

Kentucky Stroke Encounter Quality Improvement Project (SEQIP)



Kentucky Heart Disease and Stroke Prevention Task Force

SEQIP Registry 2021-2022 Data Summary

2023 Annual Report



Kentucky Public Health
Prevent. Promote. Protect.

June 1, 2023

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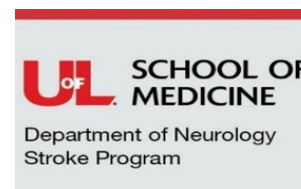
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Legislation

This data summary report is compiled pursuant to KRS 211.575, which requires the Kentucky Department for Public Health (KDPH) to establish and implement a plan to address continuous quality improvement for stroke care. KDPH is required to provide an annual report to the Governor and the Legislative Research Commission that includes data, related findings, and recommendations to improve the delivery of stroke care efforts in Kentucky. The complete annual SEQIP report can be accessed at <https://www.chfs.ky.gov/agencies/dph/dpqi/cdpb/Pages/heartdiseasestroke.aspx>.



IMPACT OF STROKE

IN KENTUCKY

ACROSS THE NATION



Kentucky had the fourteenth highest mortality rate for stroke in the United States in 2021.¹

IN THE COMMONWEALTH

Stroke was the 6th highest cause of death in Kentucky, resulting in 2,428 stroke deaths in 2021.²

4.9% of adult Kentuckians reported they had experienced a stroke at some time in their life.³

40% of adult Kentuckians reported they had hypertension, the number one risk factor for stroke.³

SOCIAL DRIVERS OF HEALTH



The prevalence of reported stroke significantly decreased as annual household income increased. Adults with an annual household income under \$25,000 reported a higher prevalence of stroke than those with an annual household income of \$50,000 or more (9.6% vs 2.4%).³



The prevalence of stroke decreased with increasing education level. The highest prevalence was among adults with less than high school education (10.4%).³



The prevalence of stroke did not significantly differ by race. The mortality rate of stroke did not significantly differ between Black and white Kentuckians.³

KENTUCKY HEALTH CARE COSTS

In 2021, the total charges for inpatient hospital stay for stroke* and transient ischemic attack (TIA)* collectively, was more than \$894 million.⁴

Sources and notes:

1. CDC NCHS. Stats of the States. Stroke Mortality by State. https://www.cdc.gov/nchs/pressroom/sosmap/stroke_mortality/stroke.htm Accessed April 2023.
 2. CDC Wonder. <http://wonder.cdc.gov/>. Accessed April 2023.
 3. Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health. BRFSS Prevalence & Trends Data 2021. Accessed at <https://www.cdc.gov/brfss/brfssprevalence/> on Jun 2, 2023.
 4. Kentucky Hospital Inpatient Claims: 2021; Kentucky Cabinet for Health and Family Services, Office of Data Analytics. In 2021, inpatient hospital stays for stroke* and transient ischemic attack* resulted in total charges of \$894,435,005.
* ICD-10 codes: I60-I609, I61-I619, I63-I639, G450-G452, G458-G459
- Infographic prepared by the Kentucky Heart Disease and Stroke Prevention Program, 2023.

Executive Summary

A stroke, also called a brain attack, occurs when blood flow to the brain is reduced or cut off and brain cells begin to die from lack of oxygen. The effects of a stroke depend on the severity of the brain damage but range from temporary weakness or numbness of the arm or leg to permanent paralysis, balance problems, loss of the ability to speak or process information correctly and sometimes death. There are two types of strokes, ischemic and hemorrhagic. Ischemic strokes are caused by loss of blood flow to the brain due to blockage of a blood vessel. Hemorrhagic strokes are caused by bleeding into the brain due to rupture of a blood vessel.

Stroke is a leading cause of death and disability in the United States and reduces mobility in more than half of stroke survivors who are 65 years of age and older. Kentucky has a higher death rate for stroke than the national average and the 14th highest rate in the nation. In 2019, stroke was the fifth leading cause of death in Kentucky. In 2020 and 2021, stroke dropped to sixth place due to a high number of deaths being attributed to COVID-19. The high morbidity and mortality are, in part, due to Kentuckians having higher prevalence rates of the common risk factors for stroke, namely: high blood pressure, high cholesterol, smoking, overweight/obesity, etc., in comparison to the nation. In addition to the high morbidity and mortality, there is a significant economic burden associated with the disease. The inpatient hospital charges for stroke and transient ischemic attack (TIA)* are substantial as detailed in the table below.

2021 Inpatient hospital charges for stroke and TIA* by patient Area Development District (ADD)

Area Development District	Cases	Average length of stay (days)	Average charge	Total charges
01 – Purchase	479	3.89	\$47,597	\$22,798,827
02 – Pennyrite	318	4.56	\$50,216	\$15,968,744
03 – Green River	356	5.03	\$51,087	\$18,186,842
04 – Barren River	668	5.30	\$51,009	\$34,073,944
05 – Lincoln Trail	717	5.38	\$78,757	\$56,468,443
06 – KIPDA	2,464	5.86	\$94,836	\$233,675,863
07 – Northern Kentucky	888	4.44	\$33,985	\$30,178,321
08 – Buffalo Trace	113	6.40	\$90,639	\$10,242,213
09 – Gateway	227	5.93	\$79,704	\$18,092,862
10 – FIVCO	376	5.19	\$64,473	\$24,241,970
11 – Big Sandy	344	6.19	\$86,970	\$29,917,512
12 – Kentucky River	335	7.29	\$78,050	\$26,146,681
13 – Cumberland Valley	644	7.25	\$90,846	\$58,504,632
14 – Lake Cumberland	518	6.22	\$93,135	\$48,244,120
15 – Bluegrass	1,704	6.17	\$98,514	\$167,868,005
Out of State	1,032	6.24	\$96,731	\$99,826,026
Total	11,183	5.75	\$79,982	\$894,435,005

Source: Kentucky Hospital Inpatient Claims: 2021, Kentucky Cabinet for Health and Family Services, Office of Data Analytics.

