

Nevada Stroke Registry: 2017 Data Summary

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Background and Purpose

In 2015, the Nevada Division of Public and Behavioral Health (DPBH) began using the nationally recognized Get With The Guidelines™ (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 78th Session of the Nevada Legislature, [Senate Bill 196](#) (SB 196), required DPBH to establish a Stroke Registry. It further provided for the inclusion of comprehensive and primary stroke centers on the list of centers maintained by DPBH and required those centers to report certain data to the Registry. 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 the most current nationally-accepted recommendations and guidelines. Hospitals using the GWTG Registry can review real-time performance and identify interventions to benchmark and maximize patient care. The Nevada Stroke Registry aims to compile and analyze Nevada's 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 DPBH Chronic Disease Evaluator was given super-user access to GWTG data to provide aggregate data for 16 reporting comprehensive stroke centers. Currently, the DPBH Chronic Disease Evaluator has permission from 11 hospitals to view individual data; however, in the aggregate data report, all 16 hospitals are reflected.

To further assist with these efforts, the Chronic Disease Prevention and Health Promotion (CDPHP) Section's Heart Disease and Stroke Prevention Program fostered the development of the Nevada Heart and Stroke Prevention Taskforce, which is actively engaged in promoting quality improvements in relation to stroke care in Nevada. The Nevada Stroke Registry aligns with the goals of the Nevada Heart 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 quality improvement aims of the Nevada Stroke Registry.

Goal 1: Improve access to effective care

Strategy 1.3 Promote clinical and public health systems that coordinate efforts to collect baseline data and share across the state.

Per statutory guidance in SB 196 [Sec. 6(1) d and Sec. 7(1)], outreach to encourage reporting and promote awareness of the Stroke Registry was targeted at all Nevada hospitals certified as acute stroke-ready hospitals, as well as to the Heart Disease and Stroke Prevention Taskforce, Heart Disease and Stroke Prevention Program Coordinators statewide, Emergency Medical Services (EMS) partners within and outside of DPBH, and to Nevada Rural Hospital Partners.

Nevada Stroke Burden

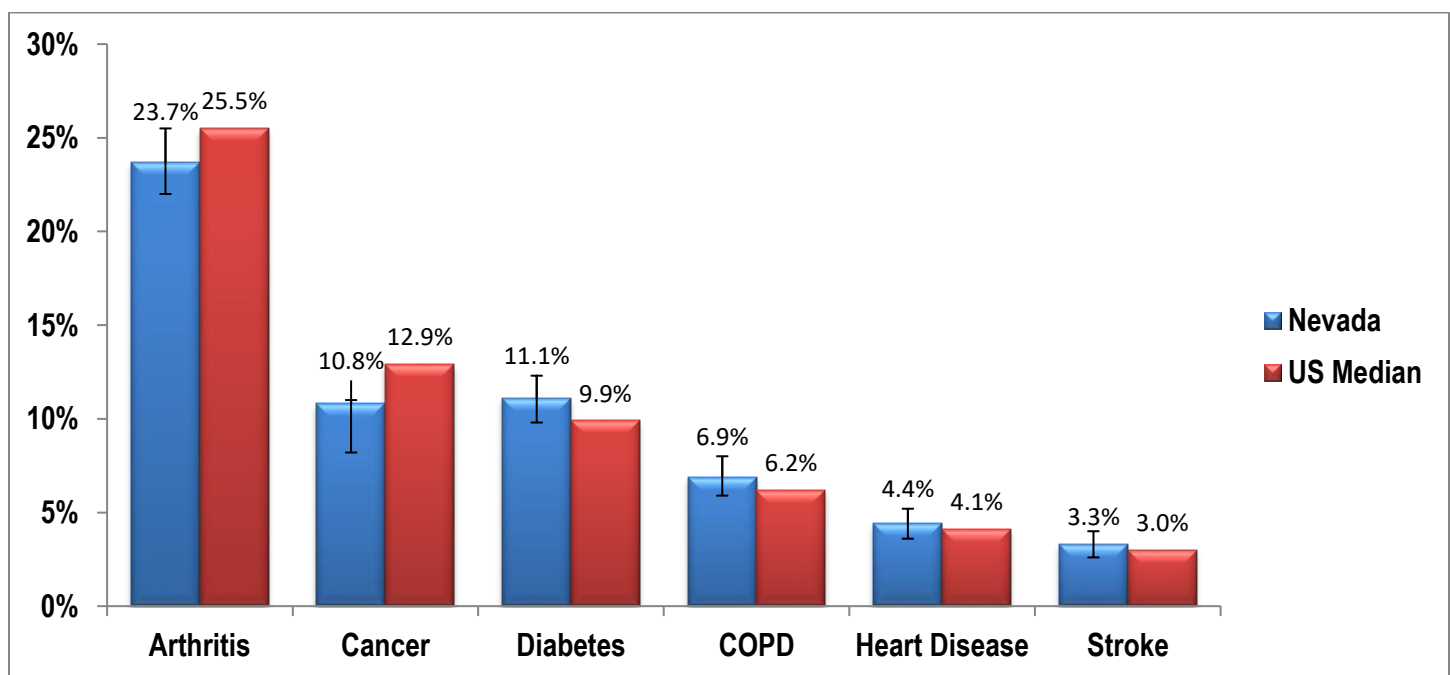
Heart disease is the leading cause of death nationwide and in Nevada, while stroke is the fifth-leading cause nationwide and fourth in Nevada.^{1,2}

Stroke kills more than 140,000 Americans each year and is responsible for one (1) of every 20 deaths. It is estimated every four (4) minutes someone dies of stroke, and every year, approximately 795,000 Americans experience stroke.³ Of these stroke incidences, 610,000 (77%) are new, or first-time, strokes, and nearly one quarter (25%) involve patients with a history of previous stroke. Stroke is also a leading cause of long-term disability costing the United States \$33.9 billion annually.³

Many factors increase the risk of stroke: tobacco use, physical inactivity, obesity/overweight, high blood pressure, and high cholesterol.⁴ Within these factors, tobacco use is also the leading cause of preventable death in the United States. One-third of American adults have high blood pressure, and of those, more than half do not have it under control.¹

Chronic disease prevalence in Nevada is addressed below using sampled self-reported data from the 2016 Behavioral Risk Factor Surveillance System (BRFSS). According to current data, the prevalence of stroke (3.3%) and heart disease (4.4%) in Nevada is slightly higher than the U.S. medians for stroke (3.0%) and heart disease (4.1%).

Figure 1. Prevalence of Chronic Diseases, Nevada vs. U.S., 2016 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, 2016

¹ National Center for Health Statistics. *Health, United States, 2016: With Chartbook on Long-term Trends in Health*. Hyattsville, MD. 2017.

