

## Key Messages

- Stroke mortality continues to decline in Montana.
- Use of the clot-busting medication for stroke patients has steadily improved over the past 12 years.
- Emergency Medical Services has improved documentation of stroke screening and last known well time.

## Montana Cardiovascular Health Program

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## Moving Forward with Systemwide Efforts to Address Stroke Morbidity/Mortality in Montana

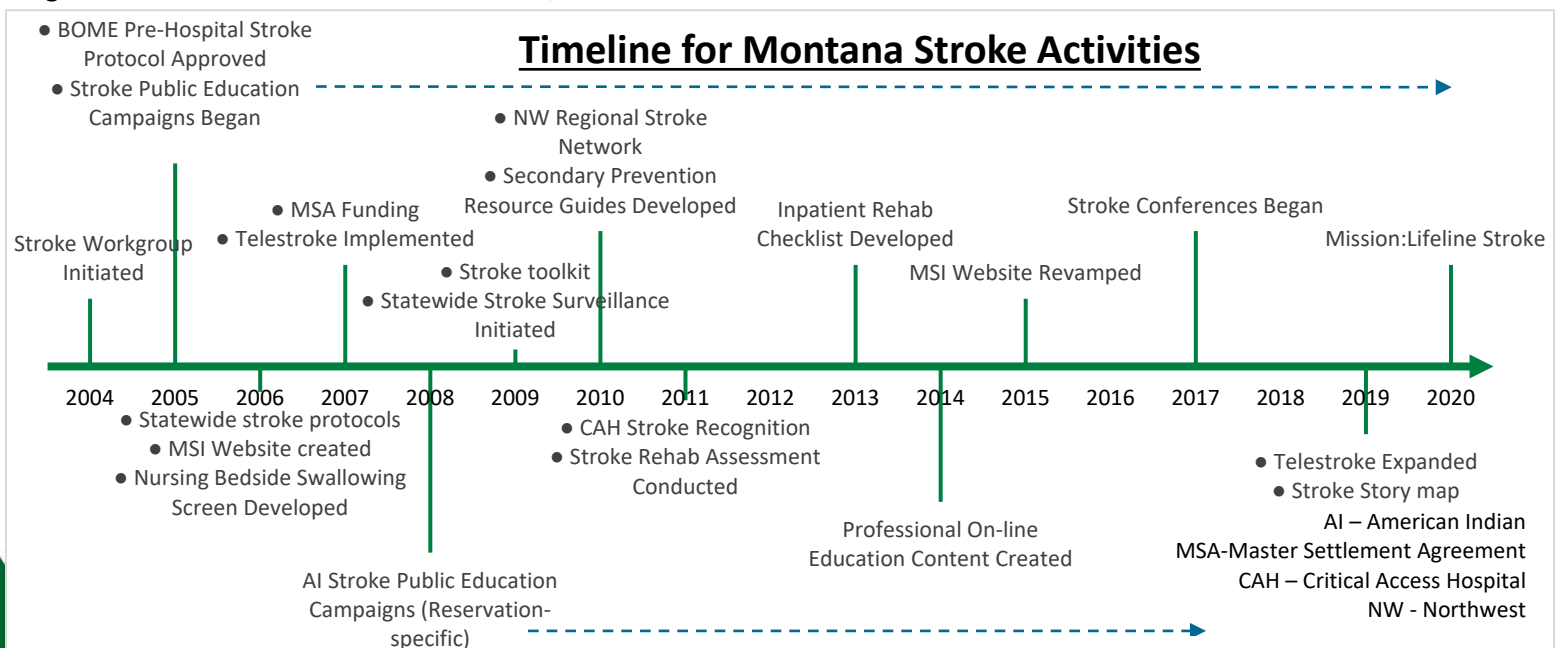
### INTRODUCTION:

Since 2000, national stroke mortality has been steadily declining, but this decline has slowed and even stalled in some states over the past few years. As reported by the Centers for Disease Control and Prevention, this pattern is noted in three out of four states in the US (1). In Montana, however, age-adjusted stroke mortality has continued to decrease over a 15-year period from 46.1 deaths per 100,000 in 2004 to 28.8 deaths per 100,000 in 2019. To understand what may be contributing to the decreased stroke mortality in Montana, this report describes stroke activities and indicators of quality stroke care.