*ICD-10 codes: I60-I609, I61-I619, I63-I639, G450-G452, G458-G459.

The Kentucky Stroke Encounter Quality Improvement Project (SEQIP) is a statewide quality improvement initiative created by the Kentucky Heart Disease and Stroke Prevention Task Force – Cardiovascular Health Delivery Systems Subcommittee, the Kentucky Heart Disease and Stroke Prevention (KHDSPP) Program, and the American Heart Association/American Stroke Association (AHA/ASA). SEQIP was created in 2009 to advance stroke systems of care (SSOC) in Kentucky by developing collaboration among member hospitals to improve evidence-based performance measures for stroke care.

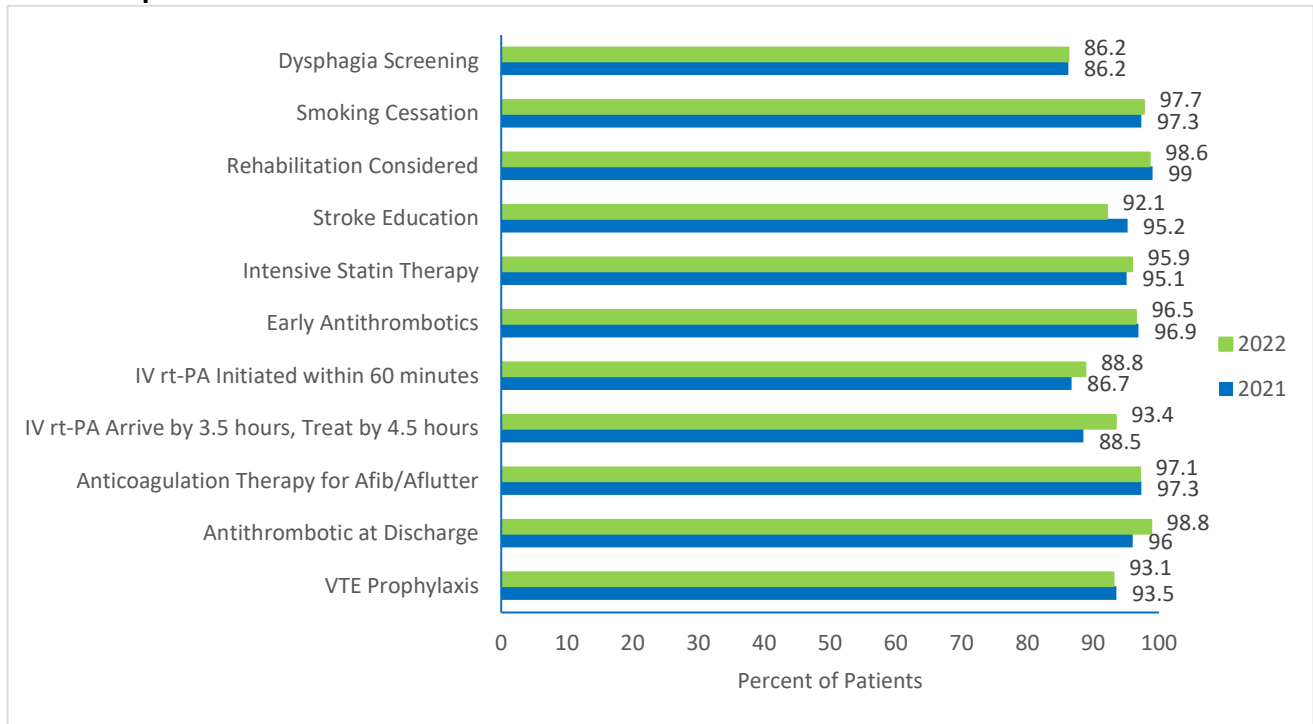
“Time is brain” and stroke is a medical emergency. Upon recognition of stroke symptoms, activation of emergency medical services (EMS) is recommended for rapid transport to the hospital where patients can be evaluated immediately upon arrival and evaluated for emergent treatment options to reverse symptoms.

SEQIP hospitals monitor evidence-based performance measures endorsed by the AHA/ASA and The Joint Commission (TJC) certification body as well as Det Norske Veritas (DNV) and Healthcare Facilities Accreditation Program (HFAP) for the treatment and management of stroke patients from hospital to discharge. The 11 performance measures are:

- Patients arrive at hospital within 3.5 hours and treated with IV rt-PA within 4.5 hours.
- Time to IV alteplase administration \leq 60 minutes.
- Dysphagia screen performed before oral intake.
- Venous thromboembolism (VTE) prophylaxis.
- Antithrombotics prescribed by hospital day 2.
- Rehabilitation is considered.
- Smoking cessation counseling during hospital stay.
- Stroke education is provided.
- Intensive statin therapy prescribed at discharge.
- Anticoagulation for atrial fibrillation/flutter at discharge.
- Antithrombotics prescribed at discharge.

Participation in the Kentucky stroke registry is required per KRS 211.575 for all hospitals in Kentucky that are certified stroke centers. The data presented in this report are based on 47 hospitals (Appendix A) submitting data to the Kentucky stroke registry via Get With The Guidelines®-Stroke (GWTG®-S). The nationally recognized goal for performance measures by the AHA/ASA and stroke center certifying bodies is at least 85% compliance in seven GWTG®-S achievement measures. SEQIP hospitals met this goal for 11 measures during calendar years 2021 and 2022.

GWTG®-S performance measures 2021-2022



Significant progress has been made in reducing stroke death rates in Kentucky over the last 14 years. SEQIP has been successful in creating a SSOC; however, there is a need to continue improving access to stroke care in Kentucky by sustaining SEQIP, increasing the number of certified stroke centers, and ongoing collaboration and implementation of processes to deliver evidence-based stroke treatments.

