

# 2020 NEVADA STROKE REGISTRY

## DATA SUMMARY

*June 2020 | Edition 1.0*



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## Background and Purpose

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The Heart Disease and Stroke Prevention (HDSP) Program, housed in the Chronic Disease Prevention and Health Promotion (CDPHP) section within the Nevada Division of Public and Behavioral Health (DPBH), Bureau of Child, Family and Community Wellness (CFCW), is pleased to release the 2020 Stroke Registry Report. The purpose of the Stroke Registry Report is to provide an annual update on the collection of data by the Stroke Registry and offer recommendations to improve the quality of care to patients who have suffered from a stroke in Nevada.

In 2015, the 78<sup>th</sup> Nevada legislative session passed [Nevada Revised Statutes \(NRS\) 439.5291](#), requiring DPBH to establish and maintain a Stroke Registry to compile information and statistics concerning the treatment of patients who suffer from strokes. Maintaining a Stroke Registry database enables DPBH to better align with the performance measures prescribed by the Paul Coverdell National Acute Stroke Registry of the Centers for Disease Control and Prevention (CDC), the American Heart Association (AHA), and the American Stroke Association (ASA). The law requires DPBH to use the *Get With The Guidelines-Stroke (GWTG-S)* data management database established by the AHA and the ASA to compile and provide a comprehensive annual report. The AHA, ASA, Nevada Hospital Association, and the Nevada Rural Hospital Partners provided support for the passing of the bill.

Per NRS 439.5291, the HDSP Program began utilizing the nationally recognized GWTG-S Registry Program as the state's standardized stroke registry data program. Stroke centers in Nevada are required to report data to the Nevada Stroke Registry annually. As of 2020, the HDSP Program maintains super-user access to the GWTG Registry to review, compile, and make stroke prevention recommendations.

The GWTG Registry Program is used nationally to help ensure hospitals treat patients according to current nationally accepted recommendations and guidelines. The GWTG-S Registry Program is a platform designed to improve stroke care by promoting consistent adherence to the latest scientific treatment guidelines. Hospitals using the GWTG Registry can review real-time performance measures, identify interventions, and maximize patient care. The Nevada Stroke Registry aims to compile and analyze stroke data in an aggregate manner to enhance surveillance and improve stroke survivorship and parity of care statewide, thereby decreasing the burden of disability.

To further assist with these efforts, the HDSP Program will reconvene the Nevada Stroke Taskforce to engage and promote quality improvement to stroke care in Nevada. The Nevada Stroke Registry aligns with the goals of the Nevada HDSP Taskforce for the use of clinical best practices in pre-hospital and hospital settings. The HDSP Taskforce Strategic Plan Goal 1 aligns with the promotion of the Nevada Stroke Registry.

**Goal 1:** To promote the adoption of evidence-based quality measurement at the provider level. Per NRS 439.5296, the DPBH shall encourage reporting to the Stroke Registry by accredited stroke centers, health care providers, and providers of Emergency Medical Services (EMS) treating patients who suffer from strokes in Nevada. This outreach further facilitates sharing and analysis of stroke-related data and improvement in the quality of care for patients who experience stroke.

## Nevada Stroke Burden

Heart disease is the leading cause of death in Nevada and in the United States (U.S.) while stroke is the fifth leading cause of death in Nevada and in the U.S. <sup>1,2</sup>

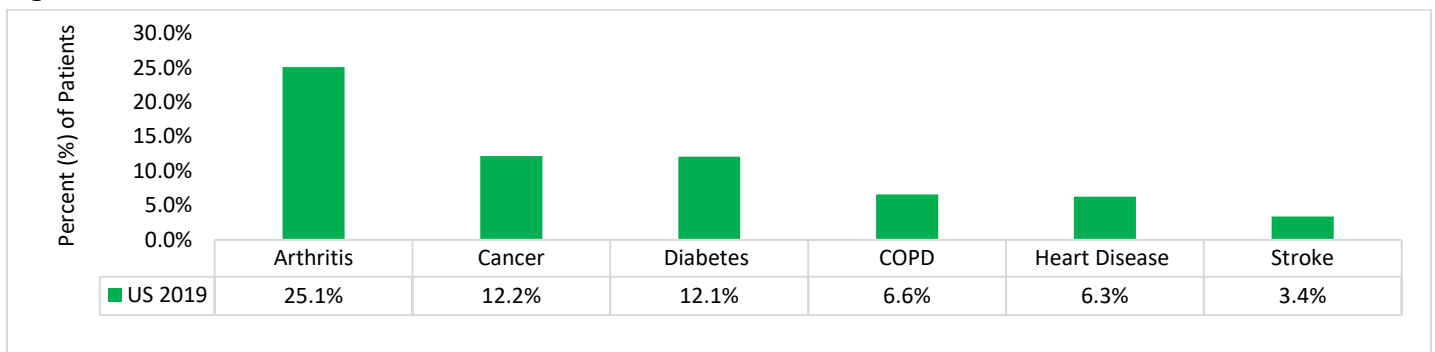
Each year, approximately 610,000 Americans experience a new or first-time stroke, and 185,000 Americans experience a second or recurrent stroke totaling 795,000 Americans experiencing a stroke annually. <sup>1</sup> Strokes kill more than 140,000 Americans (1 of 20 deaths) each year. Every 40 seconds someone has a stroke and every four minutes someone dies of a stroke. <sup>1,2</sup> Stroke is also a leading cause of long-term disability costing the U.S. \$34 billion annually. <sup>3</sup>

Strokes occur within any age group across the lifespan and there are several risk factors linked to an increased likelihood of developing one. Risk factors include diabetes, physical inactivity, obesity, alcohol abuse, tobacco use (the leading cause of preventable deaths in the U.S.), and high blood pressure/cholesterol. <sup>4</sup> Nearly one-third of American adults have high blood pressure; more than half of these exhibit uncontrolled blood pressure.

For Figures 1 – 4, data was obtained from the Behavioral Risk Factor Surveillance System (BRFSS). It is important to note in 2011 BRFSS methodology was updated to include data received from cell phone users, necessitating a change in weighting methodology.

Figure 1 represents the prevalence of stroke in Nevada is the same as the U.S. at 3.4 percent, while heart disease in Nevada is slightly higher at 7.2 percent compared to the U.S. at 6.3 percent.

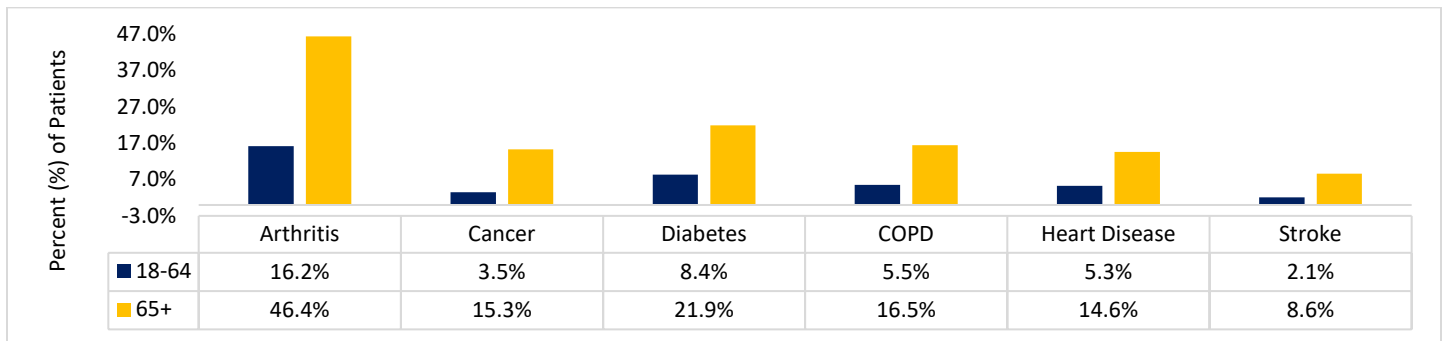
**Figure 1. Prevalence of Chronic Diseases, BRFSS Data, Nevada vs. U.S., 2019**



**Source:** Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey Data*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2019

Figure 2 indicates the prevalence of Arthritis, Cancer, Diabetes, Chronic Obstructive Pulmonary Disease (COPD), heart disease, and Stroke is greater in the age group 65+ years of age than for the age group 18 - 64 years of age.

