

# *Nevada Stroke Registry: 2018 Data Summary*

---

*June 2019 | Edition 1.0*



*Office of Analytics  
Division of Public and Behavioral Health  
Department of Health and Human Services*

**Steve Sisolak**  
*Governor  
State of Nevada*

**Lisa Sherych**  
*Interim Administrator  
Division of Public and Behavioral Health*

**Richard Whitley, MS**  
*Director  
Department of Health and Human Services*

**Ihsan Azzam, PhD, MD**  
*Chief Medical Officer  
Division of Public and Behavioral Health*

# Acknowledgements

---

## Report Prepared by:

### **Masako Berger, RD, MPH**

Health Systems Manager  
Chronic Disease Prevention and Health Promotion  
Nevada Division of Public and Behavioral Health

### **Mojde Mirarefin, MPH, MS**

Chronic Disease Evaluator  
Chronic Disease Prevention and Health Promotion  
Nevada Division of Public and Behavioral Health

### **Lisa Sheretz**

Heart Disease and Stroke Prevention Program Coordinator  
Chronic Disease Prevention and Health Promotion  
Nevada Division of Public and Behavioral Health

### **Jason Courtney, MPH**

CDC 1817 Grant Program Coordinator  
Chronic Disease Prevention and Health Promotion  
Nevada Division of Public and Behavioral Health

## Editing, Review, and Comments:

### **Kristi Robusto, PhD, MS**

Section Manager  
Chronic Disease Prevention and Health Promotion  
Nevada Division of Public and Behavioral Health

### **Candice McDaniel, MS**

Bureau Chief  
Bureau of Child, Family and Community Wellness  
Nevada Division of Public and Behavioral Health

## For Additional Information Contact:

### **Masako Berger, RD, MPH**

Health Systems Manager  
Chronic Disease Prevention and Health Promotion  
Nevada Division of Public and Behavioral Health

### **Karissa Loper, MPH**

Deputy Bureau Chief  
Bureau of Child, Family and Community Wellness  
Nevada Division of Public and Behavioral Health

## Data Provided by:

### **Helen See, MPH**

Chronic Disease Biostatistician  
Office of Analytics  
Nevada Department of Health and Human Services

## Recommended Citation

Office of Analytics. Division of Public and Behavioral Health. *Nevada Stroke Registry: 2018 Data Summary*. Carson City, Nevada e 1.0. June 2019.

## Table of Contents

<b>Background and Purpose</b> .....	<b>1</b>
<b>Nevada Stroke Burden</b> .....	<b>2-5</b>
<b>Population and Limitations</b> .....	<b>6</b>
<b>Demographics</b> .....	<b>7</b>
<b>Demographics-Who Is Affected?</b> .....	<b>8-9</b>
<b>Performance Measures</b> .....	<b>10</b>
<b>Dysphagia Screening</b> .....	<b>11</b>
<b>Stroke Education</b> .....	<b>12</b>
<b>Anticoagulants for Treatment of Atrial Fibrillation and Atrial Flutter</b> .....	<b>13</b>
<b>IV t-PA Administration</b> .....	<b>14</b>
<b>Early Antithrombotic Therapy</b> .....	<b>15</b>
<b>Pre-Hospital Mode of Transport</b> .....	<b>16</b>
<b>Recommendations and Aggregated Data</b> .....	<b>17</b>
<b>Legislative Recommendations</b> .....	<b>18</b>
<b>Report Conclusions</b> .....	<b>18</b>

## Table of Figures

Figure 1. Prevalence of Chronic Diseases, Nevada vs. U.S., 2017 BRFSS Data .....	2
Figure 2. Prevalence of Chronic Diseases by Age Group, Nevada, 2017 BRFSS Data .....	3
Figure 3. Adults who have had a stroke, Nevada vs. U.S., 2006-2017 BRFSS Data .....	3
Figure 4. Adults who have had a stroke by race/ethnicity, Nevada, 2013-2017: Pooled BRFSS Data .....	4
Figure 5. Chronic Disease Mortality Rate by Year, Nevada Residents, 2011-2017 .....	4
Figure 6. Chronic Disease Mortality Rate by Race/Ethnicity, Nevada Residents, 2017 .....	5
Figure 7. Type of Stroke, Nevada Hospitals, 2018 .....	7
Figure 8. Stroke by Gender, Crude Rates, 2018 .....	8
Figure 9. Stroke by Age, Crude Rates, 2018 .....	8
Figure 10. Race/Ethnicity, Crude Rates, 2018 .....	9
Figure 11. Performance Measures, 2018, Nevada .....	10
Figure 12. Percent of Stroke Patients Who Undergo Screening for Dysphagia, 2012-2018 .....	11
Figure 13. Percent of Patients with Stroke or TIA or Their Caregivers Given Education During the Hospital Stay, 2012-2018 .....	12
Figure 14. Percent of Patients with Ischemic Stroke or TIA with Atrial Fibrillation Discharged on Anticoagulant Therapy, 2012-2018 .....	13
Figure 15. Percent of Acute Ischemic Stroke Patients Who Arrive at the Hospital Within 120 Minutes of Time Last Known Well and for Whom IV t-PA Was Initiated Within 180 Minutes of Time Last Known Well .....	14
Figure 16. Percent of Patients With Ischemic Stroke or TIA Who Receive Antithrombotic Therapy by the End of Hospital Day Two, 2012-2018 .....	15
Figure 17. Percent of Acute Ischemic Stroke Patients Receiving Intravenous Tissue Plasminogen Activator (t-PA) Therapy With 60 Minutes or Less of Door-to-Needle Time, 2012-2018 .....	15
Figure 18. Arrival Mode, 2018 .....	16

This page was intentionally left blank.

# Background and Purpose

---

In 2015, the Nevada Division of Public and Behavioral Health (DPBH) Chronic Disease Prevention and Health Promotion (CDPHP) Section began using the nationally recognized *Get With The Guidelines*<sup>™</sup> (GWTG) Registry Program, initiated and continued by the American Heart Association/American Stroke Association (AHA/ASA), as the state's standardized stroke data registry. By compiling data from the GWTG Registry, the Nevada Stroke Registry can provide Nevada acute care hospitals with the necessary tools to view statewide, aggregated data and implement changes in their health care systems to improve patient outcomes and quality of care.

Legislation passed in the 78<sup>th</sup> Session of the Nevada Legislature, [Senate Bill 196](#) (SB 196), required DPBH to establish a Stroke Registry to compile statistics regarding the treatment of stroke patients. The law requires DPBH to include a list of comprehensive and primary stroke centers. These stroke centers are required to report quality of care data to the Nevada Stroke Registry annually. Support for SB 196 was provided by partners including the AHA/ASA, the Nevada Hospital Association, and Nevada Rural Hospital Partners.

The GWTG Registry Program is used nationally to help ensure hospitals treat patients according to current nationally-accepted recommendations and 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, rather than at an individual hospital level, to enhance the ways data can be used to improve stroke survivorship and parity of care statewide, thereby decreasing the burden of disability. The Chronic Disease Evaluator was given super-user access to the GWTG Registry to review aggregate data from 16 certified stroke centers in Nevada. Currently, the Chronic Disease Evaluator has permission from 12 hospitals to view individual data; however, in the aggregate data report, all 16 hospitals are reflected.

To further assist with these efforts, CDPHP's Heart Disease and Stroke Prevention Program fostered the development of the Nevada Heart Disease and Stroke Prevention Taskforce, which is actively engaged in promoting quality improvements related to stroke care in Nevada. The Nevada Stroke Registry aligns with the goals of the Nevada Heart Disease and Stroke Prevention Taskforce, as it promotes the use of clinical best practices in pre-hospital and hospital settings. In the Heart Disease and Stroke Prevention Taskforce Strategic Plan, Goal 1 aligns with the health promotion aims of the Nevada Stroke Registry.

**Goal 1:** Promote the adoption of evidence-based quality measurement at the provider level.

Statutory guidance in SB 196 [Sec. 6(1) d and Sec. 7(1)] encourages DPBH to increase awareness of and reporting to the Stroke Registry by primary stroke centers, health care providers, and providers of emergency medical services (EMS) that treat patients who suffer from strokes in Nevada. This outreach further leads to sharing and analysis of stroke-related data and improvement in the quality of care for patients who experience stroke.