SEQIP’s work laid the foundation for partners (UK Healthcare, UofL Health, Kentucky Department for Public Health’s Heart Disease and Stroke Prevention Program, and other collaborators) to successfully apply for and be awarded the Centers for Disease Control and Prevention prestigious Paul Coverdell National Acute Stroke Program in 2021. The \$1.8 million dollar grant over three years will allow the collaboration and expansion of existing efforts to improve health related stroke outcomes.

Recommendations

The SEQIP steering committee is recommending the funding of SEQIP in the amount of \$500,000-\$1,000,000. The funds will help SEQIP continue the objectives and action items identified in the KHDSP Task Force Strategic Map and Plan: 2020-2023 (Appendix B). These include increasing the number of stroke certified hospitals in Kentucky, increasing participation in SEQIP to expand sharing of best practices and quality improvement plans, improving data collection, educating the public, and strengthening the stroke continuum of care.

In addition, the SEQIP steering committee is requesting a legislative change to the deadline for the SEQIP report to September 1, which will allow for the most recent data from the previous calendar year to be included in the annual report.

Cardiovascular/Cerebrovascular Disease in Kentucky

What is Cardiovascular disease?

Cardiovascular disease (CVD) is a term that refers to several conditions involving the heart and blood vessels including heart disease, heart attack, stroke, hypertension, congestive heart failure, arrhythmia, and others.¹

What is Cerebrovascular disease?

Cerebrovascular disease includes all disorders that impact blood flow to the brain. Cerebrovascular diseases include stroke, TIA, aneurysms, vascular dementia, or vascular malformations.² Many of these conditions involve narrowed or blocked blood vessels² and contribute to the heavy burden of chronic diseases in Kentucky.

A stroke, also called a 'brain attack', occurs when blood flow to the brain is reduced or cut off, and brain cells begin to die from lack of oxygen.³ The effects of a stroke depend on the severity of the brain damage but range from temporary weakness or numbness of the arm or leg to permanent paralysis, balance problems, loss of the ability to speak or process information correctly and sometimes death.³ A TIA occurs when a blood clot temporarily blocks blood flow to the brain.² The symptoms occur suddenly and usually resolve within minutes.² There are two types of strokes, ischemic and hemorrhagic.² Ischemic strokes are caused by loss of blood flow to the brain due to blockage of blood vessels and hemorrhagic strokes are caused by bleeding into the brain due to rupture of a blood vessel.² Nationally, ischemic strokes account for 87% of all strokes, while intracerebral hemorrhage accounts for 10% and subarachnoid hemorrhage for 3%.⁴ Stroke is a leading cause of disability in the United States and reduces mobility in more than half of stroke survivors who are 65 years of age and older.³

Some risk factors that increase the likelihood of a stroke are not able to be modified, such as age, gender, ethnicity, and genetic or heredity factors.³ However, there are common risk factors that increase one's likelihood of having a stroke that can be modified or changed. Those risk factors include high blood pressure, high cholesterol, diabetes, smoking, being overweight or obese, not getting enough physical activity, not eating a balanced diet, and drinking too much alcohol.³

The Burden of Stroke

In 2021, stroke was the fifth highest cause of death nationally and the sixth highest in Kentucky (Table 1).⁵ Kentucky had a higher mortality rate than the rest of the nation, and African Americans or Blacks continued to have a higher mortality rate than whites in the nation (Figure 1).⁵ There is a significant economic burden associated with the disease. Each inpatient hospital stay for stroke and TIA* incurs a charge with an average of nearly \$80,000 resulting in total charges of more than \$894 million as specified in the table on page 5. According to the 2021 Kentucky Behavioral Risk Factor Surveillance (KyBRFS) prevalence data, 4.9% of adult Kentuckians reported they had experienced a stroke at some time in their life.⁶ This is similar to the prevalence in 2020.⁷ Additionally, 40.9% of Kentuckians reported they had hypertension, the number one risk factor for stroke.⁶ The age-adjusted death rate from stroke varies by county.⁸ The age-adjusted death rate varied from 51-67 per 100,000 in counties with the highest rates in the states.⁸

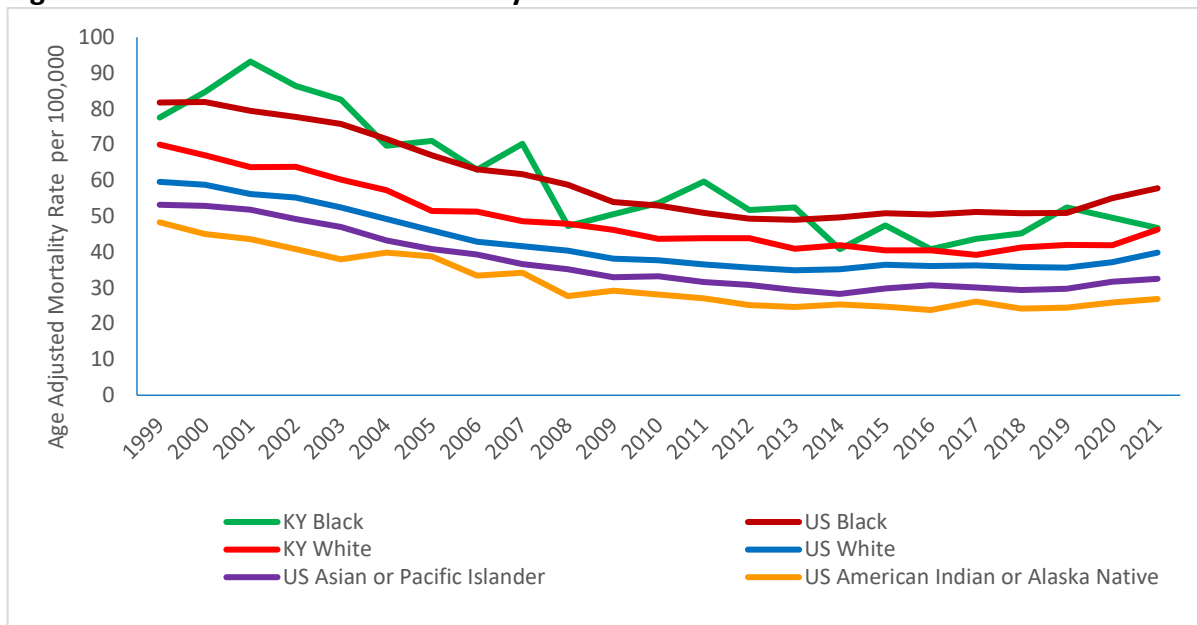
*ICD-10 codes: I60-I609, I61-I619, I63-I639, G450-G452, G458-G459.