### BACKGROUND:

In 2004, the Montana Department of Public Health and Human Services (DPHHS) formed the Stroke Workgroup to coordinate efforts (via the Montana Stroke Initiative [MSI]) to improve stroke care. The workgroup established a partnership between public health and stroke leaders. Members include Montana Cardiovascular Health (CVH) Program staff, American Heart Association/American Stroke Association (AHA/ASA) staff, stroke coordinators, neurologists, emergency department staff, and emergency medical services. Within the first five years of the workgroup, the Board of Medical Examiners (BOME) approved a pre-hospital stroke protocol developed by the workgroup, DPHHS launched stroke public awareness campaigns, and the Stroke Workgroup developed and disseminated a stroke toolkit for emergency departments (Figure 1). Stroke media campaigns have now been conducted in Montana's seven larger counties, seven American Indian Reservations, and 10 rural communities. Survey results indicated that the campaigns have been effective in improving knowledge of stroke signs and symptoms, and in some cases, intent to call 9-1-1.

**Figure 1.** Montana stroke activities timeline, 2004 – 2020.

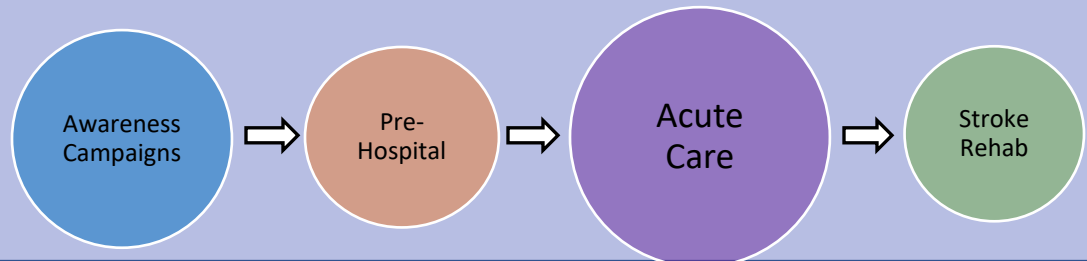


Currently, the Master Settlement Agreement (MSA) supports virtual 2-way audio/visual consults to emergency departments at six telestroke installations (Lewistown, Havre, Plains, Ronan, Glasgow, and Libby). From June 2009-May 2021, these sites documented 212 telestroke consults with 67 administrations of tPA, a clot-busting medication for stroke. tPA was rarely used prior to telestroke implementation.

Other key activities initiated by DPHHS and the Stroke Workgroup include:

- Implementing a Stroke Recognition Program for Montana CAHs that acknowledges hospitals demonstrating a high level of preparation and care in the treatment of acute stroke patients. Fifteen hospitals have participated since 2011.
- Creating a Montana Stroke Initiative website for health professionals, [www.montanastroke.org](http://www.montanastroke.org).
- Holding three stroke conferences highlighting leading edge treatment and rehabilitation of stroke patients and providing ongoing continuing education for healthcare providers.
- Developing a stroke story map, <https://arcg.is/1KXXjD>

To date, the MSI has placed greater emphasis on activities that support public awareness campaigns and acute care of stroke patients.