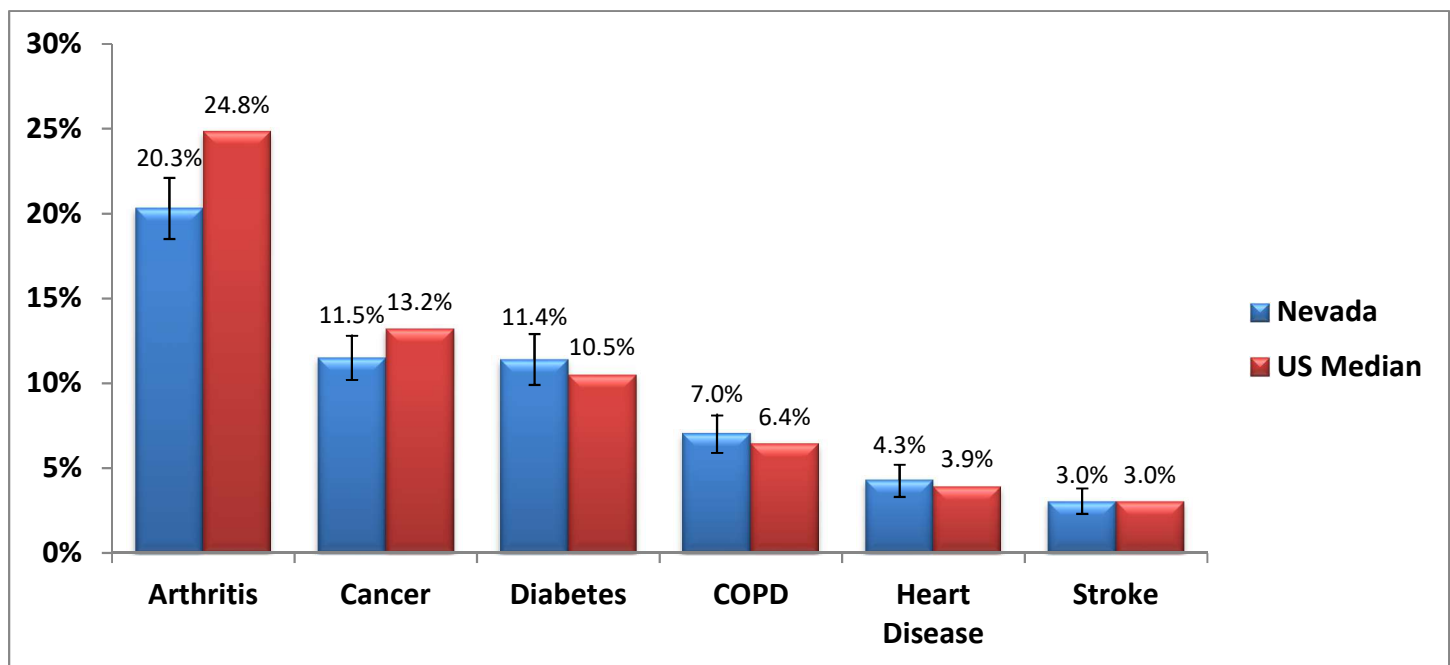
# Nevada Stroke Burden

Heart disease is the leading cause of death nationwide and in Nevada, while stroke is the fifth-leading cause of death nationwide and fourth in Nevada.<sup>1,2</sup>

Stroke kills more than 140,000 Americans each year and is responsible for one of every 20 deaths. It is estimated every four minutes someone dies of stroke, and every year approximately 795,000 Americans experience a stroke.<sup>3</sup> Of these stroke incidences, 610,000 (77%) are new, or first-time, strokes, and nearly one quarter involve patients with a history of stroke. Stroke is also a leading cause of long-term disability costing the United States \$33.9 billion annually.<sup>3</sup>

Many factors increase the risk of stroke: tobacco use, physical inactivity, obesity/overweight, high blood pressure, and high cholesterol.<sup>4</sup> Within these factors, tobacco use is also the leading cause of preventable death in the United States. Additionally, one-third of American adults have high blood pressure, and of those, more than half do not have it under control.<sup>5</sup>

In Figure 1 below, the prevalence of chronic disease in Nevada using sampled self-reported data from the 2017 Behavioral Risk Factor Surveillance System (BRFSS) is presented. Heart disease (4.3%) in Nevada is slightly higher than the U.S. median (3.9%), while the prevalence of stroke (3%) in Nevada is comparable to the U.S. median (3%).



**Figure 1. Prevalence of Chronic Diseases, Nevada vs. U.S., 2017 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, 2017

<sup>1</sup> Murphy SL, X.J. (2018). *Mortality in the United States, 2017, NCHS Data Brief*. Hyattsville, MD: National Center for Health Statistics.

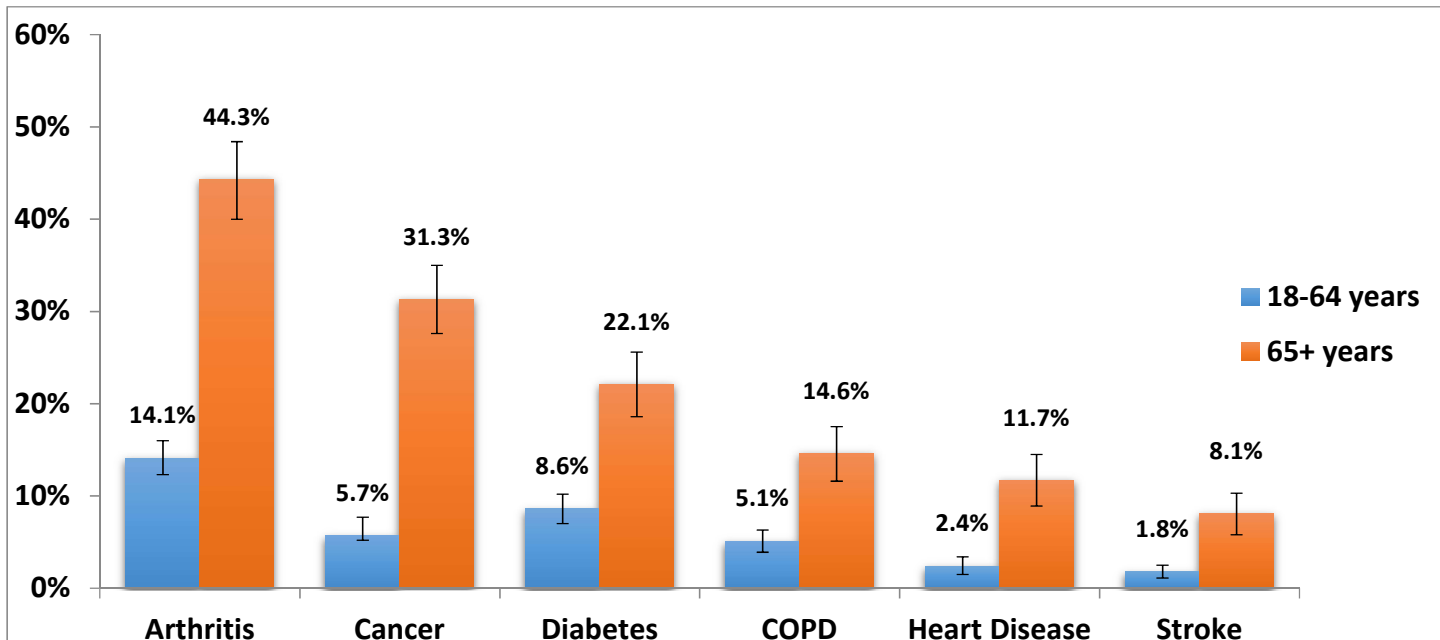
<sup>2</sup> Office of Analytics. Department of Health and Human Services. *Minority Health Report: 2012-2016*. Carson City, Nevada e1.0. March 2018.

<sup>3</sup> Yang Q, T. X. (2017). Vital signs: Recent Trends in Stroke Death Rates-United States, 2000-2015. *Morbidity and Mortality Weekly Report*, 933-939.