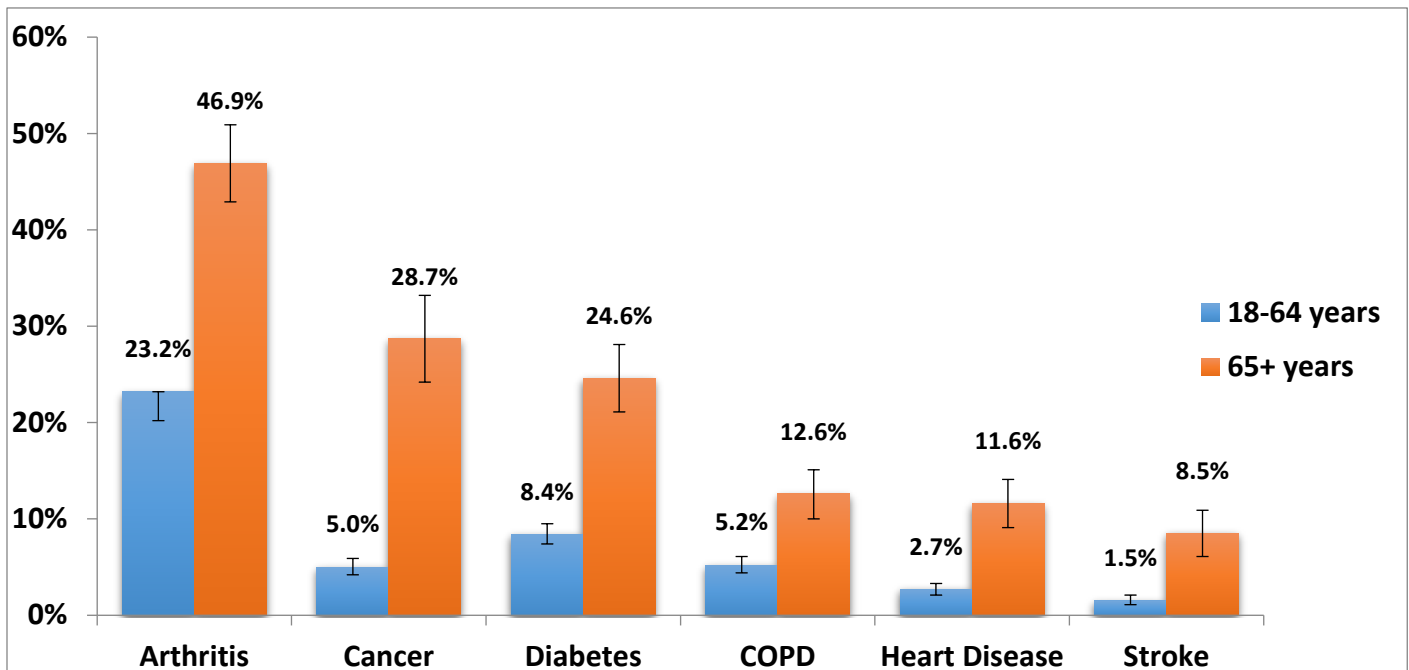
² Office of Analytics. Department of Health and Human Services. *Minority Health Report: 2012-2016*. Carson City, Nevada e1.0. March 2018.

³ Yang Q, Tong X, Schieb L, et al. Vital signs: Recent Trends in Stroke Death Rates-United States, 2000-2015. *MMWR Morb Mortal Wkly Rep*. 2017; 66: 933-939.

⁴ American Heart Association. Let's talk about stroke prevention: risk factors for stroke. Accessed April 25, 2018.

https://www.strokeassociation.org/idc/groups/stroke-public/@wcm/@hcm/documents/downloadable/ucm_309713.pdf

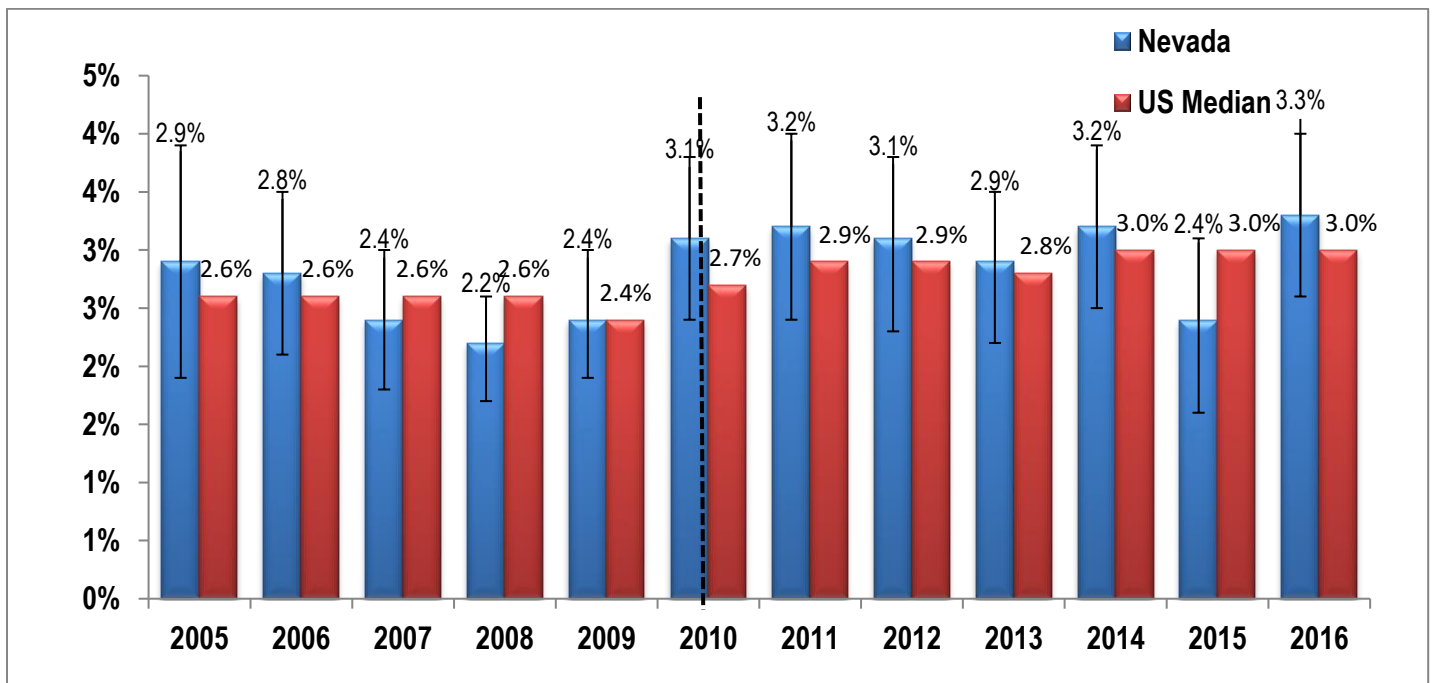
Figure 2. Prevalence of Chronic Diseases by Age Groups, Nevada, 2016 BRFSS Data



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, 2016.