Table 1: Leading causes of death in Kentucky 2021

15 Leading causes of death in Kentucky 2021	Deaths	Percent of total deaths in KY
Heart disease	11,697	19.40
Cancer	10,250	17.00
COVID-19	7,459	12.37
Accidents (unintentional injuries)	4373	7.25
Chronic lower respiratory diseases	3,243	5.38
Cerebrovascular diseases (stroke)	2,428	4.03
Diabetes mellitus	1,765	2.93
Alzheimer disease	1,632	2.71
Nephritis, nephrotic syndrome, and nephrosis (kidney disease)	1130	1.87
Chronic liver disease and cirrhosis	939	1.56
Septicemia	923	1.53
Suicide	816	1.35
Influenza and pneumonia	739	1.23
Parkinson disease	523	0.87
Essential hypertension and hypertensive renal disease	516	0.86

Source: Centers for Disease Control and Prevention. CDC Wonder. <http://wonder.cdc.gov/>. 2023.⁵

Figure 1: Stroke death rate in Kentucky and US 1999-2021

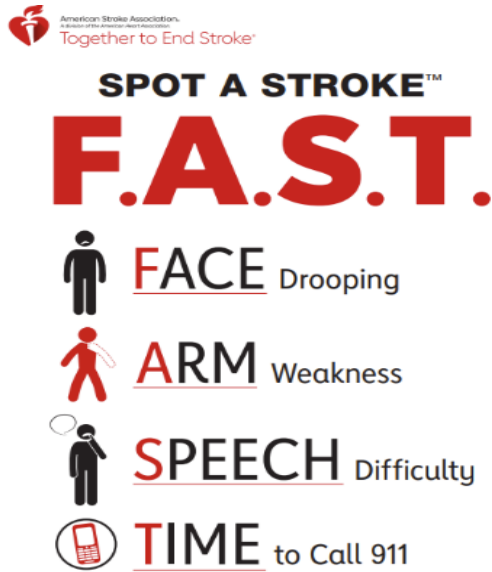


Source: Centers for Disease Control and Prevention. CDC Wonder. <http://wonder.cdc.gov/>. 2023.⁵ KY Asian and KY American Indian was either not reported due to small numbers for confidentiality reasons or rates were statistically unreliable when the numerator was <20.

Early Stroke Treatment is Important

Stroke is a medical emergency. Early treatment may reduce long-term disability from stroke and prevent death. SSOC focuses on increasing recognition of stroke symptoms; activation of the EMS at the onset of symptoms, EMS triage protocols; receiving care at hospitals equipped to treat acute stroke by offering Food and Drug Administration (FDA) approved therapies; and a process for arranging emergent patient transfer to tertiary centers for advanced stroke care, as appropriate.

Figure 2: Symptoms of stroke



The timely recognition of stroke symptoms aided by using the F.A.S.T. acronym (face drooping, arm weakness, speech difficulty and time to call 911), can facilitate stroke recognition, seeking emergent, time sensitive medical evaluation, and transport to facilities where access to treatments capable of reversing or minimizing stroke effects are available.

Source: American Stroke Association⁹

Stroke Encounter Quality Improvement Project (SEQIP)

SEQIP was created in 2009 as a voluntary statewide stroke quality improvement initiative of the Kentucky Heart Disease and Stroke Prevention Task Force - Cardiovascular Health Delivery Systems Subcommittee, KHDSP, and AHA/ASA.

The mission of SEQIP is to advance SSOC and reduce stroke disparities in Kentucky by:

- Establishing a network of professionals that will encourage and support collaboration among stroke care providers in Kentucky;
- Providing opportunities to share information and resources related to stroke program development and proficiency across the continuum of care in Kentucky;
- Promoting quality, improving outcomes, and standardizing acute stroke care through collegiality and use of evidence-based practice guidelines.



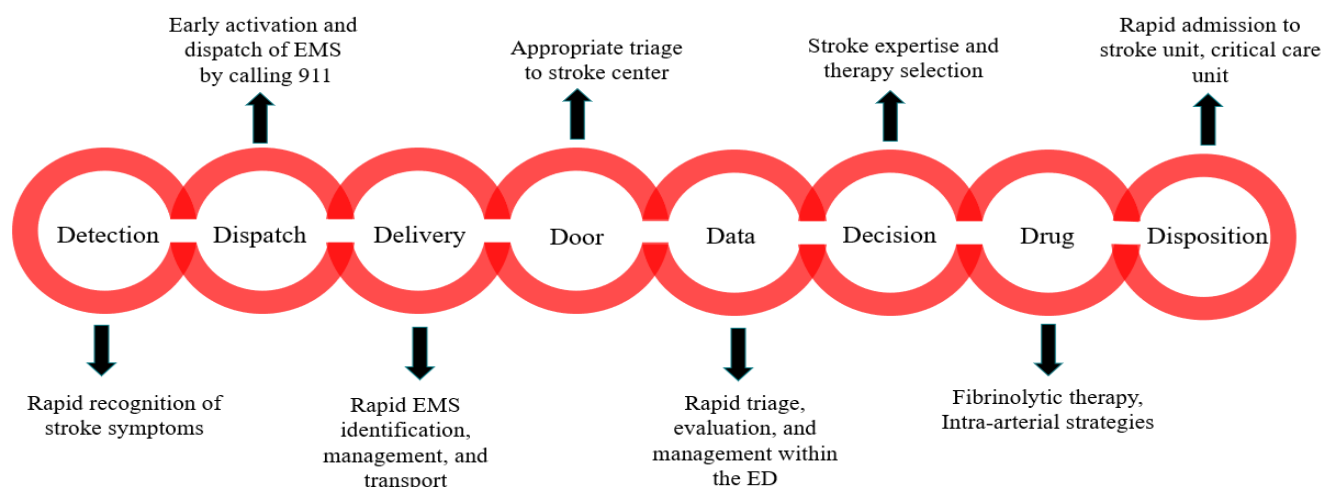
SEQIP includes hospitals that are stroke certified by TJC, DNV, or HFAP as comprehensive, thrombectomy-capable, primary, and acute stroke ready, as well as hospitals seeking to advance stroke care in the community in which they serve. Membership also includes EMS personnel, advocacy personnel, public health officials, and community leaders. Participation in SEQIP is voluntary and open to all hospitals and stakeholders in Kentucky and surrounding areas interested in reducing the burden of stroke and improving access to stroke care.