<sup>4</sup> American Heart Association. (2019, April 4). *Let's talk about stroke prevention: risk factors for stroke*. Retrieved from risk factors for stroke: [https://www.strokeassociation.org/-/media/stroke-files/lets-talk-about-risk-factors-for-stroke-ucm\\_309713.pdf?la=en&hash=19A31EF2419E43756C4B0208BBAC49CAD5BAD03E](https://www.strokeassociation.org/-/media/stroke-files/lets-talk-about-risk-factors-for-stroke-ucm_309713.pdf?la=en&hash=19A31EF2419E43756C4B0208BBAC49CAD5BAD03E)

<sup>5</sup> National Center for Health Statistics. (2017). *Health, United States, 2016: With Chartbook on Long-term Trends in Health*. Hyattsville.

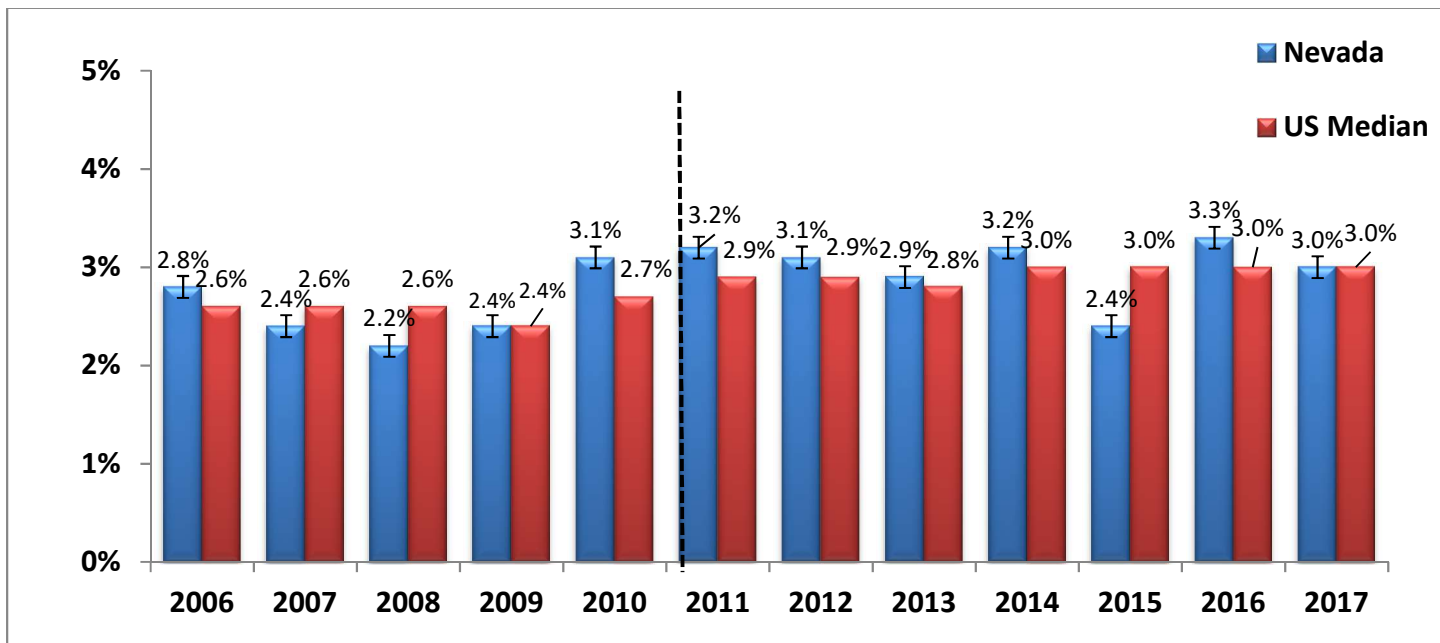
Figure 2 displays the prevalence of chronic disease in different age groups (18-64 years vs. 65+ years). Among the chronic diseases highlighted, adults older than 65 years have a higher prevalence compared to those ages 18-64 years.



**Figure 2. Prevalence of Chronic Diseases by Age Group, Nevada, 2017 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, 2017.

In Figure 3 the prevalence of stroke in Nevada is compared to prevalence of stroke in the United States from 2006 to 2017. Stroke prevalence in Nevada exceeded the median rate in the United States between 2010 and 2016, but not in 2015. The prevalence of stroke in Nevada was comparable to the United States median rate in 2017.

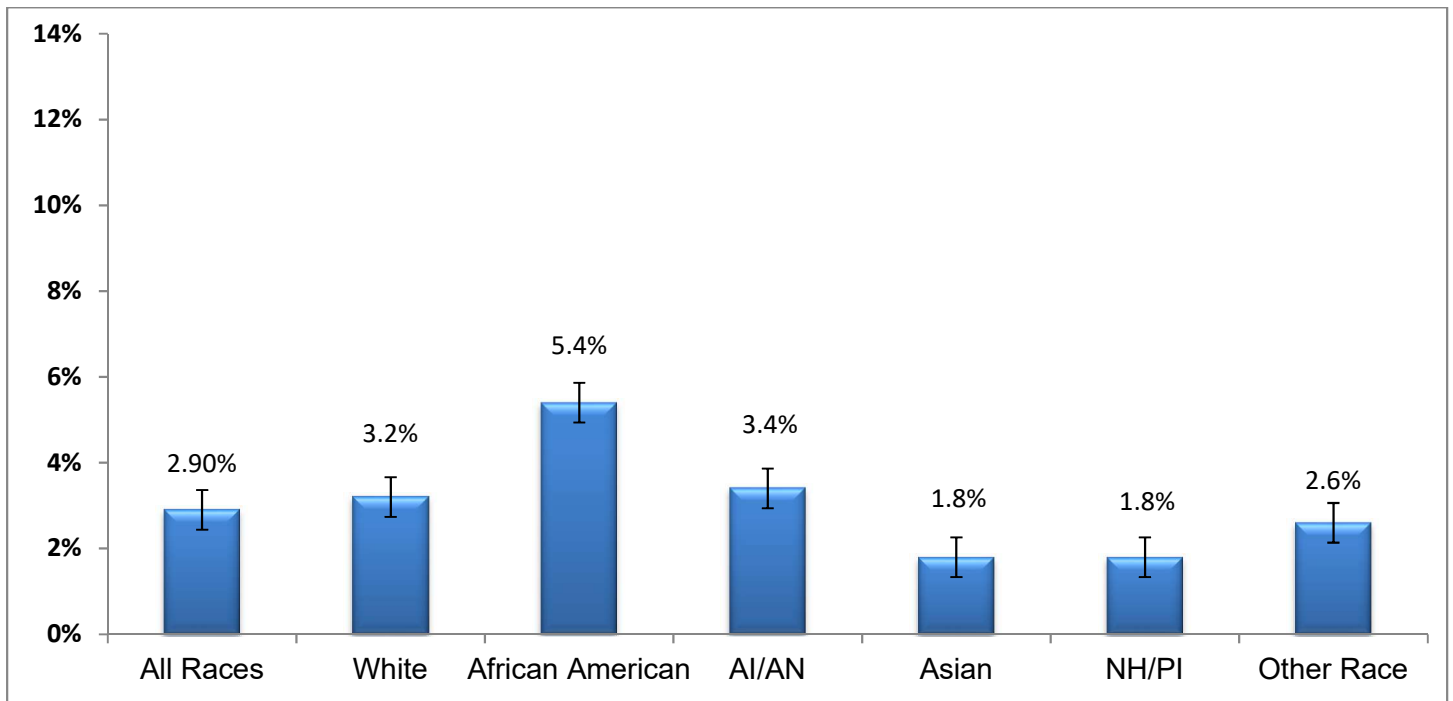


**Figure 3. Adults Who Have Had a Stroke, Nevada vs. U.S., 2006-2017 BRFSS Data**

Note: BRFSS methodology changed in 2011, therefore it may be misleading to compare statistics before and after the methodology change. 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, 2006-2017.



Presented in Figure 4 are the estimates of stroke prevalence in Nevada by race/ethnicity, based on pooled BRFSS data between 2013 and 2017. The disparity of stroke prevalence in African-American populations is striking (5.4%) and indicates a clear need to focus more resources on addressing this disparity.