Figure 2 above displays the differential burden of stroke prevalence by age group, which can be seen in the 2016 BRFSS data, with those older than 65 years showing a higher prevalence of chronic disease when compared to those ages 18-64 years.

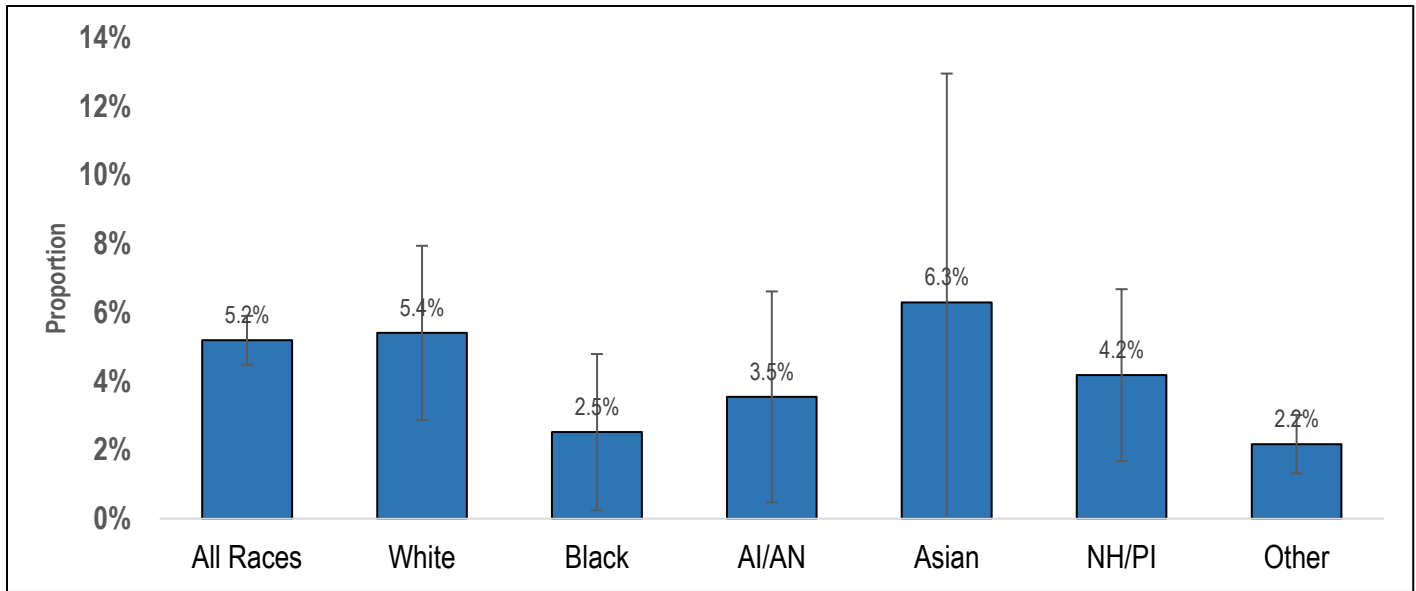
Figure 3. Adults who have had a stroke, Nevada vs. U.S., 2005-2016 BRFSS Data



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, 2005-2016.

Figure 3 above shows the comparison of stroke prevalence in Nevada to that of the United States from 2005 to 2016. Stroke prevalence in Nevada exceeded the United States median for the 2010 to 2016 period, but fell below the United States Median in 2015.

Figure 4. Adults who have had a stroke by race/ethnicity, Nevada, 2013-2016: Pooled BRFSS data

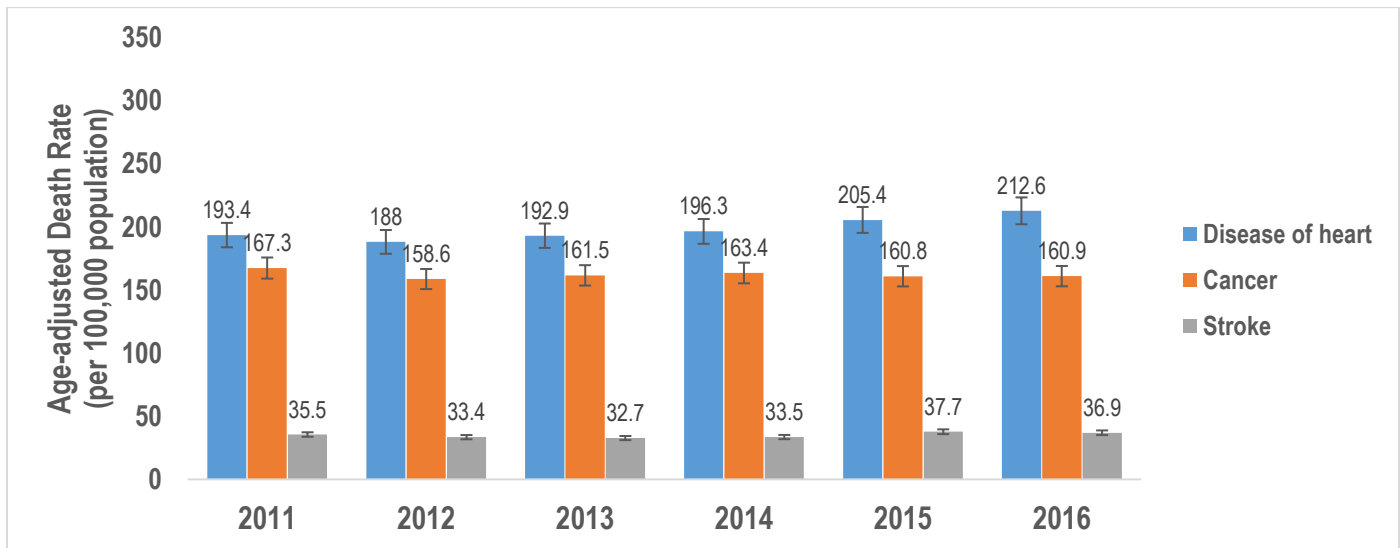


AI/AN: American Indian/Alaska Native; NH/PI: Native Hawaiian/Pacific Islander

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, 2013-2016.

2013-2016 pooled BRFSS data reflects an estimate of stroke prevalence in Nevada via self-reported stroke experience by race and ethnicity. As indicated in Figure 4 above, the health disparity in Nevada’s Asian and Native Hawaiian/Pacific Islander population is striking and indicates a clear need to focus more resources to address these disparities.