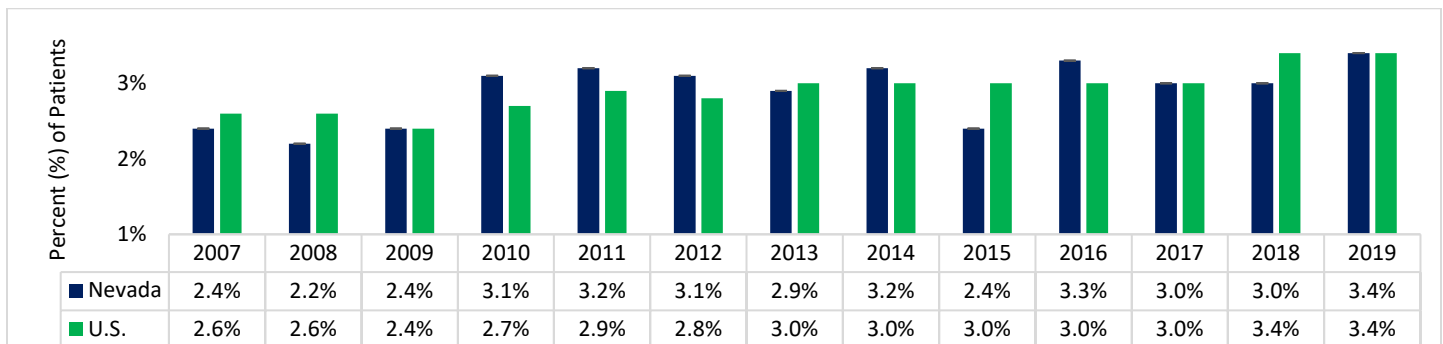
**Figure 2. Prevalence of Chronic Diseases by Age Group, Nevada, 2019.**



**Source:** Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey Data*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2019.

Figure 3 represents the prevalence of stroke in Nevada versus the U.S. In 2018, the U.S. had a higher prevalence of stroke while in 2019 the prevalence of stroke was similar to that of the U.S.

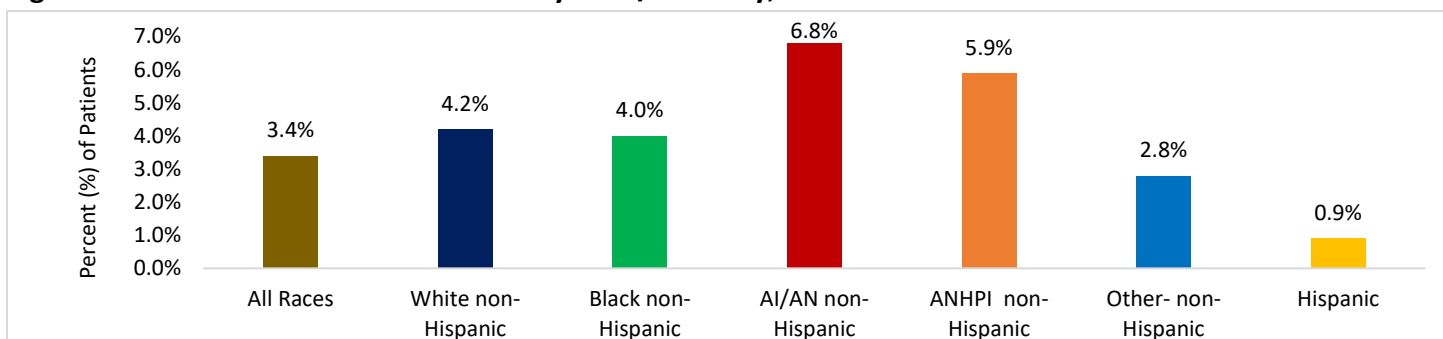
**Figure 3. Prevalence of Stroke in Adults, Nevada vs. U.S., 2007 – 2019 BRFSS Data.**



**Source:** Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey Data*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2007 - 2019.

Figure 4 represents the prevalence of stroke by race/ethnicity. The American Indian (AI) and Alaskan Native (AN) population had the highest prevalence at 6.8 percent while the Asian, Native Hawaiian, or Pacific Islander population has the second highest prevalence at 5.9 percent.

**Figure 4. Prevalence of Stroke in Adults by Race/Ethnicity, 2019 Nevada BRFSS Data.**

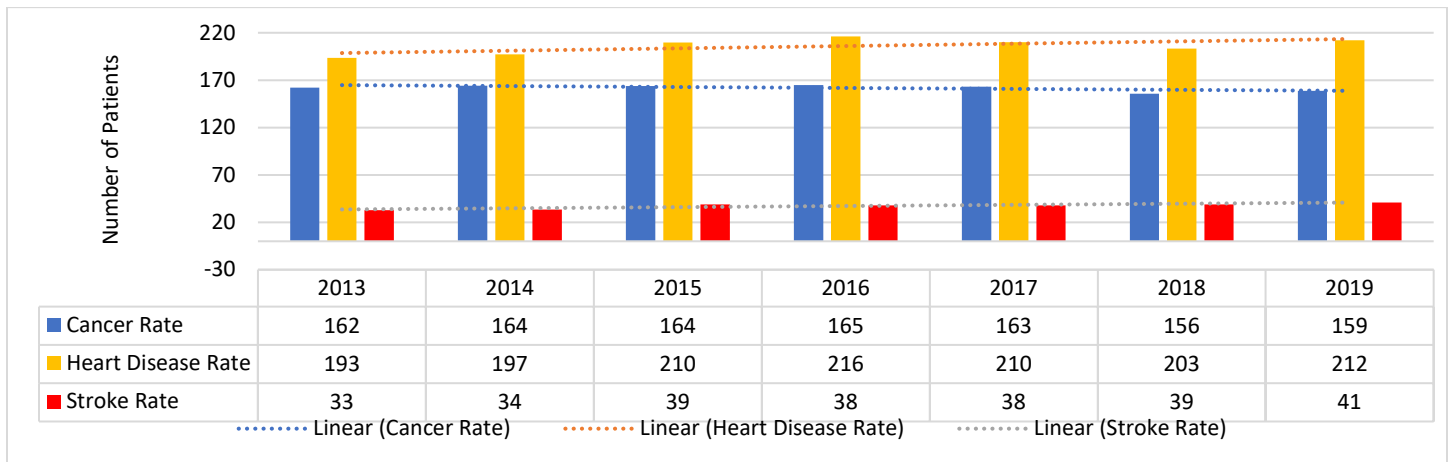


**ANHPI:** Asian or Native Hawaiian/Pacific Islander **AI/AN:** American Indian/Alaska Native

**Source:** Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey Data*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2019.

Figure 5 represents the mortality rate of chronic disease. Stroke and heart disease mortality rates increased while cancer mortality rates remained stable across the time span.