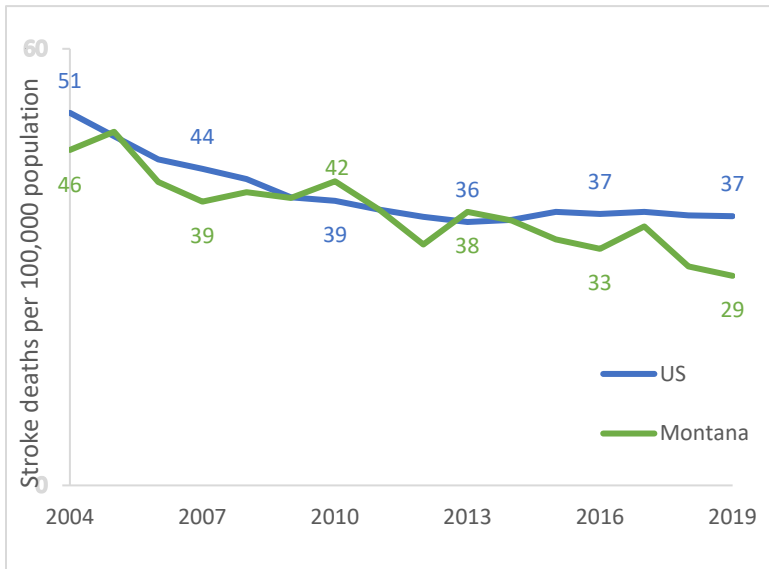


## METHODS:

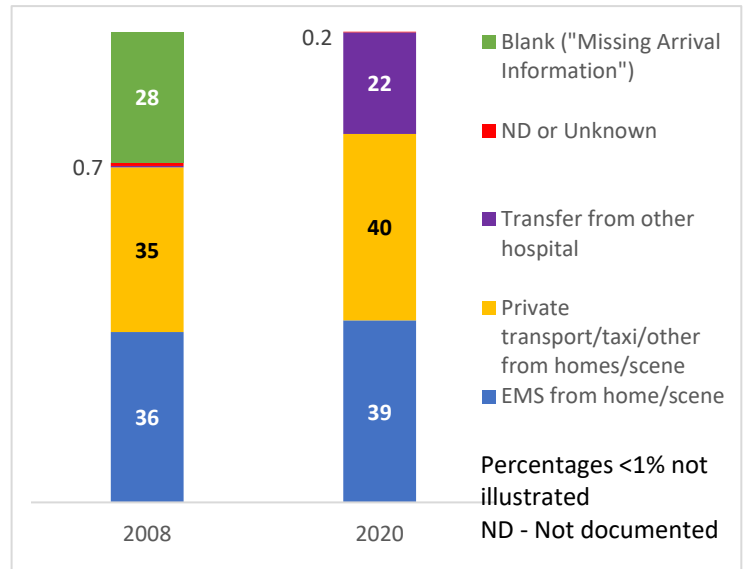
The Montana CVH Program used several data sources in this surveillance report:

- Mortality – Stroke-related deaths among Montana residents occurring in Montana from 2004-2019 were identified from the state's death certificate using data from the Montana Office of Vital Records. Stroke-related deaths were defined as death certificates with an underlying cause of death containing ICD-10 codes I60-I69. US stroke-related mortality data came from the National Vital Statistics System accessed from CDC Wonder (<https://wonder.cdc.gov/ucd-icd10.html>)
- EMS data –EMS data on ground ambulance 911 transports of suspected stroke patients were used for statewide tracking of the pre-hospital stroke measures (e.g., On-scene time <15 mins, stroke screen, last known well time documentation, blood glucose checked, and time of discovery documented) in the Coverdell stroke registry.
- Get With The Guidelines® (GWTG)-Stroke – This is a national stroke registry supported by the AHA/ASA to collect emergency department and inpatient data on stroke patients. The number of Montana hospitals using GWTG through the years had ranged from three to five. The hospitals use the data for continuous quality improvement. Montana's data are benchmarked with GWTG-Stroke Mountain Region (states include Arizona, Colorado, Idaho, New Mexico, Utah, Nevada, and Wyoming).
- Hospital discharge status of stroke-related hospital admissions –hospital discharge data from the Montana Hospital Discharge Data System provided by the Montana Hospital Association member hospitals for stroke-related inpatient hospital admissions occurring in 2004 and 2019. To assess discharge status, we used ICD-9-CM: 430-434, 436-438 (2004) and ICD-10-CM I60-I69 (2019) to identify the stroke-related hospital admissions.
- Stroke Recognition for CAHs – In 2011, the CVH Program developed the Stroke Recognition Award Program which includes a data collection tool. Since its inception, 15 CAHs have received Stroke Recognition Award. Participating CAHs submit data to the CVH program every six months. Data includes type of stroke, mode of arrival, patient disposition, date/time documentations, neurologist, NIHSS, and tPA contraindications.
- Maps – Geographical maps were created using ArcGIS. Data for stroke receiving hospital and telestroke facilities were provided by the CVH Program.