TJC stroke certification levels for hospitals as of 2020 are described below¹⁰:

- **Acute Stroke Ready Hospital (ASRH):** typically rural, always has a stroke team available with physicians privileged in the diagnosis and treatment of acute stroke or have telemedicine available within 20 minutes, have computerized tomography (CT) and laboratory testing available constantly, can deliver intravenous thrombolysis around the clock and have transfer protocols in place when a higher level of care is needed.
- **Primary Stroke Center (PSC):** typically urban/suburban, must meet all ASRH requirements, have dedicated in-patient beds for the acute care of stroke patients, may have advanced radiology imaging available around the clock, may be capable of performing endovascular therapy (clot retrieval) and can potentially admit hemorrhagic strokes.
- **Thrombectomy-Capable Stroke Center (TSC):** typically urban/suburban, must meet all PSC requirements, have advanced imaging capabilities, meet standards for performing endovascular thrombectomy (clot retrieval) and providing post-procedural care, possibly admit hemorrhagic stroke patients and potentially perform research.
- **Comprehensive Stroke Center (CSC):** typically urban, must meet all TSC requirements, as well as be able to meet concurrently the emergent needs of multiple complex stroke patients, admit hemorrhagic stroke patients, have neurosurgical capability around the clock, and perform research.

SEQIP was developed to improve SSOC by sharing best practices across geopolitical boundaries. At inception, 16 hospitals certified as a stroke center or pursuing stroke center certification were geographically chosen by the AHA and invited by KHDSP to represent the state. The number of SEQIP hospitals has increased to 47 as listed in Appendix A. SEQIP works to encourage hospitals to become stroke certified, increase their certification level, and improve their overall quality of patient care through quality improvement processes. Members identify and participate in quality improvement initiatives (based on outcomes data from the Kentucky stroke registry) to reduce disparities in stroke care and increase reperfusion therapies by impacting the stroke chain of survival, namely the Ds of Stroke Care (Figure 3).¹¹

Figure 3: Ds of stroke care



Source: Adapted from Ashcraft, S., Wilson, S.E., Nystrom, K.V., et al., 2021.¹¹

SEQIP Goals:

- Adopt evidence-based guidelines and standards for practice.
- Implement evidence-based integrated cerebrovascular systems of care.
- Support and advance the quality of care available to stroke patients in Kentucky.
- Share best practices and encourage collaboration among members.
- Identify and map certified stroke centers in the state.
- Engage and recruit hospitals to seek certification as a CSC, TSC, PSC, and ASRH.
- Evaluate quality data and identify opportunities for collaboration with partners outside of SEQIP.
- Address the entire SSOC including pre-hospital stroke care, stroke rehabilitation, transitions of care, and patient outcomes.
- Develop and disseminate an annual report to the Governor and legislature, including recommendations for improving SSOC.
- Support the passage of state policies that advance the implementation of SSOC.

SEQIP Data Registry

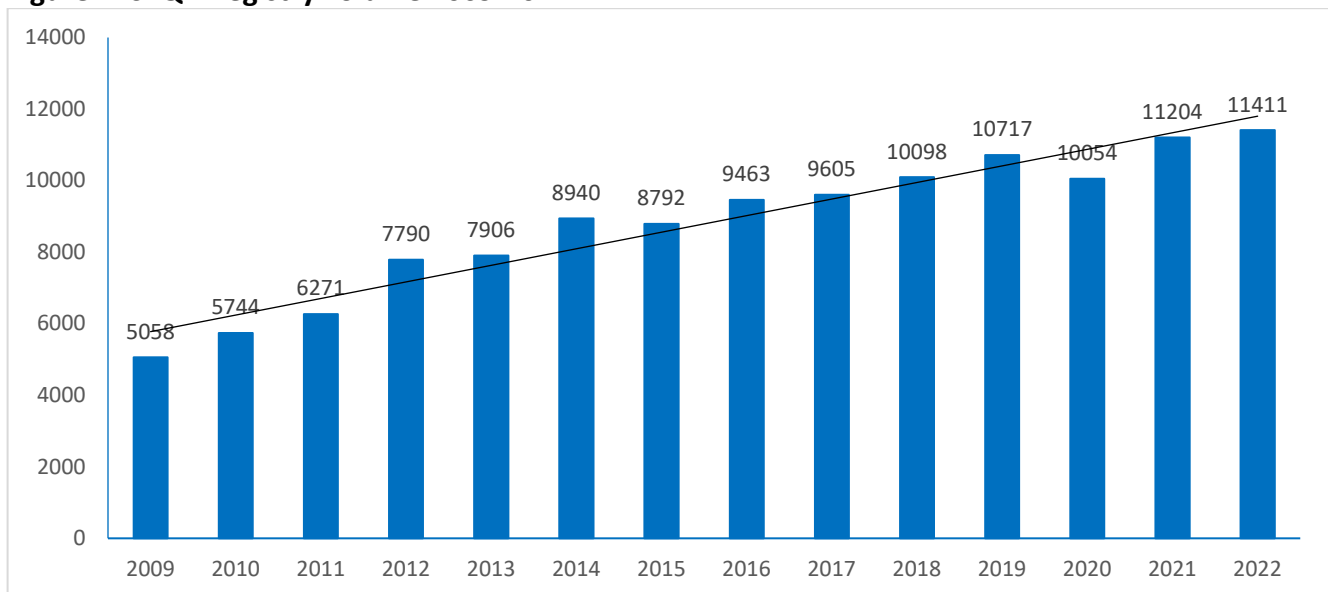
Stroke cases are added to the SEQIP registry by individual hospital data abstractors, in real time and after patient discharge. The AHA requires all data for the calendar year be entered in the registry by March 31 of the following year for consideration of a GWTG[®]-S award status. SEQIP utilizes the performance measures developed by the AHA/ASA's nationally recognized GWTG[®]-S hospital-based quality improvement program recognized by TJC and the Centers for Disease Control and Prevention (CDC). This program provides hospitals with a data collection platform, decision support, and performance improvement methodologies to improve patient outcomes, and uses a dataset with patient confidentiality standards.