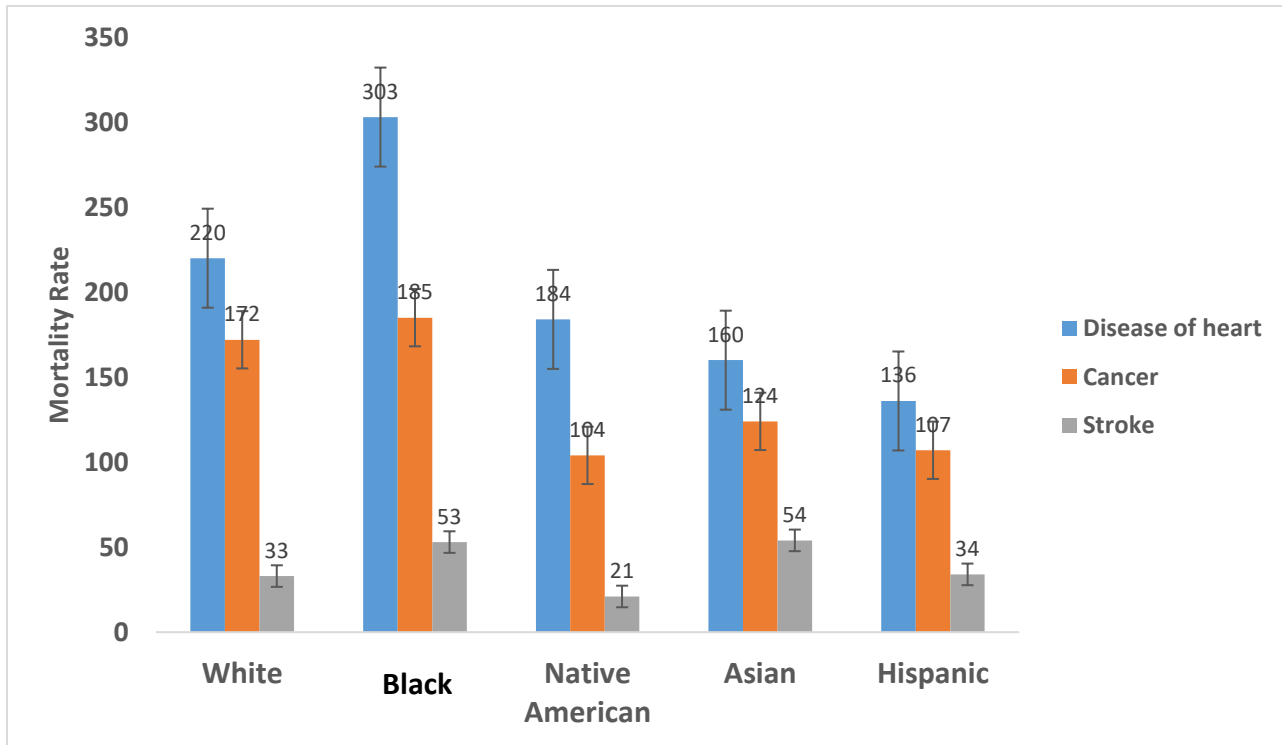
Figure 5. Chronic Disease Mortality Rate by Year, Nevada Residents, 2011-2016



Source: Nevada Division of Public and Behavioral Health. Office of Public Health Informatics and Epidemiology, 2018.

Age-adjusted stroke mortality rates in Nevada from 2011-2016 can be seen in Figure 5 above. In 2016, stroke accounted for 4.4% of mortality statewide.

Figure 6. Chronic Disease Mortality Rate by Race/Ethnicity, Nevada Residents, 2016



Source: Nevada Division of Public and Behavioral Health. Office of Public Health Informatics and Epidemiology, 2018.

The need to address racial/ethnic disparities in Nevada's stroke mortality outcomes is highlighted in Figure 6 above. Stroke mortality rate per 100,000 persons is highest among the Asian population (54), followed by African Americans (53), Hispanics (34), and Whites (33).

Gender difference is also displayed in the stroke mortality data; male mortality (37.8) exceeded female mortality (35.6) in the age-adjusted death rate per 100,000 population.⁵

⁵ Nevada Division of Public and Behavioral Health, Office of Public Health Informatics and Epidemiology, Quintiles. Data as of April 2018.

Population and Limitations

This report has been developed using aggregate data from the 16 participating Nevada stroke centers listed below. In 2016 and 2017, the participating stroke centers treated nearly 80% of all stroke visits found in the Hospital Inpatient Billing (HIB) Data and the Hospital Emergency Department Billing (HEDB) Data collected by Nevada. The HIB and HEDB Data reflects all hospital visits which provided treatment for patients who were diagnosed with stroke-related International Classification of Diseases (ICD) Codes (ICD-10 codes: I60 – I69). However, not all hospitals in Nevada report data to the DPBH.

The reported data is reflective only of the hospitals currently participating in the Get With The Guidelines-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 11 of the 16 primary care stroke centers reporting into GWTG 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 houses 32 hospitals, of which 16 are certified stroke centers per AHA/ASA designation. Furthermore, the data accessed through GWTG is de-identified by nature and not compiled in a fashion to allow comparison across different hospitals. The data accessed through GWTG-S will be addressed to develop quality improvement recommendations relative to the state of Nevada. For example, the aggregate data from all 16 hospitals can be used to address health disparities in stroke by ethnicity and race, gender, and insurance status.

DPBH will continue to educate hospitals on the need to provide comprehensive data to the Stroke Registry.

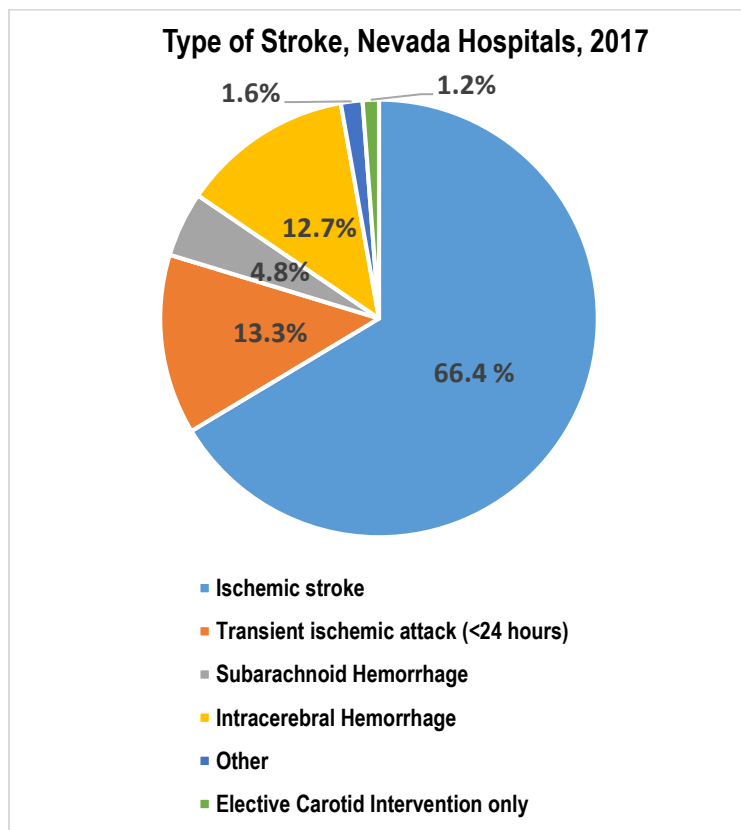
Participating Nevada Hospitals (as of April 2018)

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 those centers that currently can be viewed individually in GWTG due to permission status.*

Demographics

This report has been developed using de-identified patient data from GWTG-participating hospitals in Nevada for calendar year 2017. The pie chart below displays the percentage of cerebrovascular events which occurred in reporting Nevada hospitals in 2017. The most common type of stroke for 2017 was ischemic (66.4%), followed by transient ischemic attack (13.3%), intracerebral hemorrhage (12.7%), subarachnoid hemorrhage (4.8%), and elective carotid intervention only (1.2%).