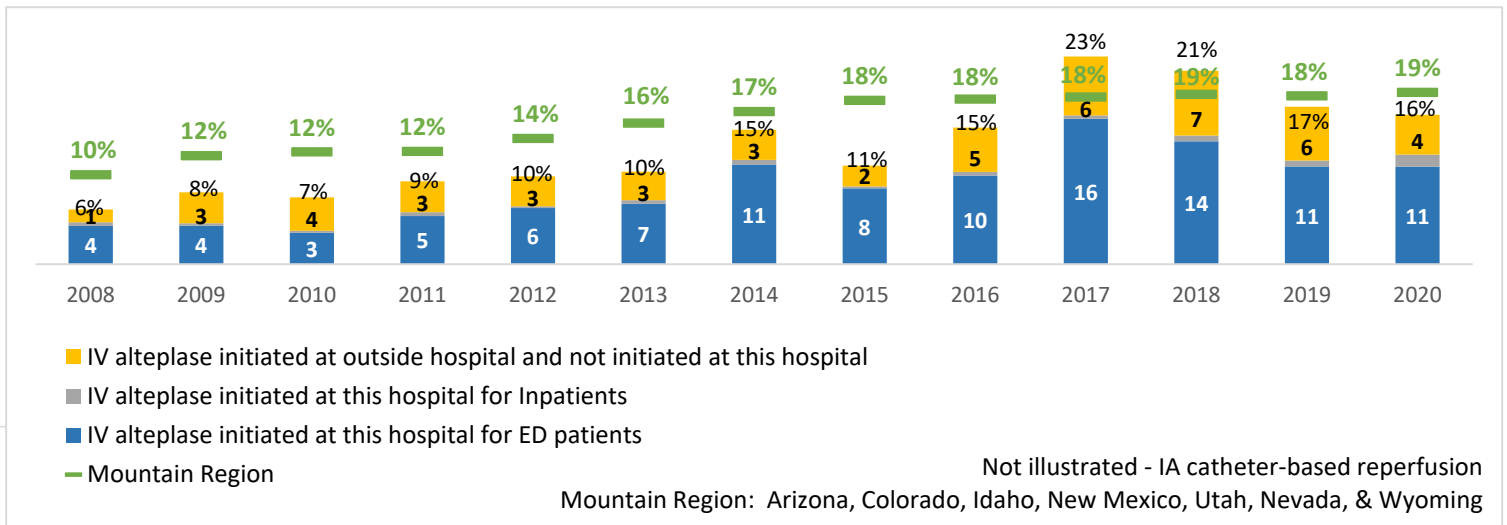
**Figure 2.** Age-adjusted stroke mortality, Montana, and US, 2004-2019.



**Figure 3.** Percent of stroke patients by mode of arrival to stroke receiving facilities, Get with the Guidelines (GWTG) registry, Montana, 2008 and 2020.



**Figure 4.** Percent of thrombolytic therapy (IV alteplase) initiated to ischemic stroke patients seen at stroke receiving facilities, GWTG registry, Montana and Mountain Region, 2008 – 2020.



## RESULTS:

From 2004 through 2019, the age-adjusted stroke mortality in Montana declined from a high of 49 deaths per 100,000 population in 2005 to 29 deaths per 100,000 population in 2019, a percent change of 37% (Figure 2). In comparison, stroke mortality in the U.S. steadily declined from 2004 to 2014 (percent change of 29%). The stroke mortality rate in the U.S. has not changed from 2015-2019.