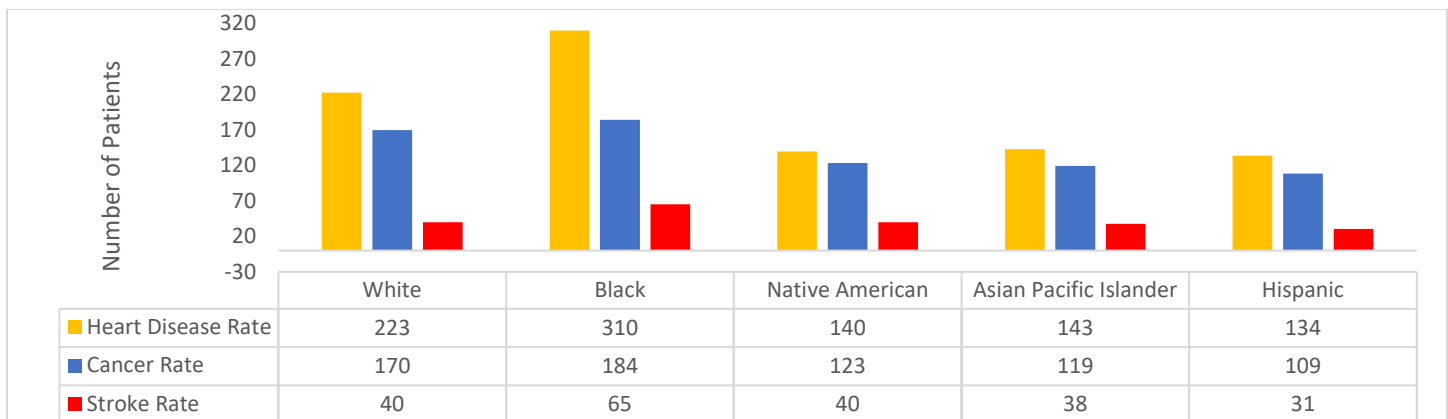
**Figure 5. Chronic Disease Mortality Rate from 2013 - 2019, Nevada.**



Source: Nevada Department of Health and Human Services, Office of Analytics, Nevada Death Registry System, 2021.

Figure 6 represents the mortality rate by race/ethnicity. African Americans have the highest rate of heart disease and stroke compared to other race/ethnicity groups, indicating a need to dedicate more resources to serving the African American population.

**Figure 6. Chronic Disease Mortality Rate by Race/Ethnicity, Nevada Residents, 2019.**



Source: Nevada Department of Health and Human Services, Office of Analytics, Nevada Death Registry System, 2021

## Population and Limitations

The 2020 Stroke Registry Report was developed using data obtained by 15 stroke centers participating in the GWTG-S Registry. Therefore, the data reflects the GWTG-S database, not individual hospital data.

The stroke performance measures reflect data from hospitals participating in the GWTG-S Registry Program, and therefore conclusions may not be generalized to the state of Nevada. In 2018, The HDSP Program obtained super-user access to the GWTG-S registry.



NRS 439.5291 requires certified stroke centers to report data to the GWTG-S database annually. According to the Nevada Hospital Association, Nevada has 37 acute care and critical access hospitals,<sup>5</sup> 15 of which are certified stroke centers per the AHA/ASA designation. Data accessed through GWTG-S is de-identified and not compiled in a fashion to allow comparisons across different hospitals. Data accessed through GWTG-S will be analyzed to develop patient care quality improvement recommendations. For example, the aggregate data from all 15 hospitals can be used to address disparities in stroke prevalence by race/ethnicity, gender, and/or insurance status.

The HDSP Program will continue to educate hospitals on the importance of providing comprehensive data to the Nevada Stroke Registry. The HDSP Program would like to thank the following hospitals for participating in the GWTG-S registry. Without their invaluable participation this would not have been possible.

### Nevada Hospitals Participating in the Get with the Guidelines – Stroke (GWTG-S) database as of April 2020

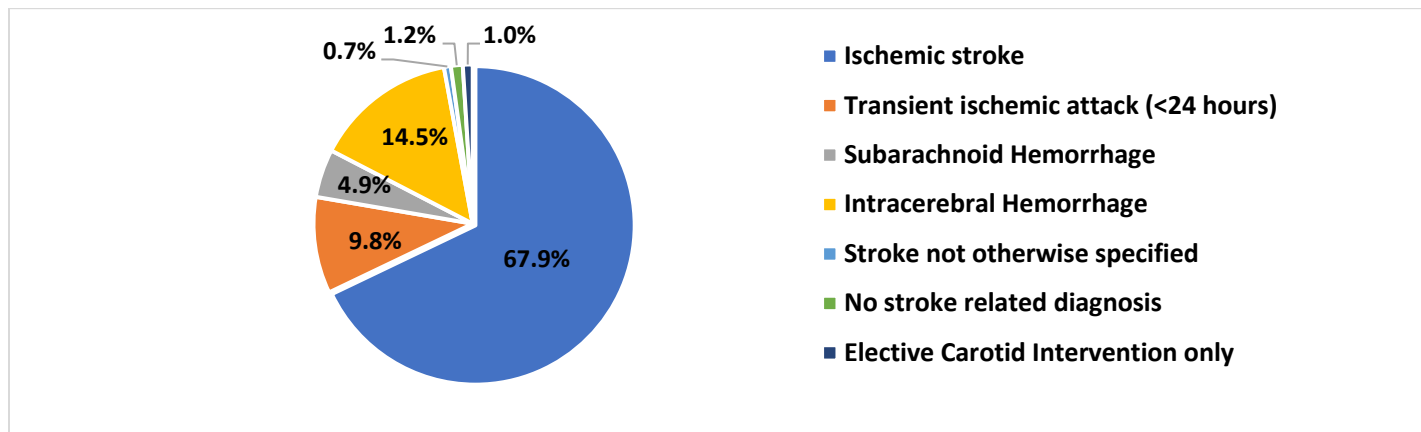
- |                                    |  |
|------------------------------------|--|
| Carson Tahoe Health                | Southern Hills Hospital and Medical Center |
| Centennial Hills Hospital          | Spring Valley Hospital Medical Center      |
| Desert Springs Hospital            | Summerlin Hospital Medical Center          |
| Henderson Hospital                 | Sunrise Hospital                           |
| Mountain View Hospital             | University Medical Center-Las Vegas        |
| Northern Nevada Medical Center     | Valley Hospital Medical Center             |
| Renown Regional Medical Center     | West Region Hospital                       |
| St. Mary's Regional Medical Center |  |

## Demographics

The Stroke Registry Report obtained de-identified patient data from the GWTG-S database.

Figure 7 represents the percentage of cerebrovascular events occurring in the reporting hospitals. Ischemic Stroke was the highest subcategory at 67.9 percent followed by intracerebral hemorrhage at 14.5 percent.

**Figure 7. Type of Stroke in Participating Hospitals, 2020**



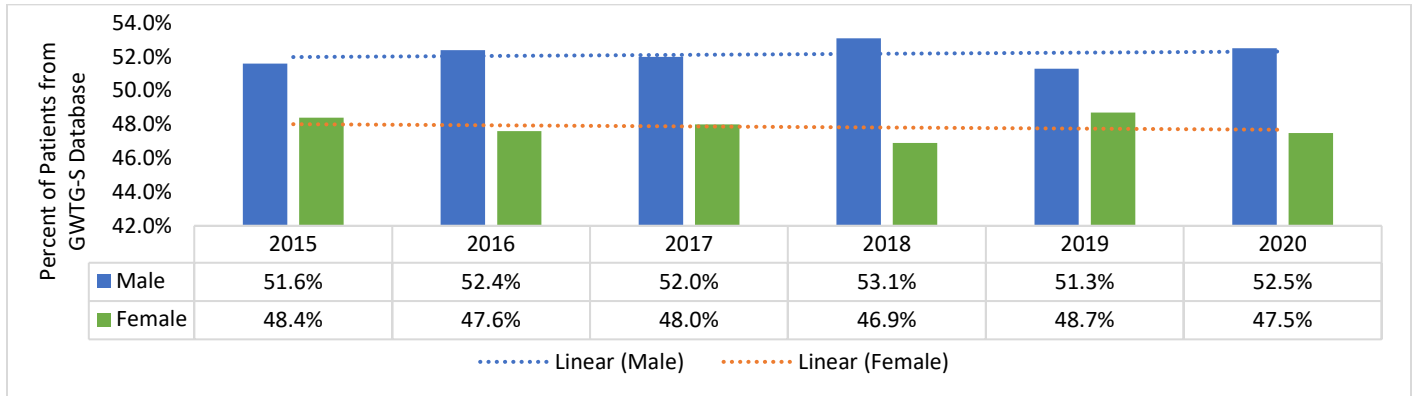
**Source:** American Stroke Association. *Get With The Guidelines - Stroke Data Registry System*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2020.

