
-

Does your free standing ED track any of the following on a log? Check all that apply.

- CVA
 TIA
 ICH
 aSHA
 We do not have a log or system for tracking these patients
-

Does your facility have stroke neurointerventional/endovascular capabilities?

- Yes
 No
-

If your facility has neurointerventional/endovascular capabilities, does the facility offer the service 24/7/365 (all day, every day)?

- Yes - capabilities are available at all times
 No - capabilities are NOT available at all times
-

What are your facility's neurointerventional/endovascular capabilities if they are NOT offered 24/7/365 (all day, every day)?

Does your facility have neurosurgical services on staff?

- Yes - 24/7/365
 Yes - but not 24/7/365
 No
-

What are your facility's neurosurgical capabilities if they are NOT offered 24/7/356 (all day, everyday)?

Which of the following methods does your facility use to see in-house stroke patients?

- In-Person Neurology providers
 Teleneurologists
 Both In-Person and Teleneurologists
 None of the above

Telemedicine

Does your facility receive acute stroke consultation services from a neurology telemedicine provider? Yes No

Who is your facility's telemedicine vendor? Adjacent Health Duke Eagle Medical Internal system or on-call staff for teleneurology Medstar Patronus Sevaro SOC Telespecialists UVA Vendor is not listed

Please enter the name of your facility's teleneurology provider/system: _____

What mode is used to conduct telemedicine consultations? Telephone Videoconference Both telephone and videoconference

How long (on average) did it take to get a teleneurology provider on camera in 2023? 0-10 minutes 11-15 minutes 16-20 minutes Greater than 20 minutes Unsure as my facility does not track this information

Does your facility receive performance reports from your teleneurology vendor? Yes No

Emergency Medical Services (EMS) Integration

Does your facility accept suspected stroke patients from EMS? Yes No

How often does pre-notification lead to activation of written stroke care protocols? (e.g. notification to pharmacy, clearing of CT scanner) More than 75% of the time Less than 75% of the time Never My facility does not track this information

How often does EMS personnel take suspected stroke patients directly to the CT scanner? More than 75% of the time Less than 75% of the time Never My facility does not track this information

What barrier(s) prevent your facility from having EMS take suspected stroke patients directly to the CT scanner? Check all that apply. Lack of pre-alert Location of CT scanner It is not the protocol for EMS to take suspected stroke patients directly to CT Preference of ED physicians Direct to CT by EMS delayed care because weight was needed for administering thrombolytics Other barrier(s) not listed (please enter below)

Please describe the other barrier(s) for EMS to take a suspected stroke patient directly to the CT scanner. _____

How often does your facility integrate EMS patient care reports into the patient health medical record?

- Always
- Sometimes
- Rarely
- Never
- Our facility does not track this information

Please check the barrier(s) preventing your facility from integrating EMS PCRs into the patient's medical record:

- Access to records
- Scanning records in
- Lack of process for integration
- Other reason not listed (please describe below)

Please describe the other barrier(s) preventing your facility from integrating EMS PCRs into the patient's medical record.

What feedback does your facility provide to EMS agencies? (Select all that apply)

- Patient diagnosis
- Patient outcome
- Emergency Department disposition
- Door to Needle time
- Other Door to Time(s)
- Imaging Results
- Opportunities for Improvement / After Action Summary
- Other

Please specify 'Other' feedback to EMS agencies:

Transitions of Care

Does your facility use a referral tracking system to support transitions of care for stroke patients post-discharge? (An example of a referral tracking system is Unite Us.)

- Yes
- No

For which of the following specific population(s) of patients do you use referral tracking systems?

- All stroke patients
- Intracerebral/subarachnoid hemorrhage patients
- Thrombolytic/Thrombectomy patients
- Our facility does not track this level of information

At time of discharge, does your patient care team ensure stroke patients have a scheduled primary care appointment?

- Yes
 - No
- (A patient care team may include a case manager, social worker, stroke coordinator, unit manager, or other similar staff.)

At time of discharge, does your patient care team ensure patients have a scheduled neurologist appointment?

- Yes
- No

Does your facility conduct post-discharge follow-up on patients discharged to home?

- Yes
- No

In the past one year, what percentage of stroke patients were you able to contact after facility discharge?

- 0-25%
- 26-50%
- Greater than 50%

Do you refer and/or connect patients to community resources?

- Always
- Sometimes
- Rarely
- Never

Do you assess the perceived level of preparation of the caregiver's ability to cope with the physical and emotional needs of the patient?