The percentage of stroke patients that arrived at stroke receiving facilities by emergency medical service (EMS) increased from 36% in 2008 to 39% in 2020 (Figure 3). However, the percentage of stroke patients arriving by private vehicle also increased from 35% in 2008 to 40% in 2020, respectively. The quality of these data also improved, with the percentage of blank or missing arrival mode improving from 28% (2008) to 0% (2020).

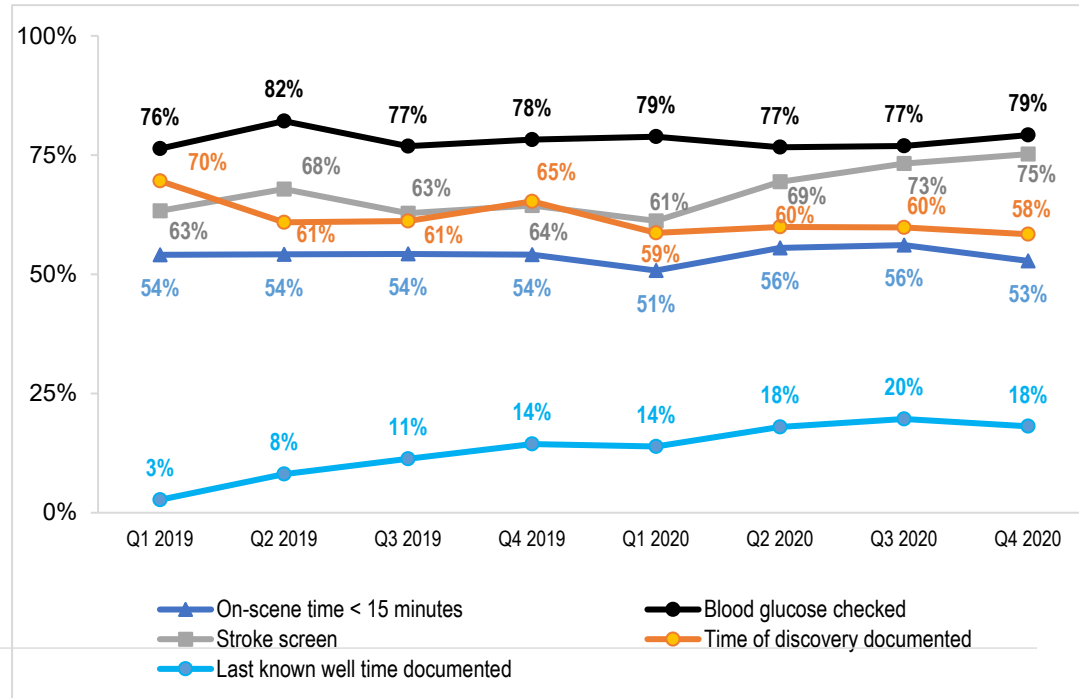
Overall, the percentage of ischemic stroke patients who received clot-busting medication, tPA (IV alteplase) more than doubled over the 13-year time-period (2008-2020) from 6% in 2008 to a high of 23% in 2017 then declined slightly to 16% in 2020 (Figure 4). Compared to other participating facilities in the Mountain Region, this figure illustrates that Montana is closing the gap in IV alteplase initiation.