## Demographics - Who is Affected?

The GWTG-S database provides stroke information as it relates to age group and gender.

Figure 8 represents the rate of stroke across age and gender. Consistently across all age groups, the rate of stroke was higher among the male population than the female population.

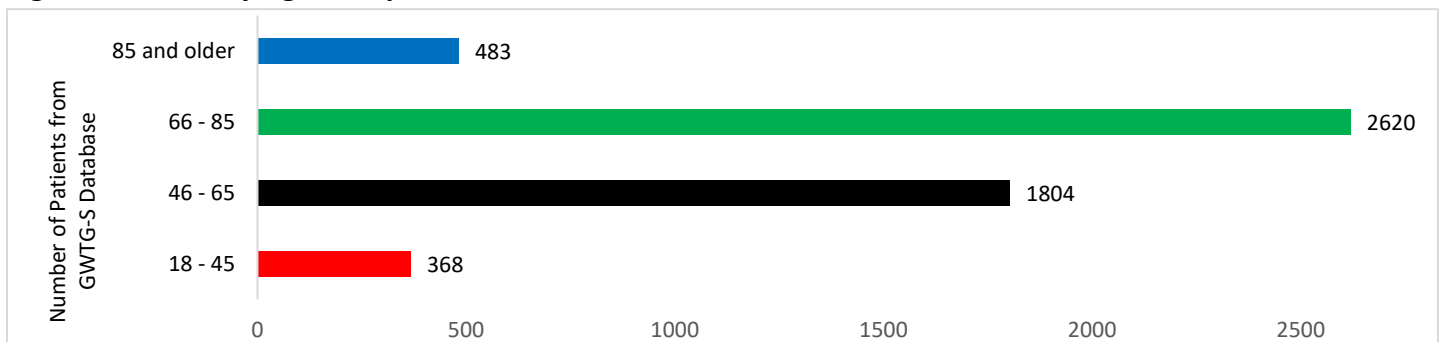
**Figure 8. Stroke by Gender, 2015 – 2020**



**Source:** American Stroke Association. *Get With The Guidelines – Stroke Data Registry System*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2020.

The distribution of stroke by age group (Figure 9) indicates the risk of a stroke increases with age. The difference in the data for the 85 and older age group compared to other age groups is due to the increased rate of all-cause mortality in older adults. (i.e., The 85 and older age group is the smallest group in the data set).

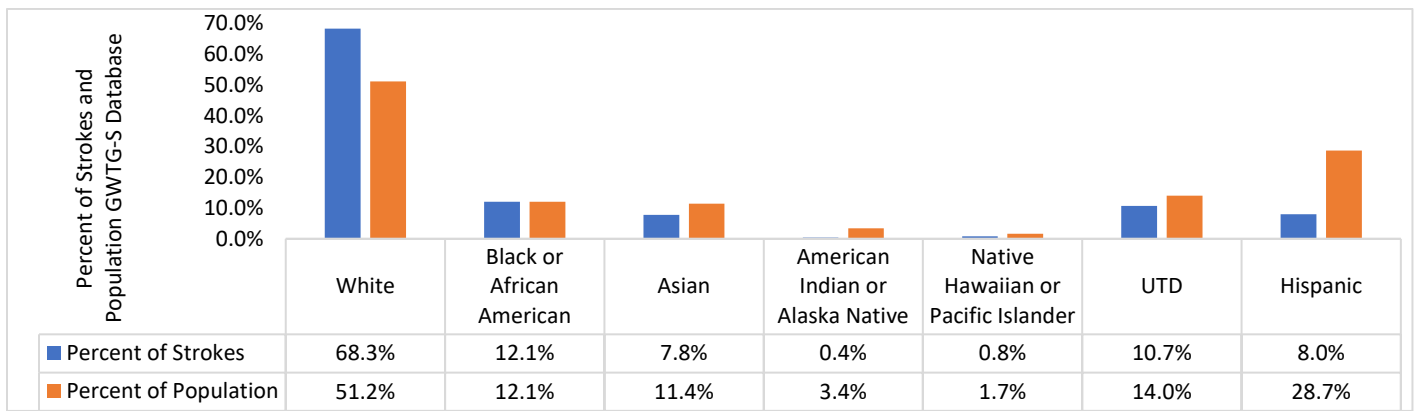
**Figure 9. Stroke by Age Group, Nevada, 2020**



**Source:** American Stroke Association. *Get With The Guidelines - Stroke Data Registry System*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2020.

The GWTG-S database provides statistics on strokes as it relates to race and ethnicity. Figure 10 represents a side-by-side comparison between the percent of strokes and the percent of population by race and ethnicity in Nevada for 2020.

**Figure 10. Percentage of Stroke and Percentage of Populations by Race/Ethnicity, Nevada, 2020**



AI/AN: American Indian/Alaska Native; NH/PI: Native Hawaiian/Pacific Islander UTD: Undetermined race or ethnicity

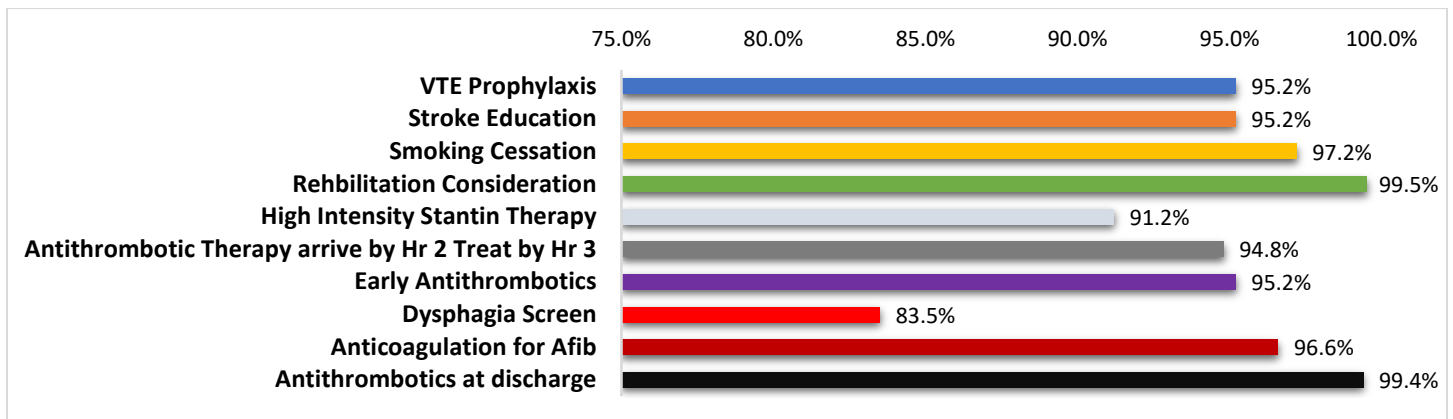
Source: American Stroke Association. *Get With The Guidelines - Stroke Data Registry System*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2020.