- Always
- Sometimes
- Rarely
- Never

Stroke Quality and Data Usage

In this section, each group is an area where changes may have been implemented at your facility to improve stroke care practices and patient care. Please reflect on the past year when responding.

What changes were made at your facility to improve stroke care practices and patient care related to EMS in the past year?

- Direct to CT
- Pre-alert Process for all strokes
- Pre-alert process for LVO positive strokes
- Increased Outreach/Meetings with EMS
- Improved/Implemented Education to EMS providers
- Improved/Implemented Feedback Process to EMS providers
- No changes made
- Change made with EMS, but option is not listed (please describe below)

Please provide information on the other changes made by your facility for improving stroke outcomes in relation to EMS.

Has your facility seen an improvement in care based upon identified performance gaps and quality improvement activities related to EMS in the past year?

- Yes
- No
- Unsure or don't know yet

What changes were made at your facility to improve stroke care practices and patient care related to Stroke Process/ED Process in the past year?

- Pre-Alert for suspected LVO patients based upon Screen by EMS
- Alert for suspected LVO patients based upon LVO screen in triage
- Direct to CT process
- Changed imaging based upon LVO screening (i.e. CTA/CTP)
- Improved Inpatient Stroke Alerts
- Change from Alteplase to Tenecteplase
- Providing Thrombolytics in CT scanner
- Improved care of Intracerebral Hemorrhage patients
- Expanded Window past 4.5 hours for thrombolytic patients
- No changes made
- Changes made for Stroke Process/ED Process, but option is not listed (please describe below)

Please provide information on the other changes made by your facility for improving stroke outcomes in relation to Stroke Process/ED Process.

Has your facility seen an improvement in care based upon identified performance gaps and quality improvement activities related to Stroke Process/ED Process in the past year?

- Yes
- No
- Unsure or don't know yet

What changes were made at your facility to improve stroke care practices and patient care related to Door to Times in the past year?

- Physician/Advanced Practice Provider
- Labs
- CT Scanner
- Images Completed
- Images Read
- Teleneurology
- Thrombolytic Administration (Door to Needle)
- Transfer (Door In to Door Out) for thrombectomy patients
- Transfer (Door In to Door Out) for intracerebral hemorrhage patients
- Thrombectomy (Door to Groin/Door to Puncture)
- Floor Admission
- No changes made
- Changes made for door times, but option is not listed (please describe below)

What is your time goal (in minutes) for door to needle for thrombolytic?

(Please respond in minutes)

Please provide information on the other changes made by your facility for improving stroke outcomes in relation to door times.

Has your facility seen an improvement in care based upon identified performance gaps and quality improvement activities related to Door to Times in the past year?

- Yes
- No
- Unsure or don't know yet

What changes were made at your facility to improve stroke care practices and patient care related to documentation in the past year? This includes improving or increasing documentation.

- Dysphagia Screen
- Vital Sign Documentation
- Neurocheck Documentation
- POC Blood Glucose
- Order Set Usage
- Patient Education
- No changes made
- Changes made for door times, but option is not listed (please describe below)

Please provide information on the other documentation changes made by your facility for improving stroke outcomes.

Has your facility seen an improvement in care based upon identified performance gaps and quality improvement activities related to documentation in the past year?

- Yes
- No
- Unsure or don't know yet

What changes were made at your facility to improve stroke care practices and patient care related to the System and Community in the past year?

- Standardized Order Sets and/or Policies
- Updated or changed care based on guidelines/new evidence
- Better/Increased Communication with hospital departments and staff
- More/Improved Community Outreach
- Improved Patient Education
- Added New Staff or Services
- Changed or implemented new education process for staff
- No changes made
- Changes made for systems or community, but option is not listed (please describe below)

Please provide information on guideline changes:

Please provide information on staff changes:

Please provide information on education changes:

Please provide information on the other changes made by your facility for improving stroke outcomes in relation to system or community.

Has your facility seen an improvement in care based upon identified performance gaps and quality improvement activities related to Community and System in the past year?

- Yes
- No
- Unsure or don't know yet

What changes were made at your facility to improve stroke care practices and patient care using technology in the past year?

- Implemented AI platform for images
- Implemented Teleneurology for ED
- Implemented Teleneurology for Inpatient services
- Changed Services for Imaging
- Changed Services for Teleneurology
- Adopted Unite Us Platform
- No changes made
- Changes made for systems or community, but option is not listed (please describe below)

What is the name of the AI platform?