**Figure 5.** EMS performance on five Coverdell pre-hospital stroke measures, 2019-2020.

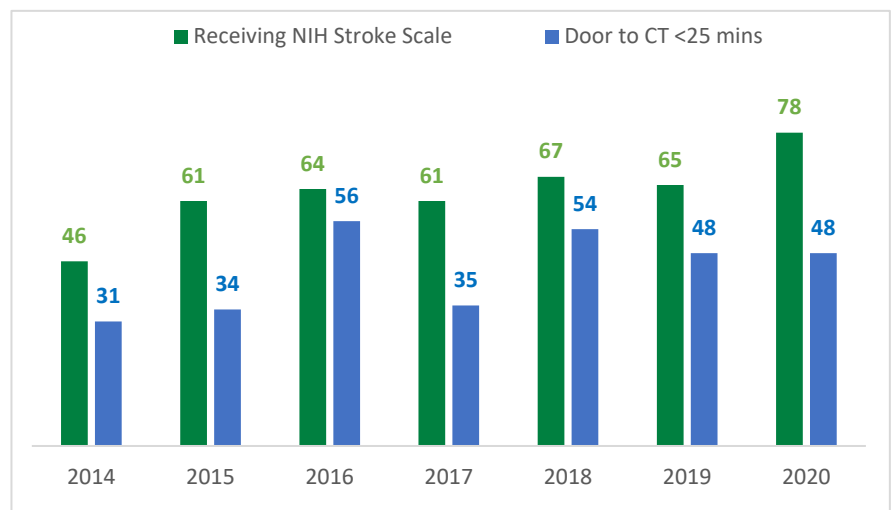
EMS data can supplement GTWG data because the EMS dataset includes all EMS transports, including those to facilities that may not participate with GTWG. Figure 5 shows results from five of the indicators. Over a two-year period, there were improvements in stroke screening and documentation of last known well. Improvements are needed in time of discovery documentation.

Stroke Recognized CAHs annually track several stroke indicators selected by the

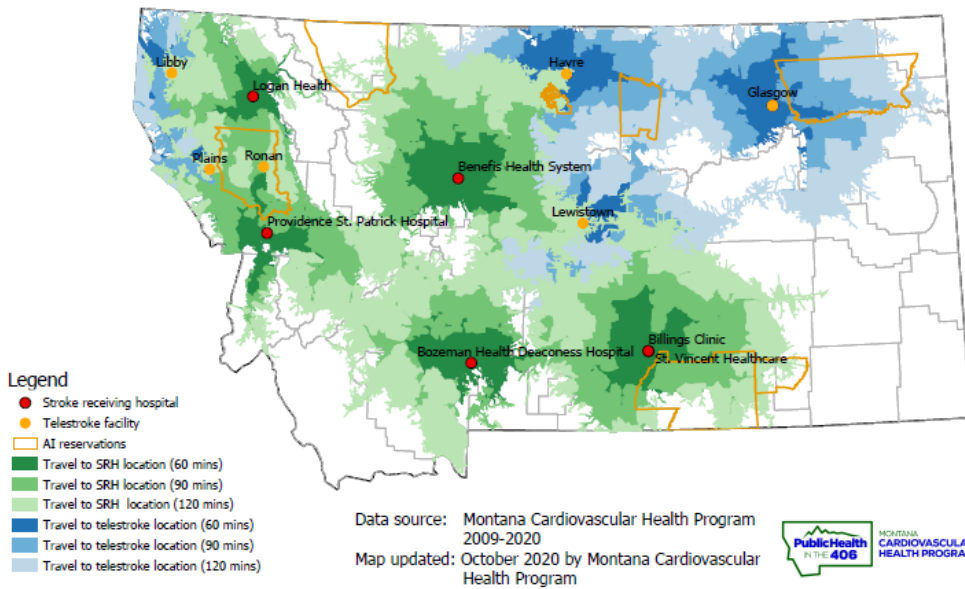
Montana Stroke Workgroup. Figure 6 illustrates a steady increase in the percentage of stroke patients seen at stroke-recognized CAHs who had an NIH stroke scale calculated and stroke patients with door to CT scan completed within 25 minutes.



**Figure 6.** Percentage of stroke patients seen at stroke-recognized CAHs receiving a National Institutes of Health (NIH) Stroke Scale and percentage with door to Computed Tomography (CT) less than 25 minutes, Montana, 2014-2020.