## Performance Measures

DPBH follows the performance measures which coincide with the Paul Coverdell core consensus measures based on GWTG-S data reported by the certified stroke centers in Nevada. The performance measures are evidence-based recommendations developed by the Joint Commission, AHA, ASA, and the CDC for optimal treatment of ischemic strokes. The performance measures are analyzed to identify opportunities to improve stroke care.

Figure 11 indicates Rehabilitation Consideration was the highest performing measure at 99.5 percent compared to Dysphagia screening at 83.5 percent, which was the lowest performance measure. This indicates a need for further targeted interventions to improve dysphagia screening.

**Figure 11. Coverdell Stroke Act Performance Measure, 2020 Nevada**



Source: American Stroke Association. *Get With The Guidelines - Stroke Data Registry System*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2020.

## Dysphagia Screening

Dysphagia, or difficulty swallowing, is common after a stroke and affects more than 50 percent of patients within three days after a stroke. Early screening helps to identify stroke patients who could be vulnerable to weight loss, fluid depletion, malnutrition, and aspiration of food or liquid causing pneumonia. Patients who are unable

to consume food or fluid by mouth often demonstrate poor health outcomes and experience prolonged hospital stays, including post-discharge treatment at long-term care facilities.

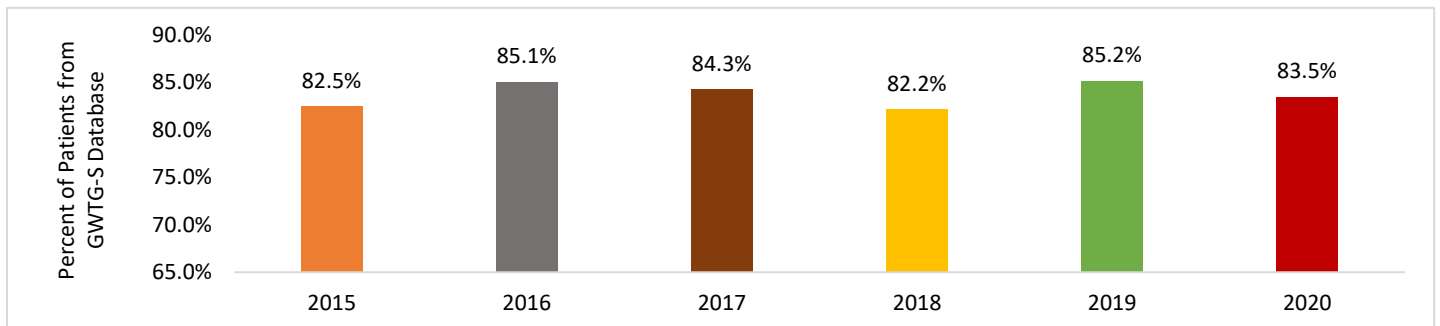
### Dysphagia Screening Action Plan

Hospitals should recruit professional staff to identify an interdisciplinary Stroke Care Team to develop and integrate evidence-based dysphagia screening policies into patient care plans. The Stroke Care Team staff should include a speech therapist, occupational therapist, physical therapist, social worker, registered dietician, or nurse navigator. Additional recommendations include:

- Staff continuously participate in trainings regarding best practices,
- Hospital quality improvement and risk management teams work closely to monitor activities, and
- Hospitals deliver recommendations for continuous quality improvement.

The percent of dysphagia screening (Figure 12) fluctuates from 2015 – 2020. Despite the increase in awareness, dysphagia screening remains the lowest performance measure (see Figure 11).

**Figure 12. Stroke Patients Who Undergo Screening for Dysphagia, 2014-2020.**

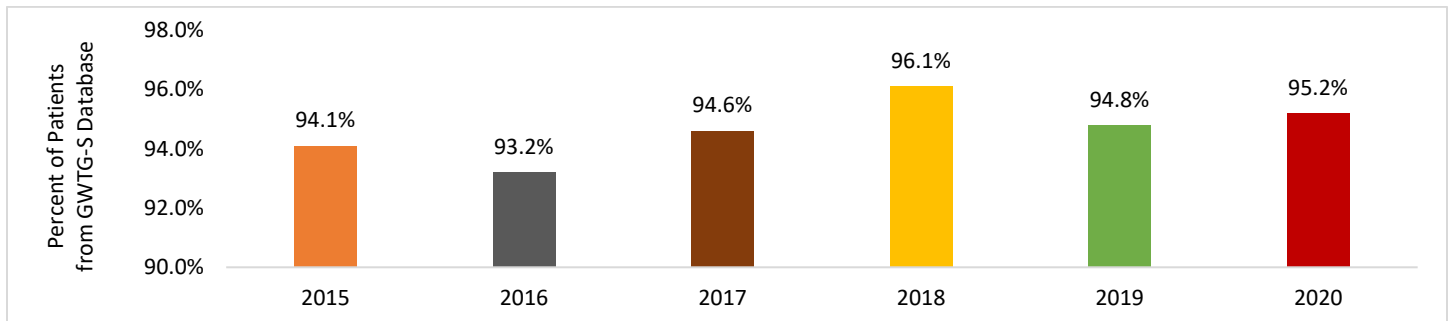


**Source:** American Stroke Association. *Get With The Guidelines - Stroke Data Registry System*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2015 - 2020.

## Stroke Education

Providing stroke education regarding necessary lifestyle changes, medication, therapy options; etc., both to patients who are at high risk for stroke but pre-stroke and those patients who have experienced a stroke is important to improve patient outcomes. Figure 13 indicates the percent of patients provided with education during a hospital stay fluctuated between 2015 to 2020, demonstrating hospitals' need to develop a system to provide consistent education to patients who experienced a stroke. Similar data indicating pre-stroke education is not available.

**Figure 13. Patients Provided with Education on Stroke or TIA during the Hospital Stay, 2015 – 2020**



**Source:** American Stroke Association. *Get With The Guidelines - Stroke Data Registry System*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2020.

Increasing efforts to provide stroke education by stroke centers is essential in raising the stroke education performance measure. Education provided to patients should include prevention, treatment, and rehabilitation. This education will decrease readmission and re-occurrence. Nevadans will benefit from a coordinated statewide effort to increase awareness regarding early signs of a stroke. Early identification of stroke symptoms is essential to accessing appropriate critical care and improving outcomes. The warning signs of a stroke include:

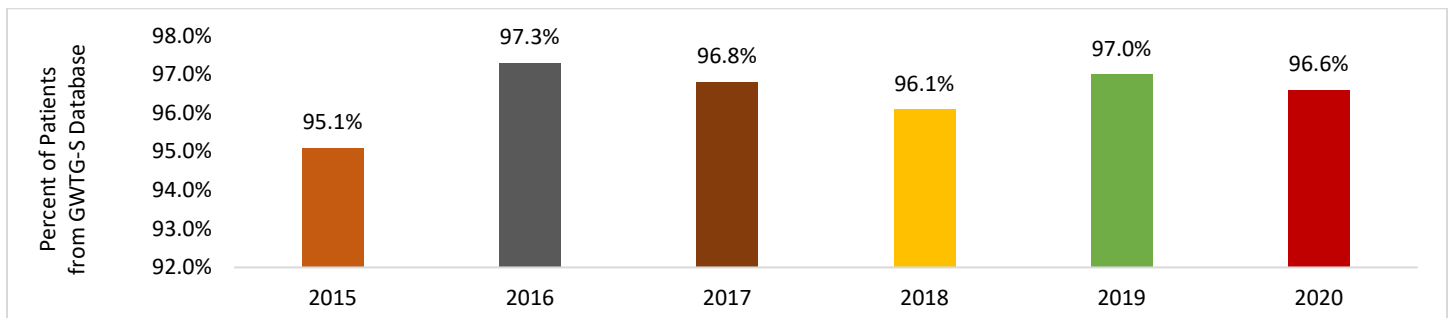
- Sudden numbness or weakness of the face, arm, or leg, especially on one side of the body
- Sudden confusion, trouble speaking or understanding
- Sudden trouble walking, dizziness, loss of balance, and/or coordination
- Sudden severe headache with no known cause

Education should also be conducted regarding preventive behaviors and lifestyle changes to decrease the chance an individual will experience additional strokes.