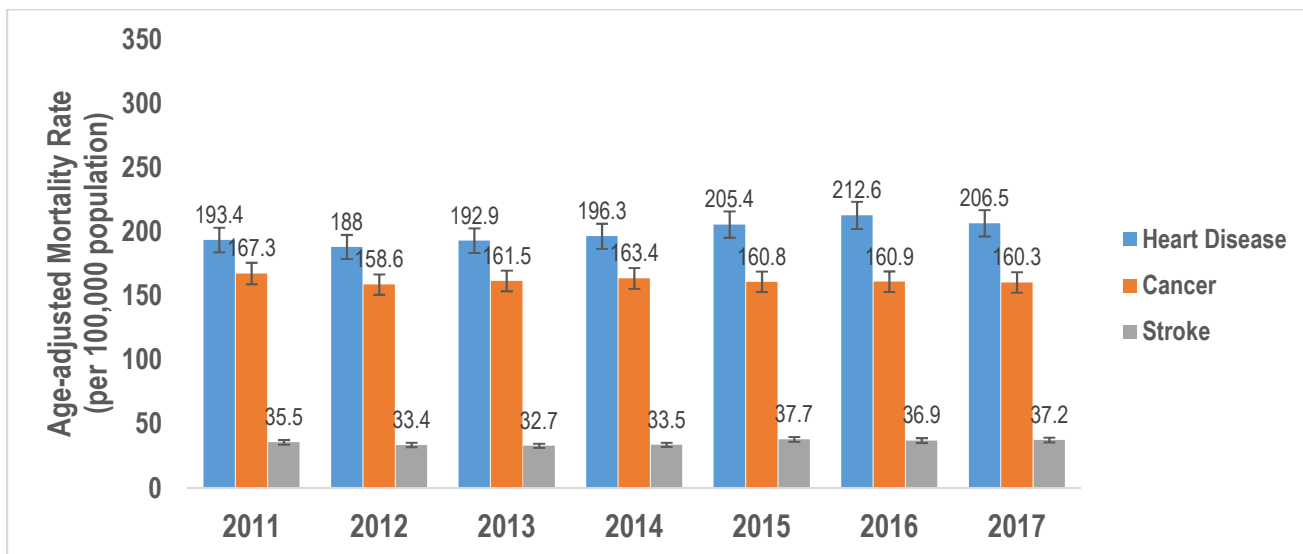


**Figure 4. Adults who have had a stroke by race/ethnicity, Nevada, 2013-2017: Pooled BRFSS data**

AI/AN: American Indian/Alaska Native; NH/PI: Native Hawaiian/Pacific Islander

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, 2013-2017.

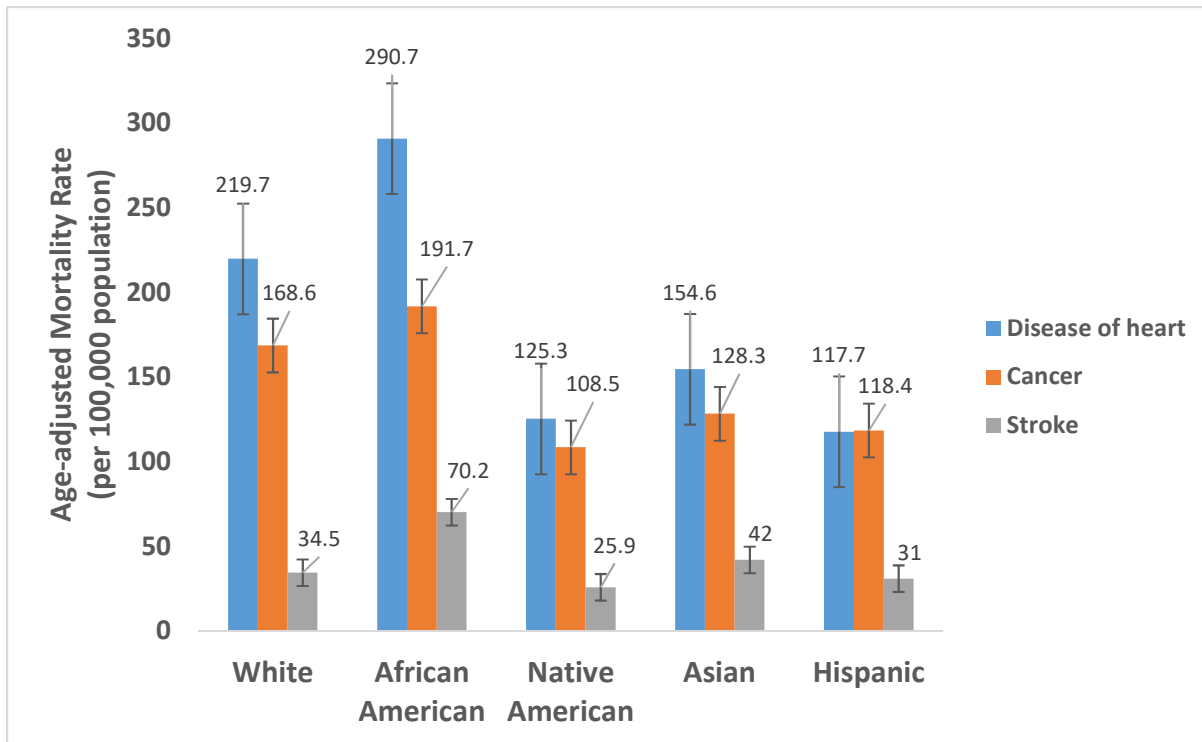
In 2017, stroke accounted for 4.5% of mortality statewide. Figure 5 presents age-adjusted stroke mortality rates in Nevada from 2011-2017. The stroke mortality rate increased from 2013 to 2015 and it remained relatively stable from 2016 to 2017.



**Figure 5. Chronic Disease Mortality Rate by Year, Nevada Residents, 2011-2017**

Source: Nevada Division of Public and Behavioral Health. Office of Analytics, 2019.

Figure 6 presents chronic disease mortality rates in Nevada by different race/ethnicity groups. Similar to Figure 4, racial/ethnic disparities exist in Nevada and need to be addressed to improve care for these population groups. The heart disease mortality rate is highest among African Americans, followed by Whites and Asians. Additionally, the stroke mortality rate is highest among African Americans, followed by Whites and Asians.



**Figure 6. Chronic Disease Mortality Rate by Race/Ethnicity, Nevada Residents, 2017**

Source: Nevada Division of Public and Behavioral Health. Office of Analytics, 2019.

# Population and Limitations

---

This report was developed using aggregate data from the 16 stroke centers participating in the GWTG Registry in Nevada. In 2018, the participating stroke centers treated nearly 82% of all stroke visits reported in the Hospital Inpatient Billing (HIB) Data and the Hospital Emergency Department Billing (HEDB) Data collected in Nevada. The HIB and HEDB Data reflect all hospital visits in which treatment was provided to patients who were diagnosed with stroke-related International Classification of Diseases (ICD) Codes (ICD-10 codes: I60 – I69). However, these data do not reflect all Nevada’s hospital data.

The stroke performance measures are reflective only of the hospitals currently participating in the GWTG-Stroke (GWTG-S) Registry Program and therefore may not be generalized to the state of Nevada. Currently, the Nevada Stroke Registry is receiving individual hospital data from 12 of the 16 certified stroke centers reporting into GWTG-S and aggregate data from all 16 hospitals. Additional limitations include incomplete data on the percentage of total stroke cases in Nevada.

The provisions of SB 196 require only the certified stroke centers in Nevada to report data to the Nevada Stroke Registry. Nevada currently has 32 hospitals; 16 hospitals are certified stroke centers per AHA/ASA designation. The data accessed through GWTG-S is de-identified and not compiled in a fashion to allow comparisons across different hospitals. The data accessed through GWTG-S will be analyzed to develop patient care quality improvement recommendations. For example, the aggregate data from all 16 hospitals can be used to address disparities in stroke prevalence by race/ethnicity, gender, and insurance status.

CDPHP will continue to educate hospitals on the importance of providing comprehensive data to the Nevada Stroke Registry.