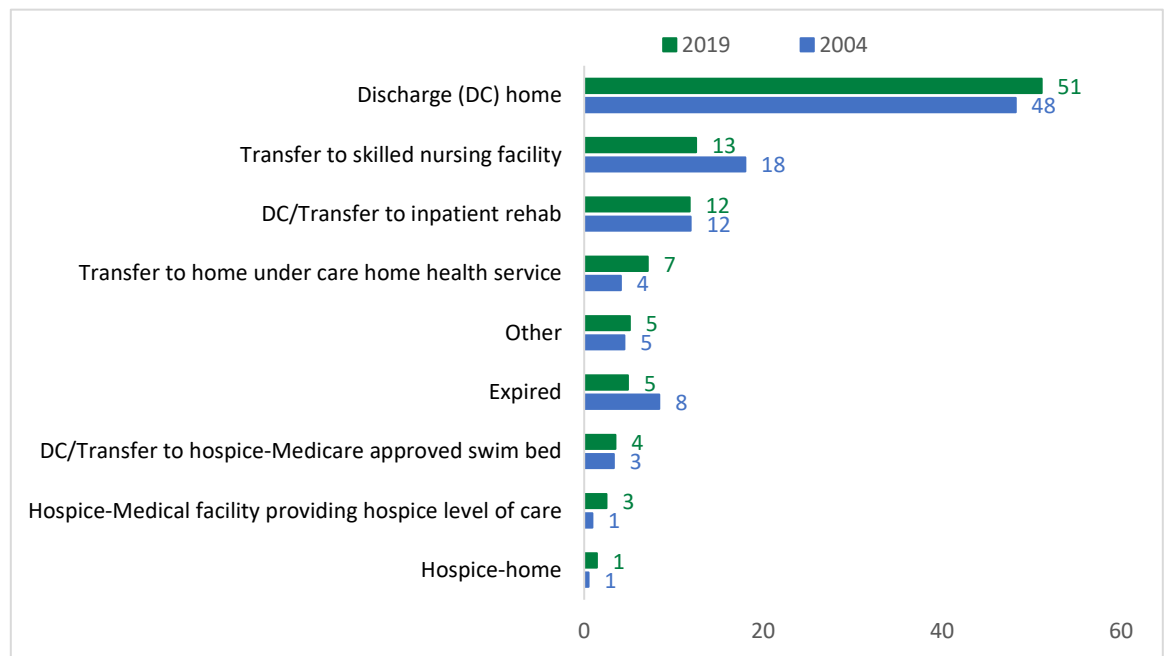
This Montana map illustrates the location of six stroke receiving hospitals (green) and six telestroke sites (blue) and the 60, 90, 120-minute one-way non-emergency drive times to these locations (Figure 7). Areas in east-central, southeastern and southwestern Montana show a lack of stroke coverage. With the addition of telestroke sites (blue) in 2010, two of Montana's seven American Indian reservations now have stroke coverage.



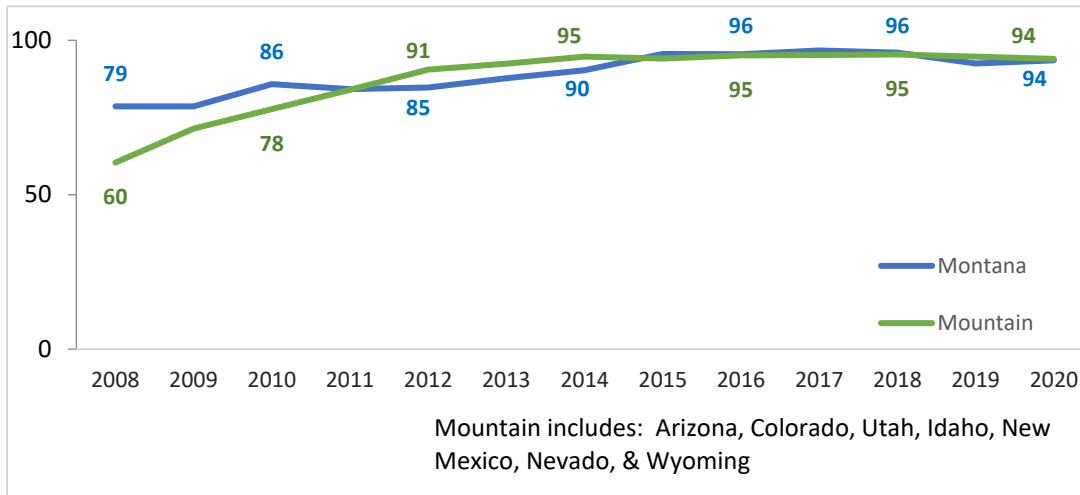
**Figure 7.** One-way 60, 90, 120-minute drive-time to stroke receiving hospitals (SRH) and active DPHHS-sponsored telestroke facilities, Montana, 2020.