### Atrial Fibrillation/Flutter at Discharge on an anticoagulation therapy medication

Figure 14 represents the percent of patients with an ischemic stroke or transient ischemic attacks (TIA) with an atrial fibrillation/flutter at discharge on an anticoagulation therapy medication from 2015 to 2020, fluctuated from 95.1 percent in 2015 to 96.6 percent in 2020.

**Figure 14. Patients with an Ischemic Stroke or TIA with an Atrial Fibrillation/Flutter at Discharge on an Anticoagulation Therapy Medication, 2015 – 2020**



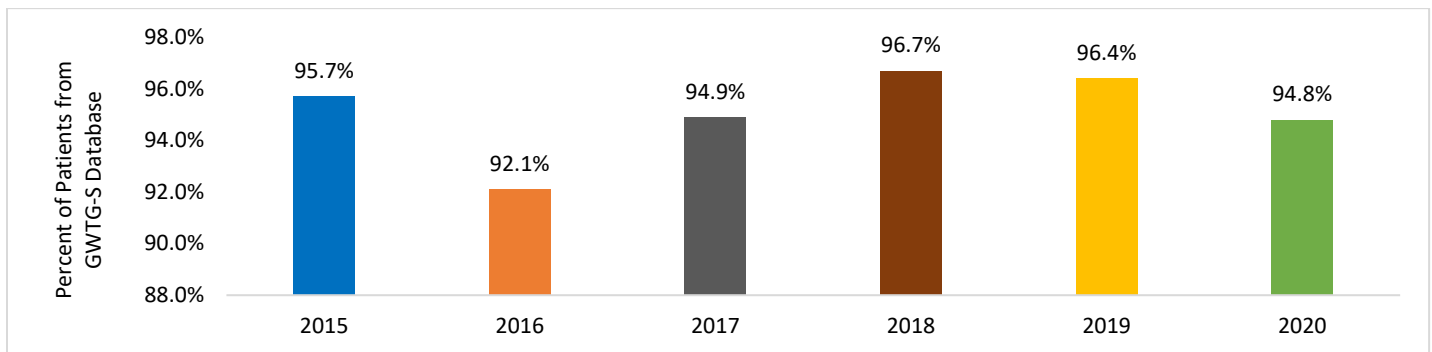
**Source:** American Stroke Association. *Get With The Guidelines - Stroke Data Registry System*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2015-2020.

## IV Recombinant Tissue Plasminogen Activator (IV rtPA)

Intravenous recombinant tissue plasminogen activator (IV rtPA) therapy is repeatedly confirmed as safe and efficacious over the past 20 years.<sup>9</sup>

Figure 15 represents administration of IV rtPA therapy for eligible patients who arrived in the hospital within two (2) hours of last known well (LKW) and received antithrombotic therapy with three (3) hours of LKW. LKW is defined as the date and time prior to hospital arrival at which it was witnessed or reported the patient was last known to be without the signs and symptoms of the current stroke or at baseline state of health.<sup>10</sup>

**Figure 15. Acute Ischemic Stroke Patients Who Arrived at the Hospital within 120 Minutes of Last Known Well and for whom IV Antithrombotic was Initiated within 180 Minutes of Time Last Known Well**



**Source:** American Stroke Association. *Get With The Guidelines - Stroke Data Registry System*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2020.

While IV Antithrombotic initiation within 120 minutes of Last Know Well is considered best practice, it is not a best fit for every case. The following are contraindicators for administration of IV t-PA:<sup>11</sup>

- Recent intracranial, spinal surgery, serious head trauma, or stroke in the previous three months,
- History of previous intracranial hemorrhage (ICH), Intracranial Neoplasm, Arteriovenous Malformation, or Aneurysm: examples of ICH include subarachnoid hemorrhage, intraventricular hemorrhage, epidural hemorrhage, and subdural conversion of infarctions,
- Active internal bleeding,
- Acute bleeding diathesis, low platelet count, increased PTT, INR  $\geq 1.7$ , or use of NOAC (novel oral anticoagulant),
- Symptoms suggest, subarachnoid hemorrhage,
- CT Demonstrates a multilobar infarction (hypodensity  $> 1/3$  cerebral hemisphere),
- Arterial puncture at noncompressible site in previous seven days,
- Blood glucose concentration  $< 50$  mg/dl (2.7 mmol/L),
- Severe uncontrolled hypertension: Elevated blood pressure or hypertension at systolic  $> 185$  or diastolic  $> 110$  mmHg,
- Thrombocytopenia and coagulopathy, and
- More than two hours elapsed since the last known stroke event.

Focused efforts to increase awareness regarding key time periods for administration, the benefits of use, and the importance of administration in a continuum of care may improve this performance measure.

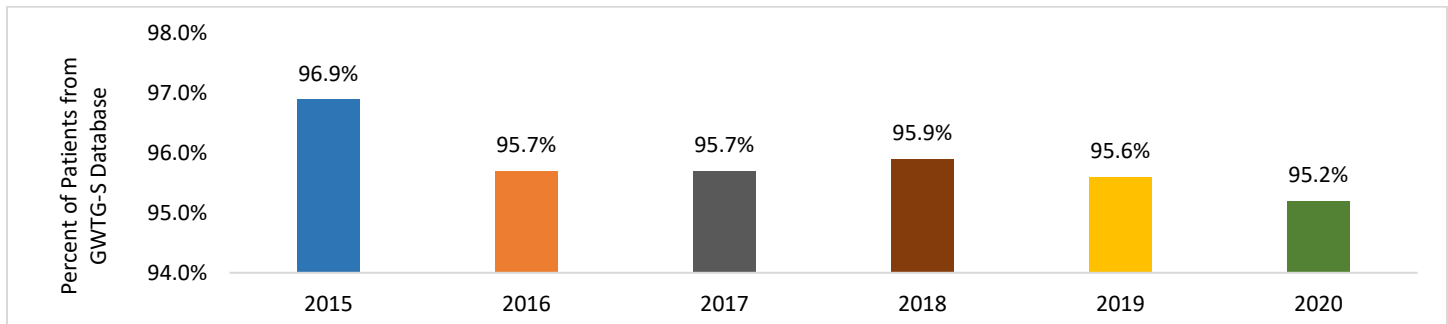
## Early Antithrombotic Therapy

Early antithrombotic therapy (before the end of the second hospital day) remained relatively constant from 2015 to 2020. The data indicates a small decline in mortality rates and an unfavorable outcome with the administration of aspirin within 48 hours after a stroke. The primary effects of aspirin are attributed to a reduction in early recurrent stroke, but consideration needs to be made about the risks associated with the use of aspirin.<sup>12</sup>

The percent of patients with an ischemic stroke or TIA (Figure 16) who received antithrombotic therapy by the end of the second hospital day decreased from 95.6 percent in 2019 to 95.2 percent in 2020.