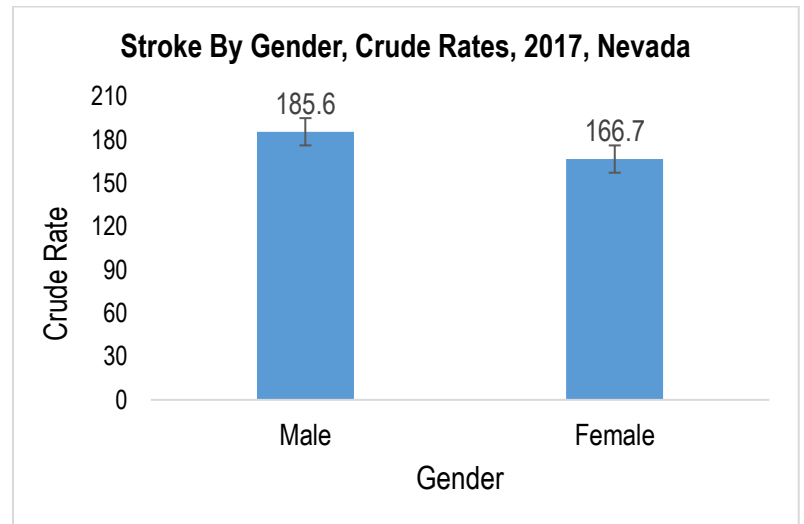
Definitions

- **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.
- **Ischemic Stroke (IS):** occurs when an artery to the brain is blocked resulting in inadequate blood supply and oxygen.
- **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. The symptoms occur rapidly and usually last for a short time (less than 24 hours) before resolving completely and leaving no permanent damage.
- **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.

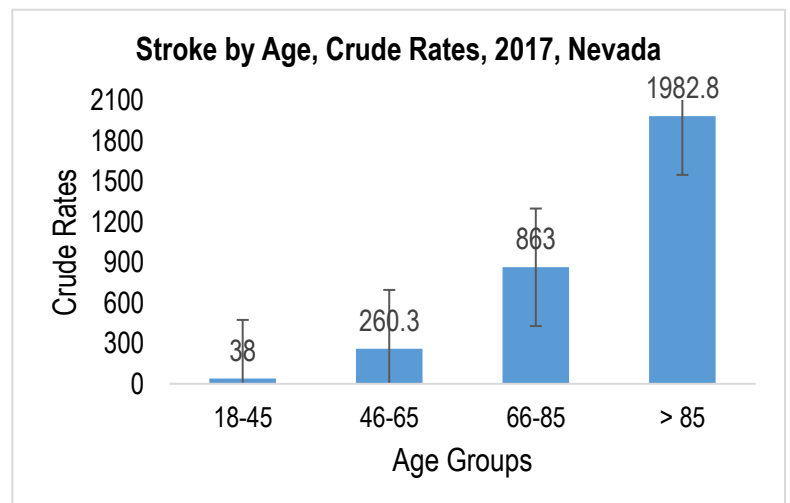
Demographics - Who is Affected?

The Nevada Stroke Registry provides information on stroke as it relates to gender and age group. In 2017, the percent of strokes in males slightly exceeded that for females, and older age groups experienced much higher stroke burdens than younger (the crude rate is generated by dividing the total number of cases in a specific time by the total number of people in the population).

When examining the data by gender, males (2,774 cases; 185.6 per 100,000 population) did not have significantly higher rates of stroke compared to females (2,492 cases; 166.7 per 100,000 population).



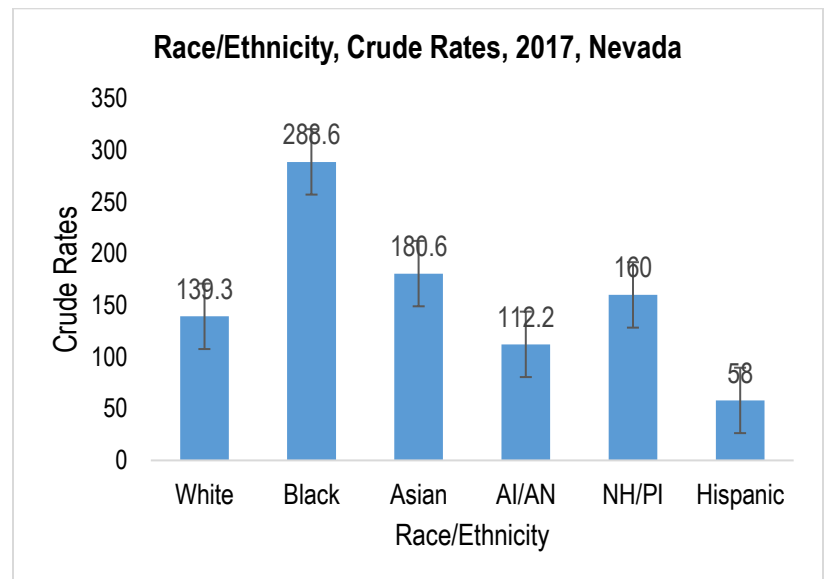
When examining the distribution of stroke by age group, individuals ages 85 years and older (558 cases; 1,982.8 per 100,000 population) experienced significantly higher rates of stroke compared to all other age groups.



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 per 100,000 population in Black Nevadans exceeds that of other racial and ethnic groups.

When examining the distribution of strokes by race/ethnicity, White (3,762 cases; 139.2 per 100,000 population) and Black (631 cases; 288.6 per 100,000 population) Nevadans experienced significantly higher rates of stroke when compared to all other racial and ethnic categories.