The percentage of stroke-related hospital admissions discharged home or transferred to home under care (home health services) increased from 48% in 2004 to 51% in 2019 (Figure 8). During the same time-period, the percent of stroke-related hospital admissions transferred to a skilled nursing facility or died at discharge decreased. Finally, the percent of stroke-related hospital admissions discharged or transferred to inpatient rehab or discharged or transferred to hospice or medical center-approved swing bed remained unchanged in 2004 and 2019.

**Figure 8.** Percent of stroke-related hospital admissions by discharge (DC) status, Montana, Montana Hospital Discharge Data System, 2004 and 2019.



The percent of patients (or caregivers) seen at stroke receiving facilities using GWTG with stroke or transient ischemic attack (TIA) who were given education and/or educational materials during their hospital stay increased steadily from 79% in 2008 to 95% in 2014 where it leveled off (Figure 9). The educational material addressed the following: personal risk factors for stroke, warning signs for stroke, activation of emergency medical system, need for follow-up after discharge, and medications prescribed.



**Figure 9.** Percent of patients or caregivers receiving stroke education among stroke patients seen at stroke receiving facilities using GWTG registry, Montana and Mountain Region, 2008-2020.

## CONCLUSION:

The state's overall improvement in stroke mortality may be, in part, due to sustained stroke activities on a statewide basis conducted by the Montana DPHHS in conjunction with partners from the Montana Stroke Initiative and its Stroke Workgroup. These stroke efforts have encompassed a continuum of care from pre-hospital to acute care to stroke rehabilitation. Key successes have been in improving signs and symptoms awareness of adult Montanans and increasing emergency department usage of tPA. In addition, the Chronic Disease Bureau at DPHHS has focused on primary prevention (e.g., hypertension, smoking cessation, medication adherence, etc.) which may impact stroke risk.

Montana is taking stroke care to the next level through *Mission: Lifeline* Stroke. With two grants from The Leona M. and Harry B. Helmsley Charitable Trust that began in 2020, the AHA/ASA is working closely with the Stroke Workgroup to build upon and expand stroke care efforts. The intent of *Mission: Lifeline* is to connect all of the components of acute stroke care into a smoothly integrated system and standardize/increase the quality of care for stroke survivors in Montana's post-acute care settings. In 2021, the CVH Program addressed data gaps by obtaining direct access to GWTG-Stroke for all larger facilities (n=7) and seven Critical Access Hospitals participating in AHA's *Mission:Lifeline* Stroke initiative (<https://www.heart.org/en/affiliates/montana/welcome-to-montana/montana-mission-lifeline-stroke>). This data will be used to assess and evaluate the implementation and outcomes of the initiative. Feedback will be given to participating hospitals showing their hospital and statewide data. *Mission: Lifeline* Stroke will also address pre-hospital education and gaps in documenting stroke-related data. For more details about *Mission: Lifeline*, contact Joani Guzman, [Joani.Guzman@heart.org](mailto:Joani.Guzman@heart.org) or Janna Pietrzak, [Janna.Pietrzak@heart.org](mailto:Janna.Pietrzak@heart.org).

To join the Stroke Workgroup or learn more about the MSI, contact Crystelle Fogle, Cardiovascular Health Program, [cfogle@mt.gov](mailto:cfogle@mt.gov).

## REFERENCE:

- Centers for Disease Control and Prevention, Vital Signs (<https://www.cdc.gov/vitalsigns/pdf/2017-09-vitalsigns.pdf>).