Participation in the SEQIP data registry is required per KRS 211.575 for all hospitals in Kentucky that are certified stroke centers after a change in legislation was passed in the 2022 session.

SEQIP collects data on measures related to stroke care that are for the treatment and management of stroke from hospital admission to discharge. The standardized, evidence-based performance measures are data driven and patient-centered to help hospitals monitor and improve acute stroke care processes and clinical outcomes. The charts on the following pages are based on performance measure data reported by the participating hospitals for the calendar years 2021 and 2022. The data presented in this report are based on 47 hospitals (Appendix A) submitting data to the Kentucky stroke registry via GWTG[®]-S. Notations are made for those hospitals that submit stroke patient data to the Kentucky stroke registry and for those that are required to report by Kentucky statute.

Figure 4 shows the change in the SEQIP registry annual volume since inception of SEQIP in 2009 when 5,058 cases were entered to 11,411 cases entered in 2022. A decrease in the volume of hospitalized stroke patients was seen across the nation as well as in Kentucky in 2020, believed to be related to the COVID-19 pandemic.¹²

Figure 4: SEQIP registry volume 2009-2022

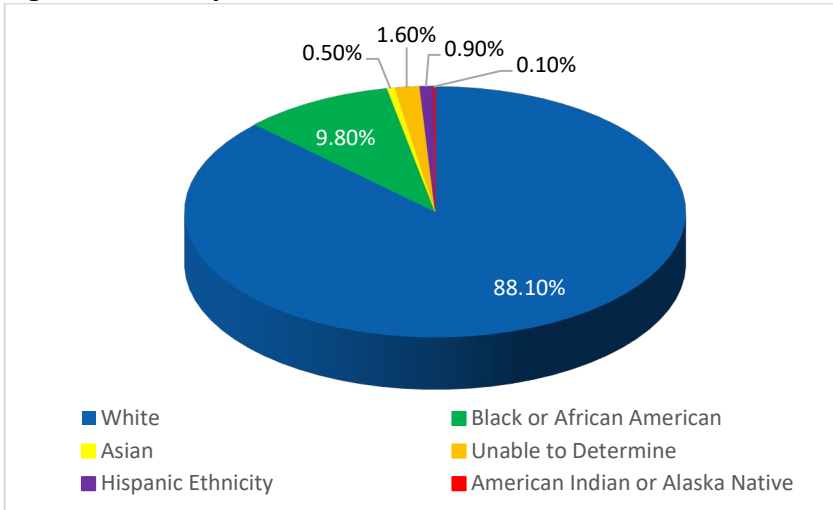


*ICD-10 codes: I60-I609, I61-I619, I63-I639, G450-G452, G458-G459.

SEQIP Patient Demographics

Stroke patients in Kentucky registry data are primarily white at 88%, followed by African American/Blacks at approximately 10%, with other identified races representing about 2% of all cases (Figure 5). SEQIP patients constituted a similar percent of males and females (Figure 6). Stroke is occurring at a younger age than national statistics with about 40% of strokes occurring in those under the age of 65 (Figure 7). Unfortunately, a likely contributor to this is the fact that Kentucky exceeds the national average in known risk factors for stroke (Figure 8).

Figure 5: SEQIP patient race 2022



Note: Native Hawaiian or Pacific Islander are not included in the chart below due to very small numbers and privacy protections.