## Nevada Hospitals Participating in the Stroke Registry (as of April 2019)

Centennial Hills Hospital \*  
Desert Springs Hospital \*  
Henderson Hospital\*  
Mountain View Hospital \*  
Northern Nevada Medical Center \*  
Renown Regional Medical Center \*  
St. Mary's Regional Medical Center  
St. Rose Dominican Hospital-Rosa de Lima  
St. Rose Dominican Hospital-San Martin  
St. Rose Dominican Hospital-Siena  
Southern Hills Hospital and Medical Center \*  
Spring Valley Hospital Medical Center \*  
Summerlin Hospital Medical Center \*  
Sunrise Hospital \*  
University Medical Center-Las Vegas\*  
Valley Hospital Medical Center\*

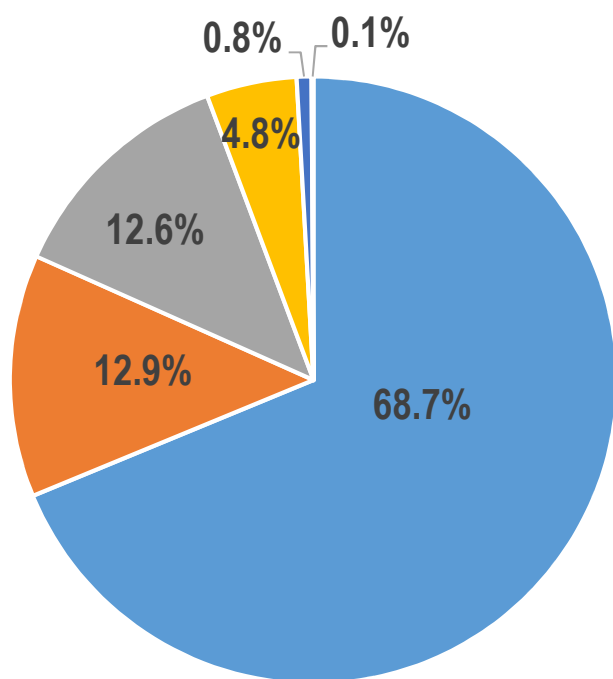
*\* Denotes facilities that can currently be viewed individually in GWTG due to super-user permission status.*

# Demographics

## Definitions <sup>6</sup>

This report has been developed using de-identified patient data from GWTG-participating hospitals in Nevada for calendar year 2018. The pie chart below displays the percentage of cerebrovascular events which occurred in reporting hospitals in Nevada in 2018. The most common type of stroke for 2018 was ischemic stroke (68.7%) followed by intracerebral hemorrhage (12.9%), transient ischemic attack (12.6%), subarachnoid hemorrhage (4.8%), other types of stroke (0.8%) and elective carotid intervention only (0.1%).

Figure 7. Type of Stroke, Nevada Hospitals, 2018



- Ischemic stroke
- Intracerebral Hemorrhage
- Transient ischemic attack (<24 hours)
- Subarachnoid Hemorrhage
- Other
- Elective Carotid Intervention only

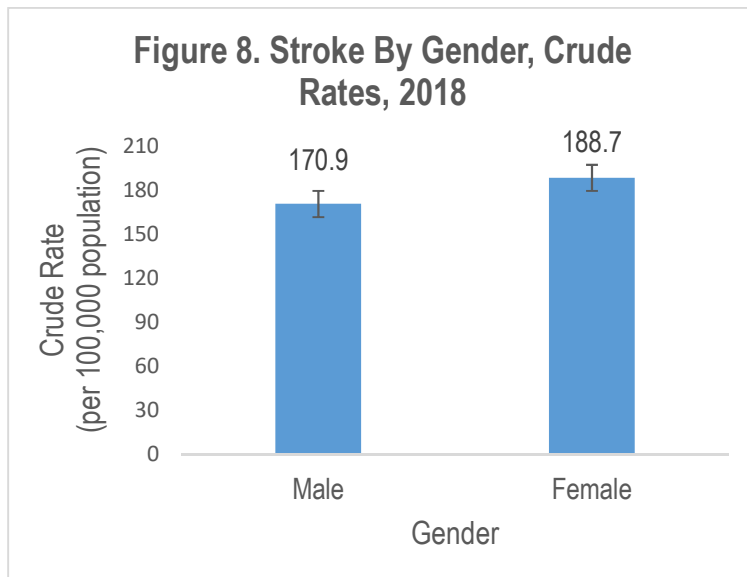
- **Cerebrovascular event:** a clinical syndrome caused by disruption of blood supply to the brain, characterized by rapidly developing signs of focal or global disturbance of cerebral functions, lasting for more than 24 hours or leading to death. A transient ischemic attack (TIA) refers to a similar presentation that resolves within 24 hours.
- **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.
- **Ischemic Stroke (IS):** occurs when an artery to the brain is blocked resulting in inadequate blood supply and oxygen.
- **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.
- **Intracerebral Hemorrhage (ICH):** occurs when a blood vessel within the brain ruptures, allowing blood to leak inside the brain.
- **Elective Carotid Intervention Only:** elective definitive interventions include elective carotid endarterectomy, angioplasty, and carotid stenting.
- **Other:** includes stroke not otherwise specified, no stroke-related diagnosis, and missing diagnosis.

<sup>6</sup>Maxine Papadakis, S. M. (2019). *Current Medical Diagnosis and Treatment*. New York: McGraw-Hill Education.  
Nevada Stroke Registry: 2018 Data Summary

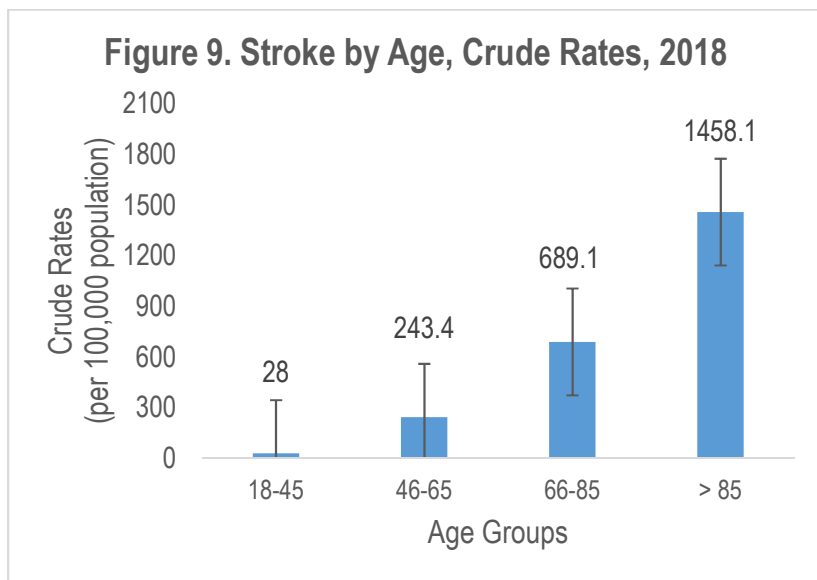
# Demographics - Who is Affected?

The Nevada Stroke Registry provides information on stroke as it relates to gender and age group. In 2018, the crude rate of stroke per 100,000 population in females slightly exceeded that for males, and the oldest age group (85+) experienced the highest burden of stroke. The crude rate is generated by dividing the total number of cases in a specific time by the total number of people in the state's population.

When examining the data by gender, females (188.7 per 100,000 population) had higher rates of stroke compared to males (170.9 per 100,000 population).



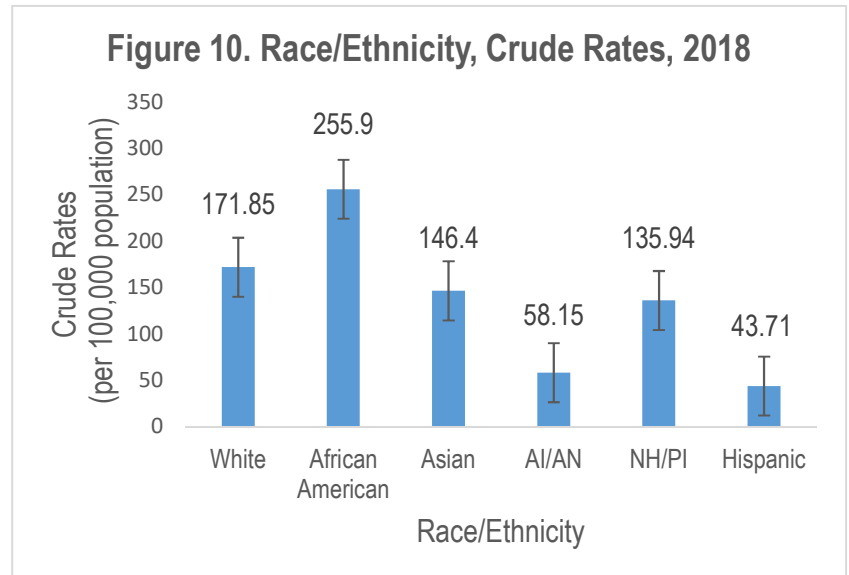
When examining the distribution of stroke by age group, individuals 85 years and older (1,458 per 100,000 population) experienced the highest rate of stroke compared to all other age groups.