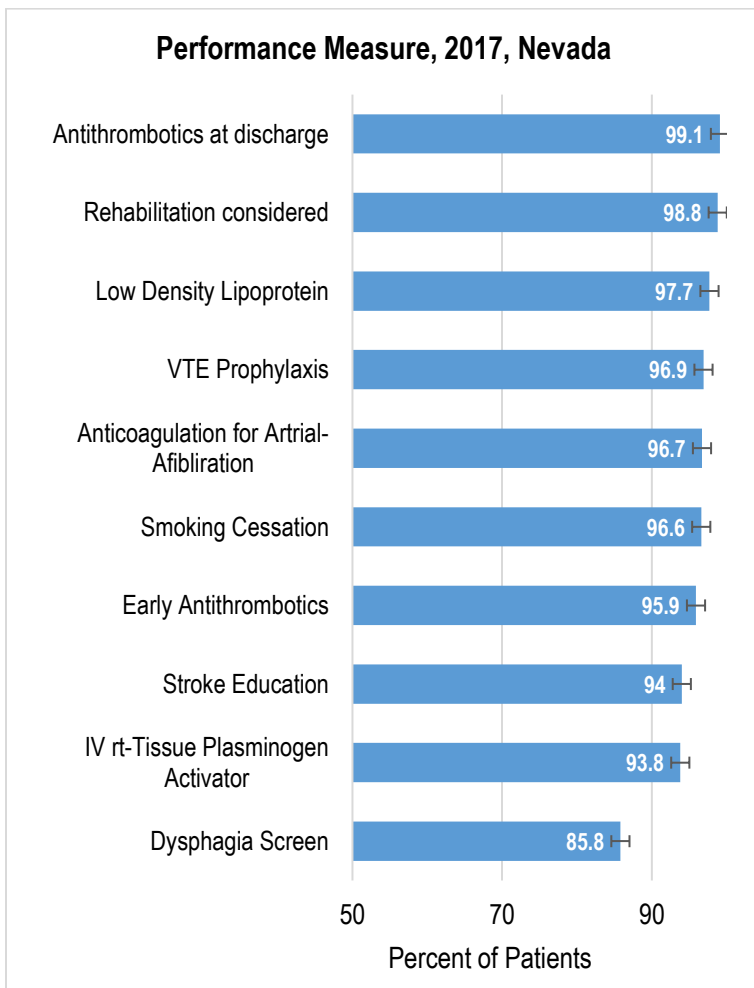


AI/AN: American Indian/Alaska Native; NH/PI: Native Hawaiian/Pacific Islander

Performance Measures

The performance measures listed below coincide with the Paul Coverdale core consensus measures and are based on GWTG data reported by Nevada stroke centers between July 2016 and June 2017. The performance measures were developed by the Joint Commission, AHA, and the Centers for Disease Control and Prevention (CDC) for optimal treatment of ischemic strokes. Some of the lower-scoring performance measures are discussed in more detail in the following sections, as well as additional performance measures beyond the core measures that indicate opportunities for statewide improvement.

The core performance measures were examined by geographic location for ten (10) individually identifiable hospitals. Specific core measures showed notable differences between regions from 2011-2016: dysphagia screening (north at 76.2%, south at 84.7%), stroke education (north at 95.1%, south at 90.1%), and venous thromboembolism (VTE) prophylaxis (north at 95.5%, south at 92.5%).



Performance Measures

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 ≥ 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 product 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 and/or 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 well time and received tissue plasminogen activator to dissolve clots and improve blood flow within three hours of last known well time.

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

Dysphagia Screening

Causes of Nutritional Impairment after Stroke

Primary Factor

- Dysphagia

Secondary Factor

- Upper limb paralysis
- Disturbance of sensory function
- Depression
- Cognitive changes affecting eating (e.g., attention-concentration deficit, forgetting to eat, eating too fast or too slowly)

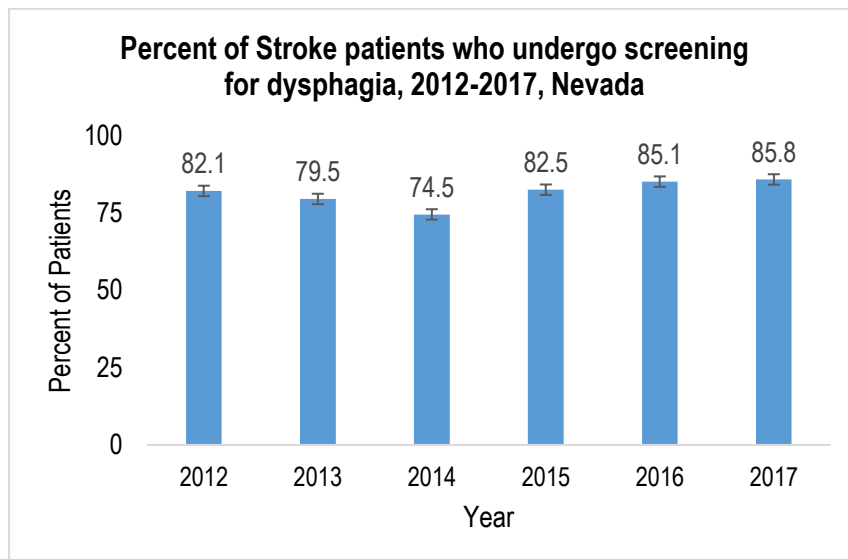
Dysphagia screening was the lowest-performing core measure in Nevada. Promotion of a dysphagia screening action plan by stroke stakeholders is one (1) recommendation for improving performance.

Dysphagia Screening Action Plan

Hospitals should identify and recruit professionals to develop a Stroke Care Team (e.g., speech therapist, occupational therapist, physical therapist, social worker, registered dietician, and nursing navigator) that will develop policies to integrate evidence-based dysphagia screenings into the stroke patient's care plan. In addition, the Stroke Care Team participates in quarterly sessions addressing stroke education and training. The hospital's risk management and quality improvement teams should closely monitor these activities and deliver recommendations for improvement.

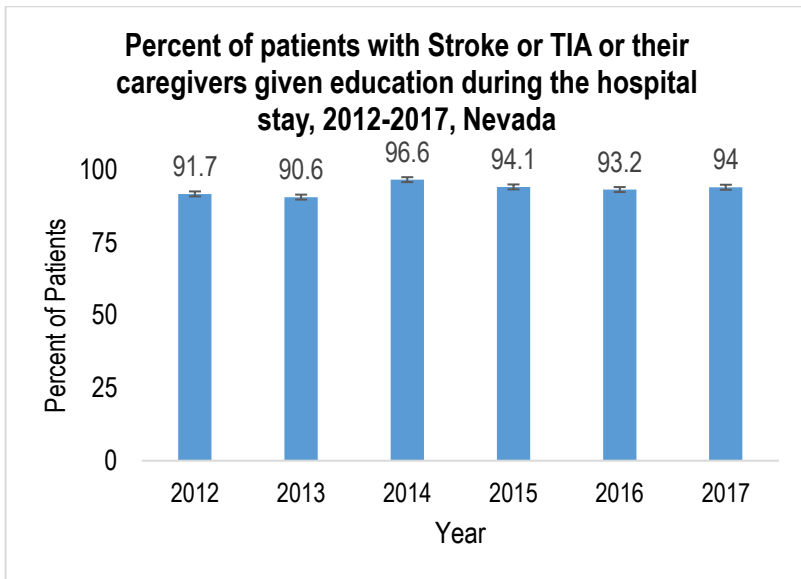
Dysphagia, or difficulty swallowing, is a common occurrence resulting from acute stroke. Early screening helps to identify stroke patients who could be vulnerable to weight loss, fluid depletion, malnutrition, and aspiration of food or liquid causing pneumonia. Patients who are unable to consume food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

Dysphagia screenings in 2017 (85.8%) show a significant increase from 2014 (74.5%).