Figure 6: SEQIP patient gender 2022

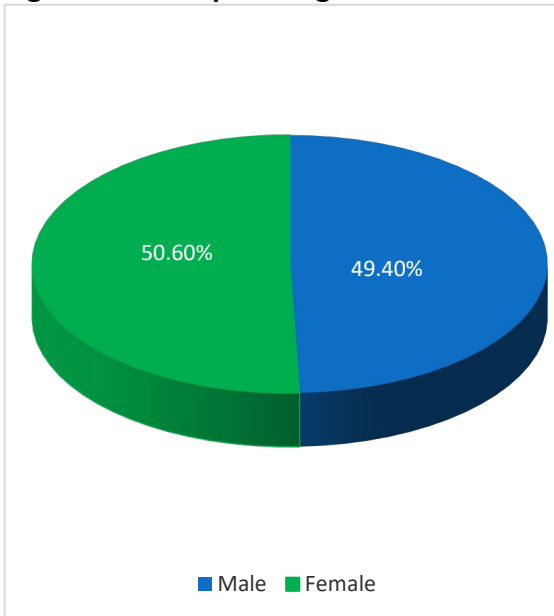


Figure 7: SEQIP patient ages 2022

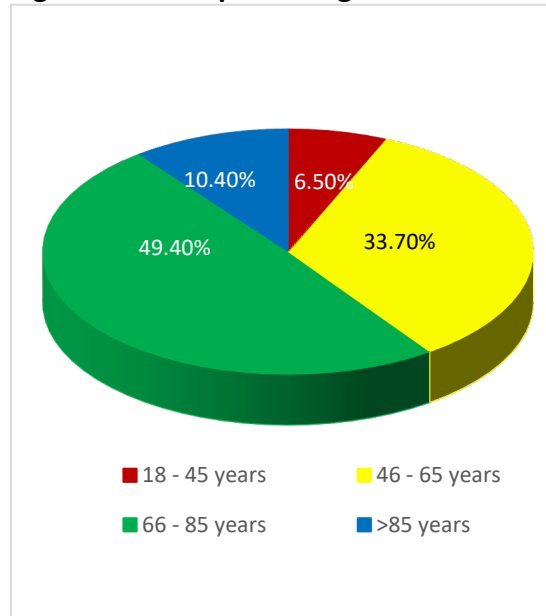
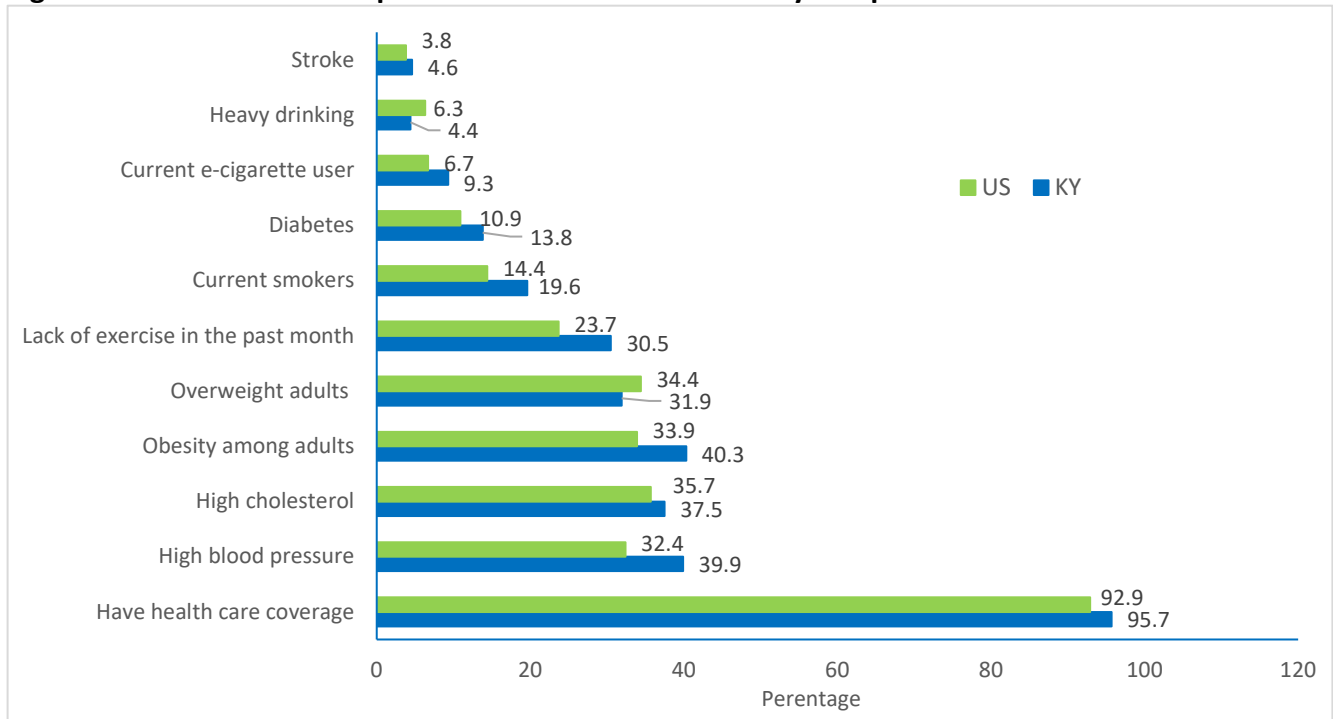


Figure 8: Stroke risk factors prevalence in adults in Kentucky compared to the US 2021