# Demographics - Who is Affected?

The Nevada Stroke Registry provides information on stroke as it relates to race and ethnicity (Hispanic and non-Hispanic). The crude rate of stroke in African Americans (255.9 per 100,000 population) exceeds that of other racial and ethnic groups.

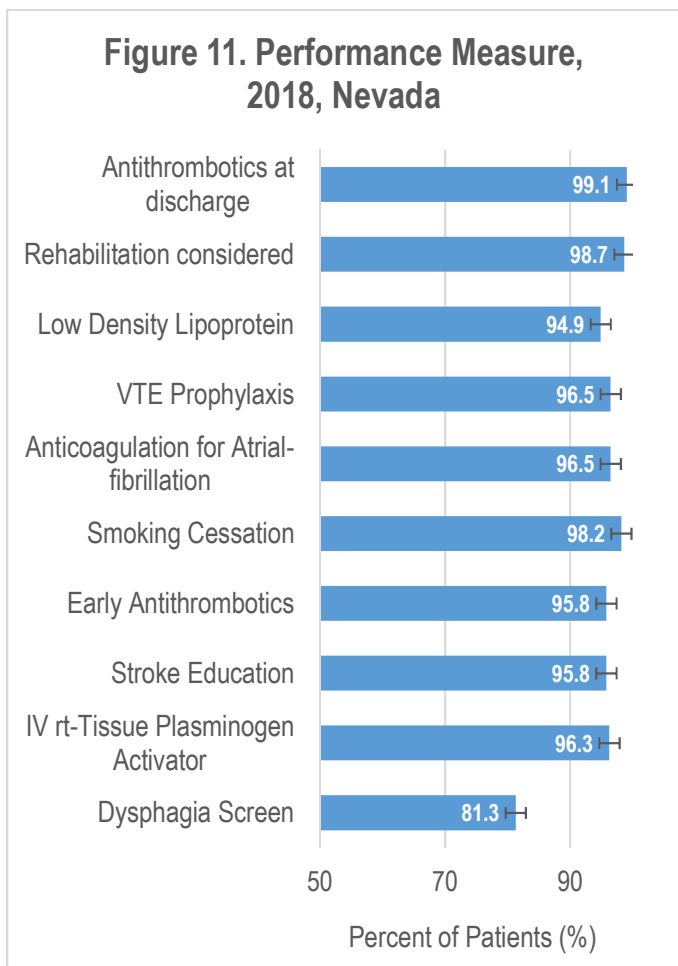
When examining the distribution of strokes by race/ethnicity, African Americans (255.9 per 100,000 population) and Whites (171.8 per 100,000 population) experienced higher rates of stroke in 2018 compared to other racial and ethnic groups.



AI/AN: American Indian/Alaska Native; NH/PI: Native Hawaiian/Pacific Islander

# Performance Measures

The performance measures listed below coincide with the Paul Coverdell core consensus measures and are based on GWTG-S data reported by primary stroke centers in Nevada between July 2017 and June 2018. Performance measures were developed by the Joint Commission, AHA/ASA, and the Centers for Disease Control and Prevention (CDC) for optimal treatment of ischemic strokes. The core performance measures were examined by geographic location for 12 individually identifiable hospitals. Specific core measures indicated differences between regions in 2018: anticoagulation for atrial-fibrillation (north at 100%, south at 95.3%), stroke education (north at 100%, south at 96.6%), and early antithrombotics (north at 99.1%, south at 94.6%).



## Performance Measures <sup>7</sup>

- **Antithrombotics at discharge:** percentage of ischemic stroke or TIA patients prescribed antithrombotic medications (prophylactics that prevent clot formation) at discharge.
- **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.
- **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).
- **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.
- **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).
- **Smoking Cessation:** percentage of patients with history of tobacco use who receive, or their caregivers receive, smoking cessation advice or counseling during hospital stay.
- **Early Antithrombotics:** percentage of stroke or TIA patients who have received antithrombotic therapy by the end of admission day two.
- **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.
- **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.
- **Dysphagia Screening:** percentage of patients screened for dysphagia (difficulty swallowing), using evidence-based protocol, before allowing any foods, fluids, and/or medications orally.

<sup>7</sup> PMT, G.W.-S. (2019, January). *Quality Measure Description*. Retrieved from Get With the Guidelines Community Page: [https://osstatic.irqvia.com/online\\_doc\\_qi/StrokePMT/measure/Quality%20Measure%20Descriptions.html](https://osstatic.irqvia.com/online_doc_qi/StrokePMT/measure/Quality%20Measure%20Descriptions.html)

# Dysphagia Screening

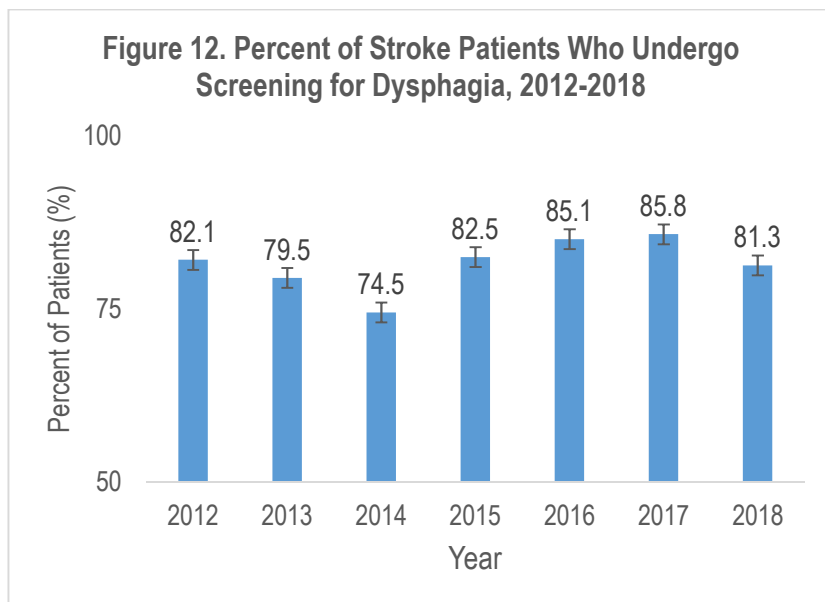
Dysphagia, or difficulty swallowing, is common after stroke, affecting almost 54% of patients within three days after stroke. Early screening helps to identify stroke patients who could be vulnerable to weight loss, fluid depletion, malnutrition, and aspiration of food or liquid causing pneumonia. Patients who are unable to consume food or fluid by mouth often demonstrate poor health outcomes and experience prolonged hospital stays including post-discharge long-term care facility admissions.

## Dysphagia Screening Action Plan

Hospitals should identify and recruit professionals to develop an interdisciplinary Stroke Care Team (e.g., speech therapist, occupational therapist, physical therapist, social worker, registered dietician, and nurse navigator) to develop policies to integrate evidence-based dysphagia screenings into the stroke patient's care plan. In addition, it is recommended the Stroke Care Team continuously participate in trainings to learn best practices for stroke care. The hospital's risk management and quality improvement team should closely monitor these activities and deliver recommendations for continuous quality improvement.

Dysphagia screening was the lowest-performing core measure in Nevada (81.3% of patients in the primary stroke centers received screening).