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 has increased from 87% in 2011 to 96.6% in 2014. However, a decrease in the percentage from 2014 to 2015 and again in 2017 was observed. 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 this performance measure. Nevadans would benefit from a coordinated statewide effort to increase recognition of the signs of stroke and preventive behavior and lifestyle factors.



Stroke Education

Risk Factors for Stroke: risk factors for stroke include, but are not limited to, using tobacco products, obesity, high blood pressure, high cholesterol (HDL), 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 waking, dizziness, loss of balance, and/or coordination
- Sudden severe headache with no known cause

Activation of Emergency Medical Systems:

If a patient experiences one (1) 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 (1) hour of the onset of signs and symptoms.

Follow-up Care: Patients who have suffered a stroke are at high risk of suffering additional strokes. Stroke care teams develop a plan of care for patients post-discharge, 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.

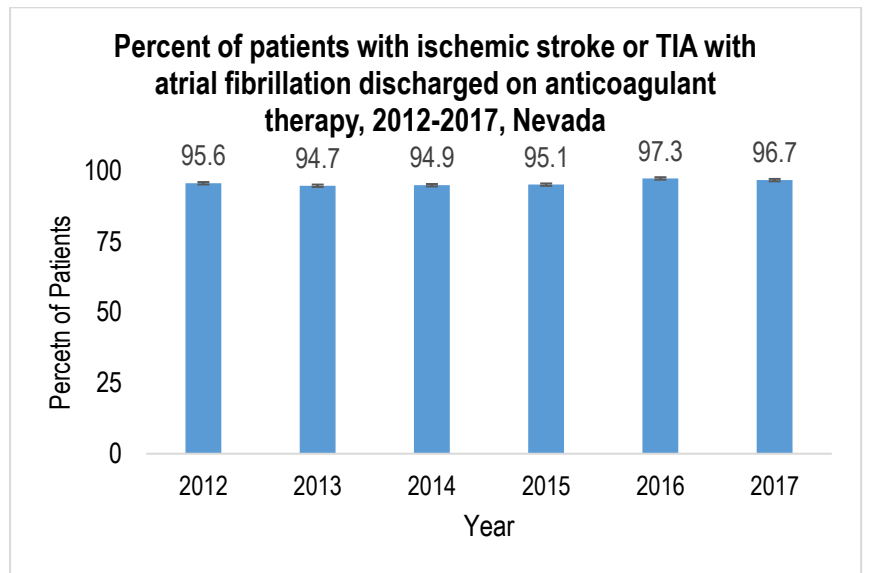
Anticoagulants for Treatment of Atrial Fibrillation and Atrial Flutter

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/flutter discharged on anticoagulation therapy has significantly changed in the past two (2) years, after a four-year period of no significant changes.

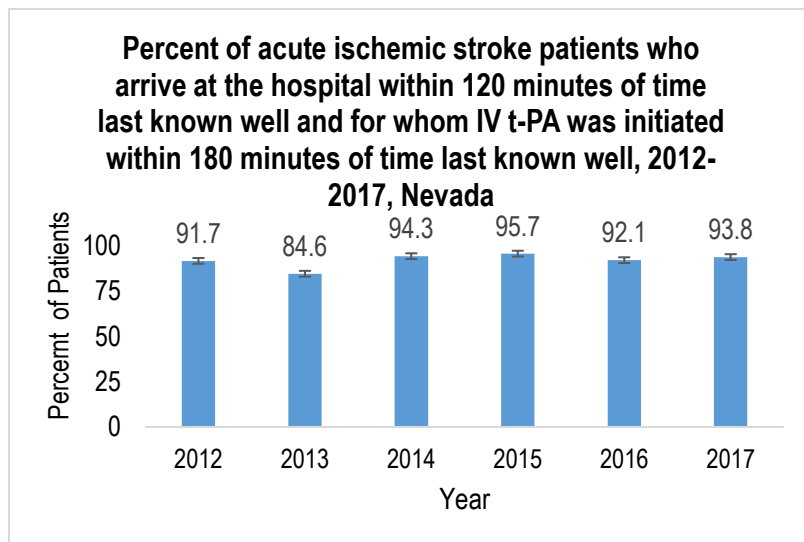


IV t-PA Administration

The IV t-PA administration performance measure reflects the percentage of ischemic stroke patients who arrived at the hospital within two (2) hours of their last known well time and received tissue plasminogen activator to dissolve clots and improve blood flow within three (3) hours of last known well time.

Focused efforts aiming 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 of 3.76% from 2015 to 2016, it increased by 1.85% between 2016 and 2017.



Contraindications for Administering IV t-PA

Recent Intracranial or Spinal Surgery or Serious Head Trauma or Stroke in the Previous Three (3) 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 ≥ 1.7 or use of NOAC

Symptoms Suggest Subarachnoid Hemorrhage

CT Demonstrates Multilobar Infarction (hypodensity $> 1/3$ cerebral hemisphere)

Arterial Puncture at Noncompressible Site in Previous 7 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

Severe Hypoglycemia or Hyperglycemia

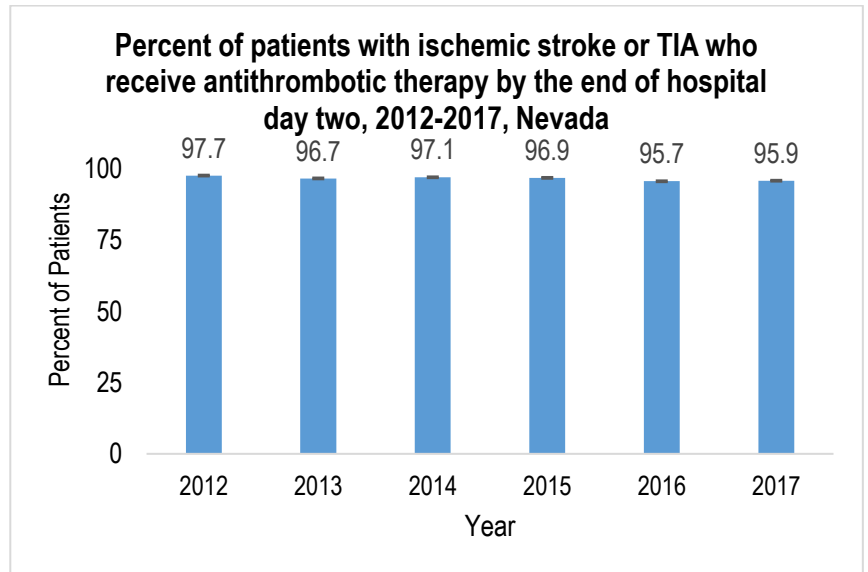
More Than Two (2) Hours since the Last Known Well Time: time of onset of symptoms or time the patient was last known to be well or symptom-free.