Focusing on statewide efforts to identify barriers for the use of early antithrombotic therapy under appropriate conditions may be a path to improve the outcome for this performance measure statewide.

**Figure 16. Percent of Patients with Ischemic Stroke or TIA Who Receive Antithrombotic Therapy by the End of the Hospital Day Two, 2015-2020**



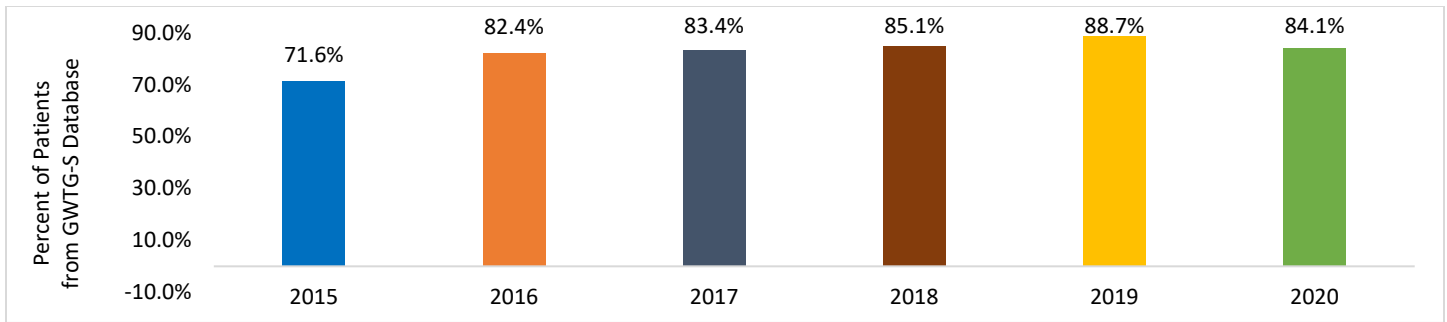
Source: American Stroke Association. *Get With The Guidelines - Stroke Data Registry System*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2020.

## Time to Intravenous Thrombolytic Therapy

Thrombolytic therapy is not part of the ten core consensus measures, but it highlights improving statewide performance as well as an opportunity for additional statewide quality improvement.

Figure 17 illustrates the percent of stroke patients who received IV rtPA therapy with an in hospital “door to needle” time of 60 minutes or less.

**Figure 17. Percent of Acute Ischemic Stroke Patients Receiving Intravenous Tissue Plasminogen Activator (rtPA) Therapy With 60 Minutes or Less of Door-to-Needle Time, 2015-2020**



Source: American Stroke Association. *Get With The Guidelines - Stroke Data Registry System*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2014-2020.

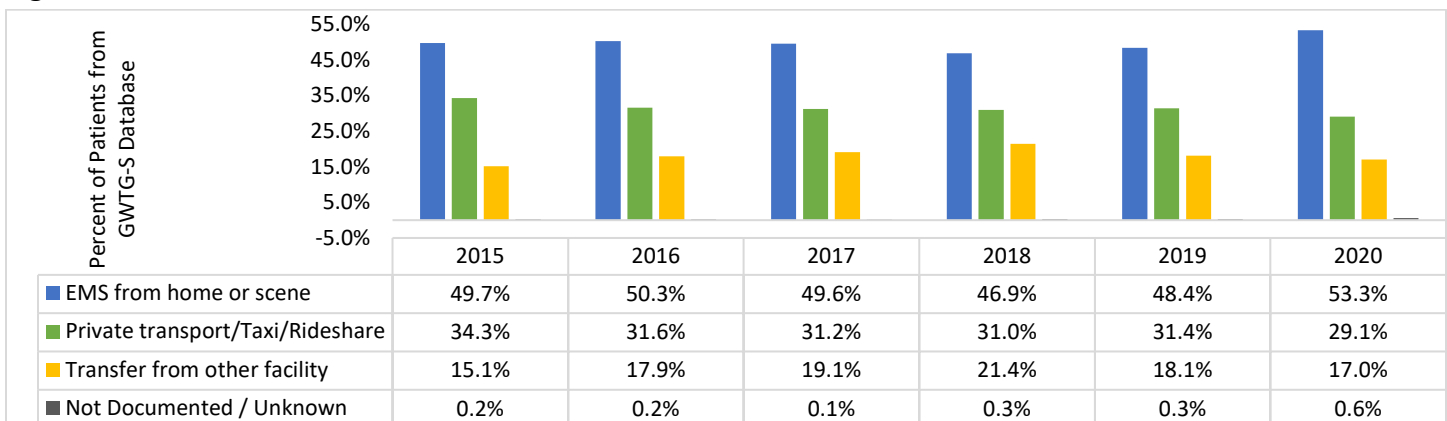
## Pre-Hospital Mode of Transport

### Notification and Response of EMS for Stroke

The notification and response of EMS to a stroke patient involves a complex interaction between the public, the applicable EMS program, and the relevant hospital emergency department. The CDC recommends hospitals develop partnerships with local EMS providers and educate communities about the symptoms of stroke and the importance of dialing 9-1-1 for timely treatment. It is important for EMS and emergency dispatch operators to be trained in symptoms of a stroke to assist in getting the patient to the nearest hospital to provide IV t-PA treatment within the three-hour window from symptom onset.<sup>13</sup>

Figure 18 demonstrates how stroke patients arrived at the hospital (arrival mode). Results indicate 53.3 percent of stroke patients involved hospital pre-notification by the EMS.

Figure 18: Arrival Mode, 2015 – 2020



Source: American Stroke Association. *Get With The Guidelines - Stroke Data Registry System*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2015-2020.

## Recommendations and Aggregated Data

CDPHP and partners, including local hospitals, not for profits, primary care providers, federally qualified health centers, and the AHA, developed recommendations for improving outcomes based on 2020 aggregate Nevada Stroke Registry data:

- Currently, 15 facilities have completed and returned a Memorandum of Agreement (MOA) for data sharing/super-user allowance to Quintiles (GWTG vendor).



- Quality Improvement (QI) recommendation: Explore using the Health Information Exchange to collect data aligning with the ten GWTG quality improvement measures to include Critical Access Hospitals and cross-walking with GWTG data to develop a comprehensive geographic representation of stroke in Nevada.
- Use aggregate data to address stroke disparities by race/ethnicity and gender.
  - QI recommendation: Health disparities are evident in Nevada in relation to stroke prevalence and chronic disease mortality by race and ethnicity. Nevada GWTG data reveals disparities for stroke which are most apparent among Native American and Pacific Islander populations in Nevada. An emphasis should be placed on addressing health equity, health access, and health literacy disparities relating to stroke prevention and care and identified contributing factors.
- Reporting fatigue on the part of providers and organizations coupled with numerous reporting requirements and demands are barriers to effective and beneficial reporting of all stroke cases, contributing to the current limited submission of stroke cases in Nevada.
  - QI recommendation: Determine a QI activity to reduce reporting fatigue and requirements/demands to facilitate increased reporting to encompass all stroke cases encountered by each facility.
  - QI recommendation: Explore the feasibility of using a template for entering data from Electronic Health Records (EHRs) into the Nevada Stroke Registry and develop data-sharing capability or importing-exporting functionality between the Nevada Stroke Registry and EHRs. Identify methods to improve data communication between systems by assisting with and supporting the development of data interfacing between hospitals' EHRs and the Nevada Stroke Registry.
- Include stroke hospital pre-notification by EMS statewide to maximize transitions along the continuum of care.
- Continue to increase statewide performance on time to intravenous thrombolytic therapy within 60 minutes.
- Increase statewide performance with initial use of thrombectomy device within 90 minutes for direct-arriving patients (60 minutes for transfer patients) in eligible acute ischemic stroke patients.
- Decrease last known well to arrival time to maximize survivorship and decrease the disability burden.
- Explore the interests of the members of Nevada's Heart Disease and Stroke Prevention Taskforce regarding reviewing stroke registry data to make more informed recommendations on quality improvement for possible incorporation into the Nevada Stroke Registry Reports in the future.