**Improvement in dysphagia screening practices among the primary stroke centers is one of the recommendations for statewide performance improvement.**





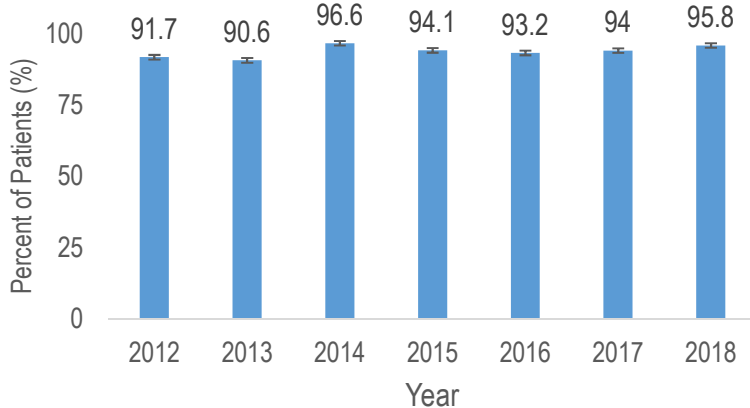
# Stroke Education

The percentage of patients or caregivers provided education addressing personal risk factors for stroke, warning signs for stroke, activation of the emergency medical system, need for follow-up after discharge, and medications prescribed increased from 91.7% in 2012 to 96.6% in 2014. However, there were slight decreases between 2014 and 2016, with increases observed from 2016 to 2018. Increasing efforts by all stroke stakeholders on stroke education across the continuum of care (prevention, treatment, rehabilitation, decreasing readmissions, and re-occurrence) is key to raising the stroke education performance measure. Nevadans will benefit from a coordinated statewide effort to increase recognition of the signs of stroke and improve preventive behaviors and lifestyle factors.

## Stroke Education 7

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

**Figure 13. Percent of Patients with Stroke or TIA or Their Caregivers Given Education During the Hospital Stay, 2012-2018**



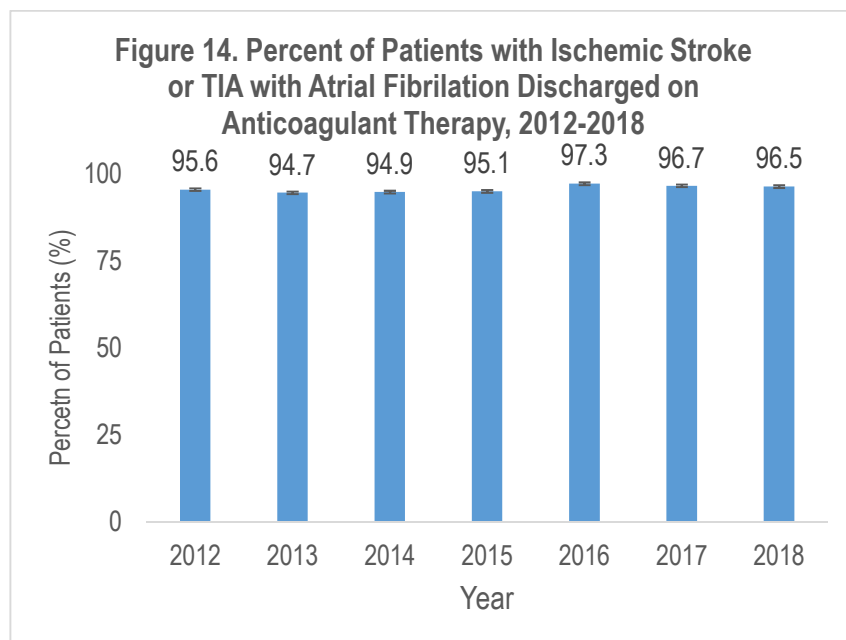
# Anticoagulants for Treatment of Atrial Fibrillation and Atrial Flutter

**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.

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

The percent of patients with an ischemic stroke or TIA with atrial fibrillation and/or flutter discharged on anticoagulation therapy has experienced fluctuations since 2015, after a four-year period of no significant changes. However, the rate change from 2017 to 2018 is negligible.

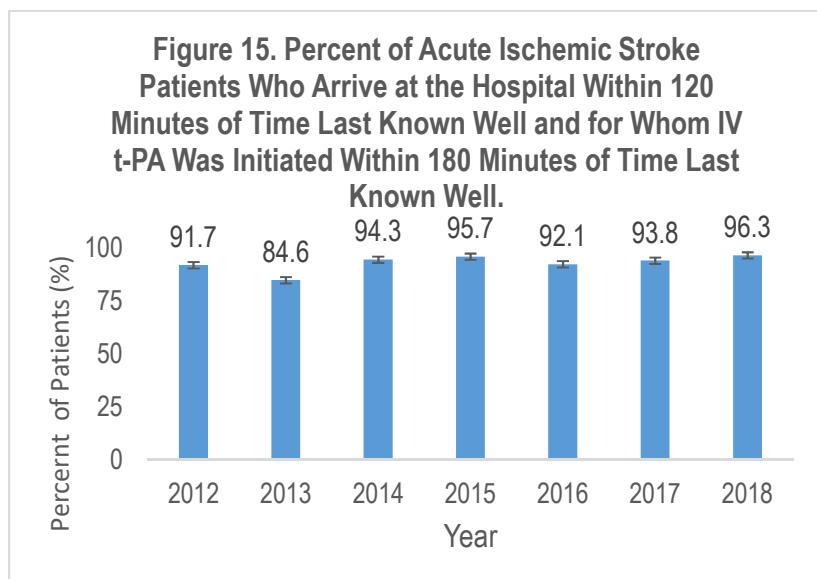


## IV t-PA Administration

The IV t-PA administration performance measure reflects the percentage of ischemic stroke patients who arrived at the hospital within two hours of their last known stroke and received tissue plasminogen activator to dissolve clots and improve blood flow within three hours of last known stroke.

Focused efforts to increase awareness of the key time periods for administration, the benefits of use, and the importance of administration in a continuum of care may be productive routes to improving this performance measure, keeping in mind the contraindications listed in the sidebar.

IV t-PA administration for eligible patients increased from 91.7% in 2011 to 95.7% in 2015. Although this measure showed a decrease from 2015 to 2016, it increased by 2.66% from 2017 to 2018, and is now the highest rate Nevada has experienced for this measure.



<sup>8</sup> Fugate, J. E., & Rabinstein, A. A. (2015). Absolute and Relative Contraindications to IV rt-PA for Acute Ischemic Stroke. *The Neurohospitalist*, 5(3), 110–121. doi:10.1177/1941874415578532

### Contraindications for Administering IV t-PA <sup>8</sup>

**Recent Intracranial or Spinal Surgery or 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 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 (systolic  $> 185$  or diastolic  $> 110$  mmHg)

**Thrombocytopenia and Coagulopathy**

**More Than Two Hours since Last Known Stroke Event:** time of onset of symptoms or time the patient was last known to be well or symptom-free.

# Early Antithrombotic Therapy

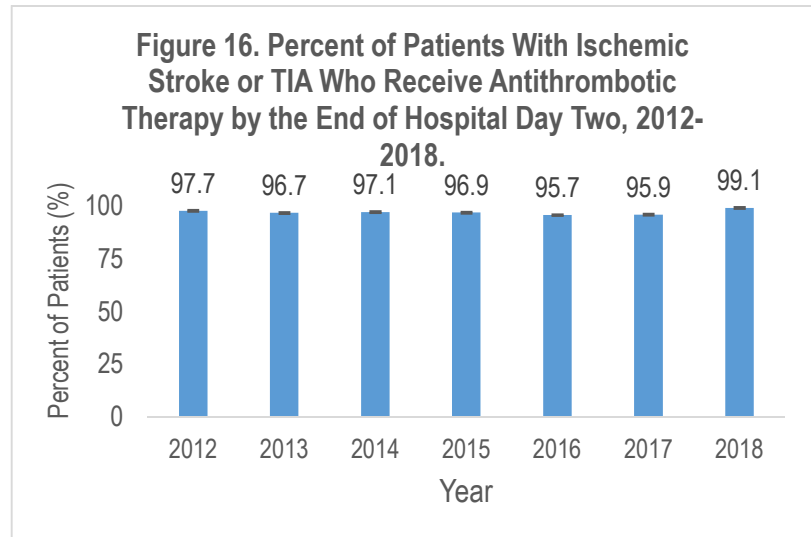
Early antithrombotic therapy (before the end of the second hospital day) has remained constant from 2012 to 2018. Currently, available data demonstrates a small decline in mortality and unfavorable outcomes with the administration of aspirin within 48 hours after stroke. It appears the primary effects of aspirin are attributable to a reduction in early recurrent stroke.