Early Antithrombotic Therapy

Early antithrombotic therapy (before the end of the second hospital day) has remained constant from 2012-2016 as reflected in the Nevada Stroke Registry. Early antithrombotic therapy is considered most effective after the first 24 hours for those experiencing acute ischemic stroke.

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

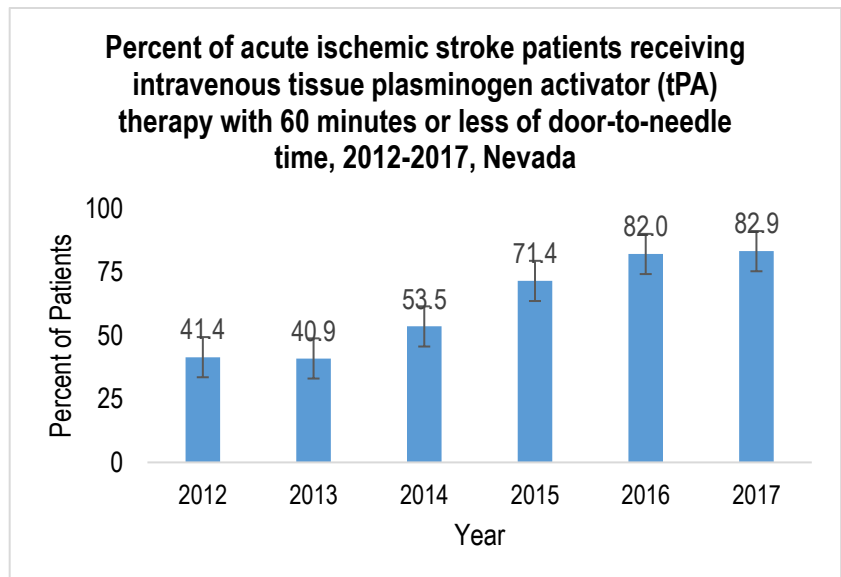
The percent of patients with an ischemic stroke or TIA who received antithrombotic therapy by the end of the second hospital day has not significantly changed in the past five (5) years.



Time to Intravenous Thrombolytic Therapy

The graph on the right indicates the need to continue increasing statewide performance on time to intravenous thrombolytic therapy within 60 minutes as an opportunity to improve stroke outcomes in Nevada. Although this measure is not part of the ten (10) core consensus measures, it highlights improving statewide performance over the past five (5) years, as well as an opportunity for more statewide quality improvement.

The percent of patients with an ischemic stroke who received thrombolytic therapy within 60 minutes has significantly improved in the past five (5) years.



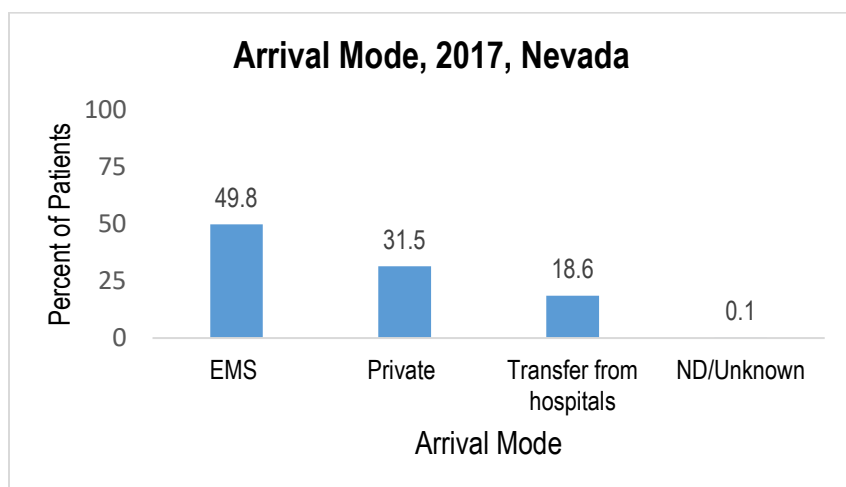
Pre-Hospital Mode of Transport

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. 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 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 below. A measure relating to EMS pre-notification indicates that, in 2017, 49.8% 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 relating last known well time to arrival time offers opportunities for improvement to maximize survivorship and decrease disability burden. In 2017 GWTG data, most people arrived at the stroke center more than one (1) day or unknown (35%), 0-1 day or unknown (12%), and more than 540 minutes (11%) from last known well time, offering opportunities to improve statewide reporting for this measure and reduce the arrival time to stroke centers thereby decreasing disability.



Stroke Symptoms (With Acute Onset)

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

The Division of Public and Behavioral Health has developed recommendations for improving outcomes based on 2017 aggregate Nevada Stroke Registry data:

- Currently, only 11 of the 16 facilities have completed and returned a Memorandum of Agreement (MOA) for data sharing/super-user allowance to Quintiles (vendor of GWTG).
 - 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.
 - QI recommendation: Explore using the Health Information Exchange to collect data aligning with the ten (10) GWTG performance 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 health disparities in stroke by ethnicity and race, gender, and insurance status.
 - 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 health disparities for stroke are most apparent among Black, Asian, and Pacific Islander/Native Hawaiian Nevadans. 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 11 individually-identifiable hospitals. Specific core measures had notable differences between regions from 2011-2017: dysphagia screening (north at 76.2%, south at 84.7%), stroke education (north at 95.1%, south at 90.1%), and VTE prophylaxis (north at 95.5% and south at 92.5%).
 - QI recommendation: Examining the data by geographic location can identify opportunities for targeted technical assistance and can reveal important differences between regions. Additional analysis could be conducted within a geographic location.
- 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 submissions of limited stroke cases.
 - 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.
- 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.
- Decrease last known well to arrival time to maximize survivorship and decrease the disability burden.
- Explore Nevada Heart and Stroke Prevention Taskforce interest in reviewing stroke registry data and making recommendations on quality improvement for possible incorporation into future Nevada Stroke Registry Reports.

Legislative Recommendations

Senate Bill 196 (78th Legislature), section 9, subsection 2, subsection b states the Nevada Division of Public and Behavioral Health is required to provide “any recommendations for legislation to improve the quality of care provided to patients who suffer from strokes in the state.” Nevada 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 additional 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/CDPHP 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 the stroke signs/symptoms, high blood pressure awareness and high cholesterol control (including medication adherence), smoking cessation, importance of physical activity and exercise, and diabetes control. Expanding data collection efforts to include EMS and rural Critical Access Hospitals to capture stroke data 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/CDPHP staff can view their GWTG data.

Increased stroke education efforts, particularly in relation to stroke burden and mortality disparities and for 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.

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