What is the name of the ED Teleneurology service?

What is the name of the IN-PATIENT Teleneurology service?

Please provide information on the other changes made by your facility for improving stroke outcomes through technology.

Has your facility seen an improvement in care based upon identified performance gaps and quality improvement activities related to technology in the past year?

- Yes
 No
 Unsure or don't know yet

If your facility made other changes over the past year to improve stroke outcomes, please describe them here. Please also note the impact of these other changes.

Has your facility seen an improvement in the past one year to a selected performance measure of care based upon identified performance gaps and quality improvement activities?

- Yes
 No
 Don't know

What improvements has your facility seen in a selected performance measure of care based upon identified performance gaps and quality improvement activities in the past one year?

Community Resources/Disparities of Care

In the past year, what community education did your facility provide on stroke signs and symptoms, the importance of calling 911, or resources to reduce risk of stroke? Check all that apply.

- Stroke Smart Wallet Cards (English)
 Stroke Smart Wallet Cards (Spanish)
 Stroke Smart Magnet (English)
 Stroke Smart Magnet (Spanish)
 Stroke Fact Sheet
 Stroke Education Video
 Stroke Smart Poster
 QR Code for stroke education
 Referral to Quit Now line for smoking cessation
 Blood Pressure management
 Other

Please describe the other education provided.

How does your facility identify patients at high risk for stroke events?
(Check all that apply)

- Review of patient information in EHR (such as vital signs, labs, history, risk scoring)
 Screening events (health fairs, stroke risk card, BP screenings)
 Other

Please describe the other method for identifying high risk patients.

Does your facility monitor disparities among patients impacted by stroke and/or are at high risk for stroke, including disparities in hypertension and other stroke risk factors? This includes outcomes, stroke care, and referrals to resources post-stroke discharge.

- Yes
 No
 Don't know

Does your facility utilize Community Health Workers (such as patient navigators, community paramedics, etc.) to address social services and support needs for those with hypertension, high cholesterol, or other risk of stroke or cardiovascular disease?

- Yes
 No
 I do not know if my facility utilizes Community Health Workers

Appendix B: REFERENCES

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Appendix C: American Heart Association's Suggested Time Interval Goals

Action	Time
30-minute door-to-needle time interval goals:	
Door to physician	≤ 2.5 minutes
Door to stroke team	≤ 5 minutes
Door to CT/MRI initiation	≤ 15 minutes
Door to CT/MRI interpretation	≤ 25 minutes
Door to needle time	≤ 30 minutes
45-minute door-to-needle time interval goals:	
Door to physician	≤ 5 minutes
Door to stroke team	≤ 10 minutes
Door to CT/MRI initiation	≤ 20 minutes
Door to CT/MRI interpretation	≤ 35 minutes
Door to needle time	≤ 45 minutes
60-minute door-to-needle time interval goals:	
Door to physician	≤ 10 minutes
Door to stroke team	≤ 15 minutes
Door to CT/MRI initiation	≤ 25 minutes
Door to CT/MRI interpretation	≤ 45 minutes
Door to needle time	≤ 60 minutes
60-minute door-to-device time interval goals:	
Door to physician	≤ 5 minutes
Door to stroke team	≤ 10 minutes
Door to CT/MRI initiation	≤ 20 minutes
Door to CT/MRI interpretation	≤ 35 minutes
Door to needle time	≤ 40 minutes
Door to patient arrival in neurointensive suite	≤ 60 minutes
Door to puncture	≤ 75 minutes
Door to device	≤ 90 minutes

Appendix D: Virginia Stroke Systems Task Force Teleneurology Workgroup Recommendations

Virginia Stroke Systems Task Force Teleneurology Workgroup Recommendations

Purpose

Members of the Virginia Stroke System Task Force (VSSTF) Teleneurology Workgroup created this document to provide guidance to hospitals Virginia that are currently working with telestroke vendors or for health systems that have set up their own telestroke spoke and hub models utilizing telemedicine platforms. The VSSTF is a Virginia Department of Health (VDH) collaborative initiative aimed at improving stroke care across the Commonwealth of Virginia. Comprising of healthcare professionals, policymakers, and stakeholders from various organizations, the VSSTF works diligently to develop and implement strategies that enhance the prevention, treatment, and rehabilitation of stroke. Fostering collaboration among healthcare providers, emergency medical services and community organizations, the task force seeks to optimize the continuum of care for stroke patients, from the prehospital setting to post-acute care. Through education, advocacy, and the establishment of evidence-based protocols, the VSSTF endeavors to reduce the burden of stroke, improve outcomes, and promote a healthier future for all Virginians.