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

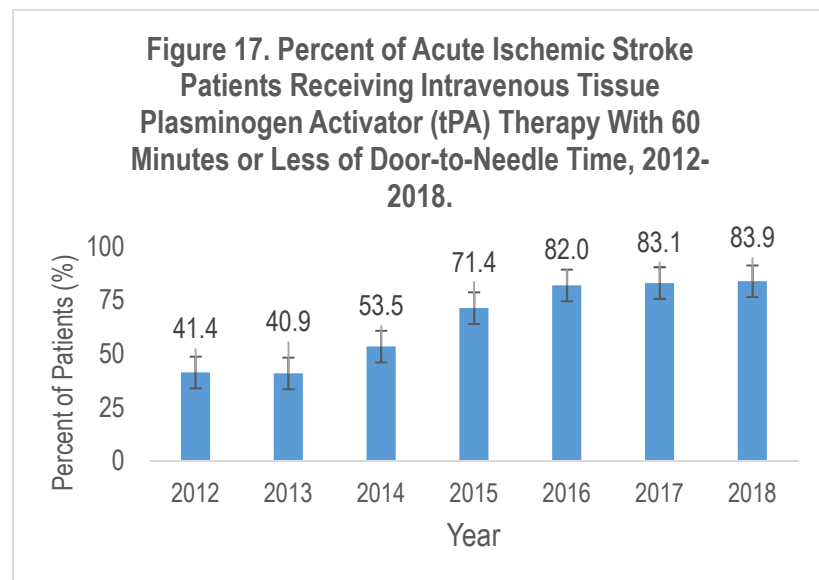
## Time to Intravenous Thrombolytic Therapy

The graph on the right indicates the need to continue increasing statewide performance regarding the percent of patients who received intravenous thrombolytic therapy within 60 minutes as an opportunity to improve stroke outcomes in Nevada. Although this measure is not part of the ten core consensus measures, it highlights improving statewide performance over the past five years, as well as an opportunity for more statewide quality improvement.

The percent of patients with an ischemic stroke or TIA who received antithrombotic therapy by the end of the second hospital day increased by 3.3% between 2017 and 2018.



The percent of patients with an ischemic stroke who received thrombolytic therapy within 60 minutes has significantly improved in the past five years.



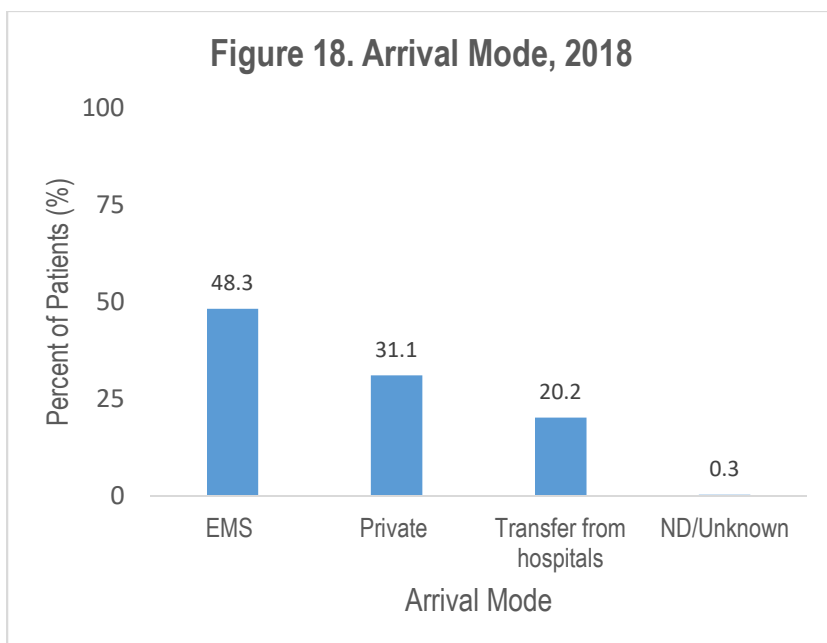
# Pre-Hospital Mode of Transport

## Notification and Response of EMS for Stroke

The notification and response of EMS to a stroke involves a complex interaction between the public, the applicable EMS program, and the relevant hospital emergency department. 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 also important for EMS and emergency dispatch operators to be trained in stroke symptom recognition and be able to assist patients to quickly get to the nearest hospital that can provide IV t-PA within the three-hour window from symptom onset.

Additional measures relating to arrival mode of transport are displayed in Figure 18. A measure relating to EMS pre-notification indicates in 2018, 48.3% of stroke patient encounters involved hospital pre-notification by EMS, offering room for improvement to increase pre-notification rates statewide to maximize transitions along the stroke continuum of care.

In addition to mode of transport, a measure on arrival time to a primary stroke center offers opportunities for improvement to maximize survivorship and decrease disability burden. In 2018 GWTG data, most people arrived at the stroke center more than one day or unknown (32%) followed by more than 540 minutes (13%) and 0-1 day (12%) for arrival time at the stroke center, offering opportunities to improve statewide reporting for this measure and reduce the arrival time to stroke centers thereby decreasing disability.



<sup>9</sup> Jauch, E. (2019, March 28). *Stroke Clinical Presentation*. Retrieved from Medscape: <https://emedicine.medscape.com/article/1916852-clinical>

## Stroke Symptoms (With Acute Onset) <sup>9</sup>

**Altered Mental Status:** patients suddenly become confused, disoriented, agitated, or unresponsive.

**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.

**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.

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

**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.

**Cephalgia:** sudden onset of severe headache or pain. Often described as the worst "headache" of the patient's life.

**Sudden numbness or weakness** of the face, arm, or leg on one side of the body.

**Sudden confusion, difficulty talking or understanding.**

**Sudden trouble seeing on one side.**

**Sudden, severe difficulty walking, dizziness, and/or loss of coordination or balance.**

**Sudden severe headache for no known reason.**

**Anyone experiencing these symptoms or noticing these symptoms in another person should immediately dial 9-1-1. It is also important to note the time of symptom onset.**

# Recommendations and Aggregated Data

---

CDPHP has developed recommendations for improving outcomes based on 2018 aggregate Nevada Stroke Registry data:

- Currently, only 12 of the 16 facilities have completed and returned a Memorandum of Agreement (MOA) for data sharing/super-user allowance to Quintiles (GWTG vendor).
  - **Quality Improvement (QI) recommendation: Increase the number of MOAs returned to DPBH to include all 16 primary care stroke facilities in Nevada to enable viewing all hospitals' individual data to identify successful quality performance measures.**
  - **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 African Americans in Nevada. An emphasis should be placed on addressing racial and ethnic disparities relating to stroke prevention and care and identified contributing factors.**
- The core performance measures were examined by geographic location for the 12 individually-identifiable hospitals. Specific core measures showed some differences between regions in 2018: anticoagulation for atrial-fibrillation (north at 100%, south at 95.3%), stroke education (north at 100%, south at 96.6%), and early antithrombotics (north at 99.1% and south at 94.6%).
  - **QI recommendation: Examine geographic location data to identify opportunities for targeted technical assistance which can reveal regional differences.**
- Reporting fatigue on the part of providers and organizations coupled with numerous reporting requirements and demands is a barrier 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. Find ways 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

---

Senate Bill 196 (78<sup>th</sup> Nevada Legislature, 2015), section 9, subsection 2, subsection b states 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 due to the need to address the limitations stated in this report, and because access to a comprehensive amount of stroke data was only recently attained. A better sense of any future need to recommend additional stroke-related legislation will be available over time and with increased utilization of the Nevada Stroke Registry.

## Report Conclusions

---

Aggregate data collected in the Nevada Stroke Registry provides an opportunity to enhance stroke survivorship and reduce 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 Heart Disease and Stroke Prevention Program, in collaboration with Nevada’s Heart Disease and Stroke Prevention Taskforce 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, optimal 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 16 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 stroke transit and hospital care to post-discharge care will be key to implementing QI at the health systems level statewide to ensure each Nevadan has the optimal experience to enhance survival and decrease disability burden in case of stroke.

# Acknowledgements

---

Thank you to RaeAnne Arcangel, JoAnne Pineda, Ron Loomis, Jessica Rosing, and Ben Schmauss of the American Heart Association/American Stroke Association for their generous technical assistance and time.