## Legislative Recommendations

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Per NRS 439.5291, the DPBH is required to provide "any recommendations for legislation to improve the quality of care provided to patients who suffer from strokes in the state."

DPBH does not recommend additional stroke quality improvement legislation at this time because access to comprehensive stroke data was recently attained. Limitations outlined in this report still need to be addressed. Future recommendations regarding additional stroke-related legislation will become available through increased utilization of the Nevada Stroke Registry and cooperation with the Nevada Stroke Task Force.

## Report Conclusions

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Aggregate data collected in the Nevada Stroke Registry provides an opportunity to enhance stroke survivorship and to reduce the disease and disability burden in Nevada through the identification of priority areas upon which to focus QI efforts. Aggregate data reporting allows participating hospitals the opportunity to identify and celebrate areas of success and optimal implementation of QI measures by displaying excellent performance measure outcomes. The results of the reported performance measures, along with the provided recommendations, are offered to address QI statewide, as opposed to at the level of the individual hospital. Efforts of the DPBH HDSP Program, in collaboration with Nevada's Stroke Task Force and the AHA/ASA, will need to align when addressing QI opportunities for promoting and implementing enhanced stroke prevention and care along the continuum of stroke prevention education, EMS activation and destination protocols, optimal acute stroke treatment, and post-stroke care, particularly regarding readmissions.

Stroke prevention education needs to address the importance of widespread awareness of stroke signs/symptoms, high blood pressure and high cholesterol control (including medication adherence), smoking cessation, importance of physical activity and exercise, and diabetes control. Expanding stroke data collection efforts to include EMS and rural Critical Access Hospitals will allow for more complete regional representation independent of facility size and location. It is also important to promote the value of complete reporting and to encourage all 15 hospitals to opt-in to reporting individual data to the Nevada Stroke Registry by sharing permission so DPBH staff can view their individual GWTG data.

Increased stroke education efforts, particularly in relation to the disparity in stroke burden and the lowest-scoring performance measure (dysphagia screening), need to be deployed to all stroke stakeholders working in concert to leverage resources and scope of impact. Closing the circle for seamless information flow from stroke education to pre-hospital, and hospital care, to post-discharge care will be key to implementing QI at the health systems level statewide. This will ensure each Nevadan has the optimal experience to enhance survival and decrease disability burden in case of stroke.

## Definitions and Performance Measures <sup>13</sup>

**Activation of Emergency Medical Systems:** If a patient experiences one or more signs/symptoms of a stroke, they should immediately call 9-1-1 and activate the emergency response system. Early access to advanced care and early definitive interventions are imperative for the best possible patient outcomes. Patients should arrive at the nearest appropriate acute care facility within one hour of the onset of signs and symptoms.

**Anticoagulants:** drugs that slow the clotting process in the blood preventing blood clots from forming.

**Anticoagulation for Atrial Fibrillation:** percentage of patients with an ischemic stroke or TIA also presenting with atrial fibrillation and/or atrial flutter who are discharged on anticoagulation therapy (medication that prevents clotting).

**Antithrombotic at discharge:** percentage of ischemic stroke or TIA patients prescribed antithrombotic medications (prophylactics that prevent clot formation) at discharge.

**Atrial Fibrillation:** an irregular heartbeat (or arrhythmia) that may result in blood clots, stroke, heart failure, and other heart-related complications.

**Atrial Flutter:** arrhythmia due to problems with the electrical system of the heart originating in the atria.

**Cephalgia:** sudden onset of severe headache or pain. Often described as the worst “headache” of the patient’s life.

**Cerebrovascular event:** a clinical syndrome caused by disruption of blood supply to the brain, characterized by rapidly developing signs of focal or global disturbance of cerebral functions, lasting for more than 24 hours or leading to death. A transient ischemic attack (TIA) refers to a similar presentation that resolves within 24 hours.

**Difficulty ambulating:** acute onset of stroke often leaves patients unable to walk due to hemiparesis, with a loss of coordination, or leaves them with an unsteady gait, increasing the risk of falls.

**Dysphagia Screening:** percentage of patients screened for dysphagia (difficulty swallowing), using evidence-based protocol, before allowing any foods, fluids, and/or medications orally.

**Dysphagia:** (difficulty swallowing) patients may suddenly lose the ability to swallow, feel like they are choking, and/or feel as if something is lodged in their throat.

**Early Antithrombotics:** percentage of stroke or TIA patients who have received antithrombotic therapy by the end of admission day two.

**Elective Carotid Intervention Only:** elective definitive interventions include elective carotid endarterectomy, angioplasty, and carotid stenting.

**Facial Droop:** patients develop a sudden onset of facial numbness or droop. This often happens to only one side of the face and can be accompanied by slurred speech or difficulty speaking.

**Follow-up Care:** Patients who have suffered a stroke are at higher risk for suffering additional strokes. Stroke Care Teams at each hospital should develop a post-discharge care plan for patients, including follow-up primary care visits, medication regimens, physical therapy, occupational therapy, and other services including support groups.

**Hemiparesis or hemiplegia:** sudden onset of one-sided weakness and/or movement, usually beginning in the face and associated side of the body.

**Intracerebral Hemorrhage (ICH):** occurs when a blood vessel within the brain ruptures, allowing blood to leak inside the brain.

**Ischemic Stroke (IS):** occurs when an artery to the brain is blocked resulting in inadequate blood supply and oxygen.

**IV rt-Tissue Plasminogen Activator (t-PA):** percentage of ischemic stroke patients who arrived at the hospital within two hours of their last known stroke event and received tissue plasminogen activator to dissolve clots and improve blood flow within three hours of last known stroke event.

**Low Density Lipoprotein (LDL):** percentage of patients with LDL levels  $\geq 100$ , or not measured, or on cholesterol-reducer prior to admission, who are discharged on statin medication (cholesterol-reducing drugs).

**Medication Adherence:** Patients are discharged on specific medication regimens after suffering a stroke to help prevent additional strokes. These medications may include antihypertensives, antithrombins, anticoagulation therapies, and antilipidemics.

**Rehabilitation:** percentage of patients with stroke evaluated for rehabilitation services including modalities within the hospital, subacute care, long-term care facility, home, and outpatient therapies.

**Risk Factors for Stroke:** include, but are not limited to, using tobacco products, obesity/overweight, high blood pressure, high cholesterol (LDL), heart disease, diabetes, and sickle cell disease.

**Smoking Cessation:** percentage of patients with history of tobacco use who receive, or their caregivers receive, smoking cessation advice or counseling during hospital stay.

**Stroke Education:** patients/caregivers provided with education and/or educational materials during the hospital stay addressing personal risk factors and warning signs of stroke, activation of emergency medical system, need for follow-up after discharge, and medications prescribed.

**Subarachnoid Hemorrhage (SAH):** occurs when a blood vessel just outside the brain ruptures. The area of the skull surrounding the brain (the subarachnoid space) rapidly fills with blood.

**Transient Ischemic Attack (TIA):** occurs when a clot (typically blood) temporarily blocks an artery and part of the brain does not get the blood flow it needs. Symptoms occur rapidly and usually last for a short time (less than 24 hours) before resolving completely and leaving no permanent damage.

**VTE Prophylaxis:** percentage of patients with ischemic stroke, hemorrhagic stroke, or like conditions who receive venous thromboembolism prophylaxis (VTE) the day of or day after hospital admission.

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