The Teleneurology Workgroup consists of:

- Laith Altaweel, MD – Neurointensivist and the System Stroke and Acute Care Neurology Medical Director with Inova Health
- Carla Gunter, RN – Nursing Educator and Stroke Coordinator with Twin County Regional Healthcare
- Kimberly Warren, DNP – VP of Nursing at Bon Secours Mercy Health
- Laurie Mayer, MBA, BSN – Quality Program Specialists with TeleSpecialists
- Heather Forrest, SCRNP – Associate Clinical Director, Subspecialty Affiliations and Telestroke with Duke University Health Systems
- Karen Deli – CEO with Adjacent Health
- Beth Hundt, PhD, APRN – Stroke Program Supervisor with Centra Health
- Branden Robinson – Chief Growth Officer with Sevaro Health

Our recommendations can be separated into two categories: Best Practices for Telestroke Programs and Common Metrics to Report.

A Brief Description of Telestroke

Telestroke is a groundbreaking approach that harnesses the power of telemedicine to revolutionize stroke care. It involves using telecommunications technology to connect stroke specialists with patients, allowing for rapid assessment, diagnosis, and treatment of stroke. This innovative approach offers numerous benefits that can significantly improve patient outcomes and reduce the burden of healthcare systems.

One of the primary benefits of telestroke is its potential to reduce healthcare disparities. Providing remote access to stroke specialists, telestroke programs ensure that all patients, regardless of their geographic location, socioeconomic status, or time of day that they are presenting have access to high-quality stroke care. This helps to address disparities in stroke outcomes that may arise due to unequal access to healthcare resources.

Telestroke also enhances efficiency in stroke care delivery. Through telemedicine platforms, stroke specialists can remotely evaluate patients, review medical imaging and make treatment decisions without the need for in-person consultations. This streamlines the care process, allowing for faster diagnosis and initiation of treatment, which is critical for improving outcomes in acute stroke cases.

Furthermore, telestroke facilitates collaboration among healthcare providers across different institutions. Stroke specialists can consult with local healthcare teams, share expertise, and coordinate patient care effectively, regardless of geographical barriers. This collaborative approach ensures that patients receive comprehensive and coordinated care, leading to better outcomes and reduced healthcare costs.

In addition to improving patient care, telestroke offers benefits for healthcare providers and institutions. By leveraging telemedicine technology, hospitals can optimize resource utilization and improve operational efficiency. Telestroke programs enable hospitals to manage patient volumes more effectively, reduce unnecessary transfers and hospitalizations, and allocate resources where they are most needed, enhancing the sustainability of stroke care delivery.

From a financial perspective, telestroke offers potential cost savings for healthcare systems. Facilitating timely intervention and reducing the incidence of severe stroke complications allows telestroke to lower the overall healthcare costs associated with stroke care. Additionally, preventing unnecessary transfers and hospitalizations, telestroke programs can reduce healthcare expenditure and optimize resource allocation within healthcare systems.

Overall, telestroke represents a transformative approach to stroke care delivery that offers numerous benefits for patients, healthcare providers, and healthcare systems alike. Leveraging telemedicine technology extends the reach of stroke expertise, telestroke programs improve access to time and high-quality stroke care, leading to better outcomes, reduced disparities, and enhanced efficiency in stroke management. As technology continues to advance, telestroke is poised to play an increasingly critical role in improving stroke care worldwide.

Telestroke in the eyes of Accrediting Bodies:

Multiple accrediting bodies offer stroke certification throughout the Commonwealth of Virginia: The Joint Commission (TJC), Det Norske Veritas (DNV), and Accreditation Commission for Health Care (ACHC). While these agencies provide guidelines for the use of telestroke, there is no sole source of information for best practices and metrics to achieve in telestroke.

These agencies offer the following levels of stroke certification:

1. Acute Stroke Ready: For hospitals with the capability to diagnose and treat stroke patients promptly.
2. Primary Stroke Center: For hospitals providing the critical elements to achieve long-term success in improving outcomes for stroke patients.

3. Thrombectomy Capable (Primary Plus in DNV): For hospitals equipped to perform mechanical thrombectomy in addition to thrombolytic administration and management.
4. Comprehensive Stroke Center: The highest level of certification, indicating expertise in treating complex stroke patients.

In addition to accrediting bodies, the following organizations are resources to hospitals regarding best practices and metrics.

1. American Heart Association/American Stroke Association (AHA/ASA): Collaborates with accrediting bodies that provide stroke-focused certifications for hospitals nationwide by providing support and resources for ongoing quality improvement.
2. Virginia Department of Health (VDH): VDH plays a crucial role in stroke care improvement supporting Virginia hospitals with the following initiatives:
 - Gathering and analyzing stroke care data.
 - Facilitating the exchange of relevant information and data.
 - Ensuring adherence to best practices.
 - Supporting continuous quality improvement of stroke care.

In Virginia, stroke centers may seek certification to demonstrate their commitment to providing high-quality stroke care. Stroke certified hospitals benefit from improved efficiencies, reduced morbidity/mortality rates and increased satisfaction.

Best Practices for Telestroke Programs

Best practices are recommendations for the best approach currently available and predicated on the experience and knowledge base of members of the teleneurology workgroup as members of the healthcare landscape. While there are other options available and many reasons why the ideas and suggestions listed below could be avoided, we urge telestroke programs to collaborate with teleneurology partners to implement the following Best Practice recommendations:

1. One step notification from facility to teleneurology provider.
2. The teleneurology process should have a backup process utilizing the same one step notification process.
3. An established process for the Teleneurologist to contact receiving facility/Neurointerventional Radiology (NIR) MD for appropriate patients.
4. Teleneurology provider etiquette:
 - Introduction
 - Confirm the identity of the patient using two unique identifiers.
 - Identify staff and family present for the teleneurology interaction.
5. Emergency Department (ED) provider should be in the room at the end of the consult to facilitate care or available by phone.
6. Level of care and response from the Teleneurologist should be the same for all levels of stroke certification (including noncertified facilities).
7. If available, artificial intelligence (AI)-powered care coordination platforms for advanced image interpretation could be used by front-line teams and teleneurology teams.
8. Establish a direct to computed tomography (CT) scan and tele-cart setup protocol.
9. In instances where there is cross coverage between on-site neurology and teleneurology, the activation process should be the same to ensure uniformity of patient

care and staff processes. The same standards and goals should be established for inpatient stroke alerts and ED stroke alerts.

10. Documentation should be available in the hospital electronic medical record (EMR) to onsite care teams within an hour of the consultation being completed.
11. A process for metric data sharing should be agreed upon by the facility and telemedicine vendor.
12. Teleneurology should have a process established to review and document both risk and benefits of thrombolytic treatment and discuss alternatives to thrombolytic treatment.
13. Teleneurology should follow the established emergency consent policy if a patient is unable to provide consent and the family is unable to be reached.
14. Wi-Fi connectivity mapping should be completed, and areas should be designated for video evaluations.
15. National Institutes of Health (NIH) Stroke Scale-Certified staff, trained as a telepresenter, should be present at the bedside to assist in the consultation.
16. If a video consult is not completed, the reason should be documented by teleneurology with the percentage of consults not evaluated by video reported.
17. All eligible thrombolytic candidates should be treated. If thrombolytic is not given, a reason should be documented.
18. Imaging should be shared with receiving hospital upon transfer.

Common Metrics to Report for Telestroke

Hospital leadership, stroke program managers, and stroke medical directors should expect the following data to be provided and discussed on a monthly basis. The following are recommended metric goals:

1. Stroke alert to telestroke activation within 10 minutes.
2. Telestroke activation to telestroke response within 10 minutes
3. Image completion to interpretation by teleneurology (wet read) within 10 minutes.
4. Telestroke imaging interpretation to treatment decision communication:
 - Intravenous thrombolytic within 10 minutes
 - Endovascular thrombectomy intervention within 10 minutes
 - Notification of onsite staff (including ED provider)
 - Call to neurointerventional radiology.
 - Communication with the transfer center
5. Communication of the decision to treat to administration of the thrombolytic within 10 minutes.

Conclusion

In conclusion, telestroke provides faster treatment, wider access, and improved outcomes. Leveraging technology to connect stroke patients with expert care bridges geographical gaps, enhances collaboration, and ultimately saves lives. Collaboration between stroke centers and teleneurology partners will lead to improved stroke care across the Commonwealth of Virginia.

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