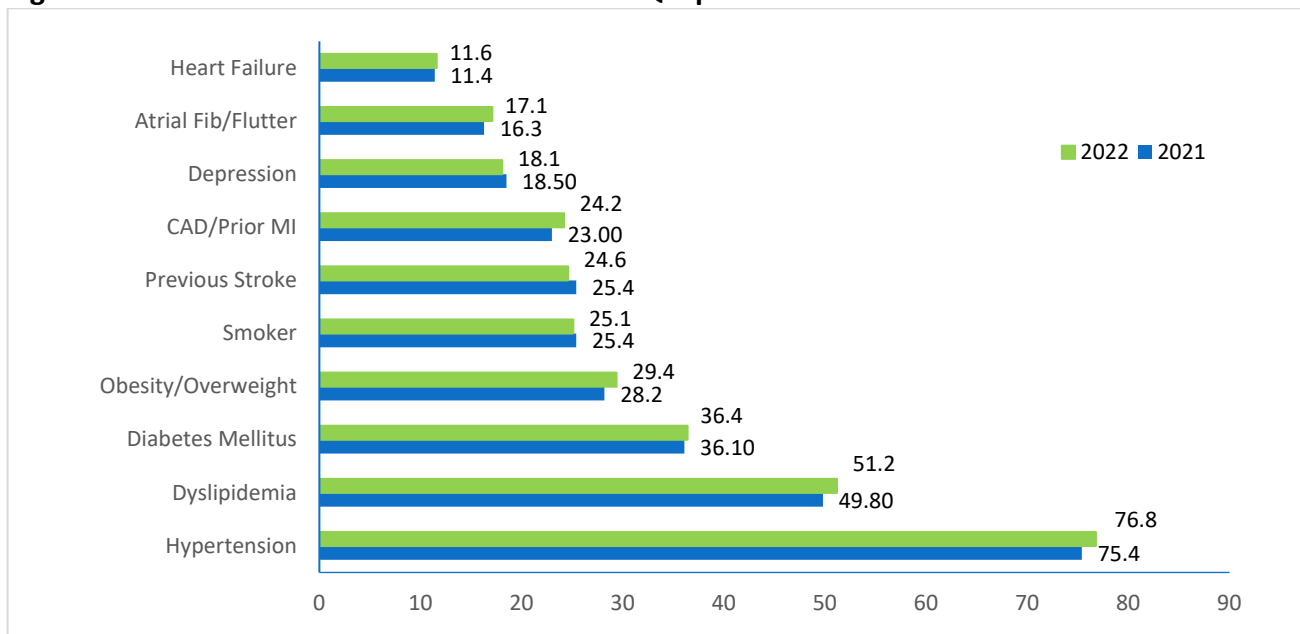


Source: CDC, BRFSS Prevalence & Trends Data, 2021.⁷

*Heavy drinking, adult men > 14 drinks/week, adult women > 7 drinks/week.

Registry data show stroke patients in Kentucky have common stroke risk factors. The approximate percent obtained from 2021-2022 data indicate: 76% had hypertension, 50% had high cholesterol, 36% had diabetes, 29% were overweight/obese, 25% were smokers, 25% had a previous stroke, 24% had a prior myocardial infarction or coronary artery disease, and 17% had atrial fibrillation/flutter (Figure 9).

Figure 9: Most common stroke risk factors of SEQIP patients 2021-2022



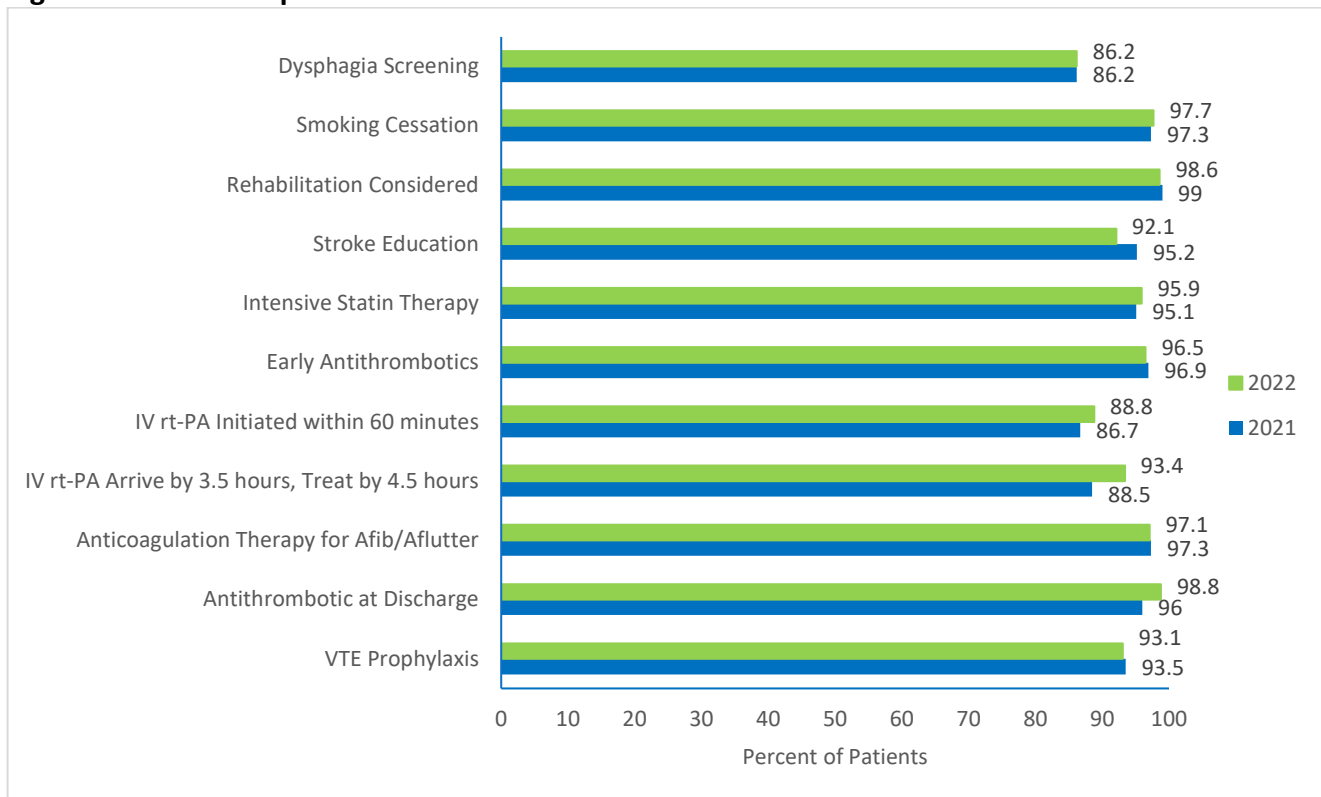
Stroke Performance Measures

Stroke performance measures focus on:

- Delivering time sensitive acute stroke therapies to eligible patients;
- Providing appropriate medications proven to reduce the risk of recurrent stroke;
- Educating patients and families on their risk for recurrent stroke and what they can do to prevent a stroke from happening again by making lifestyle changes;
- Preventing complications during hospitalization;
- Providing access to rehabilitation specialists to aid in recovery; and
- Ensuring appropriate follow up care post hospitalization.

The nationally recognized goal for performance measures by the AHA/ASA and stroke center certifying bodies is >85% achievement for each measure. SEQIP hospitals met this goal for all 11 measures during calendar years 2021-2022 (Figure 10).

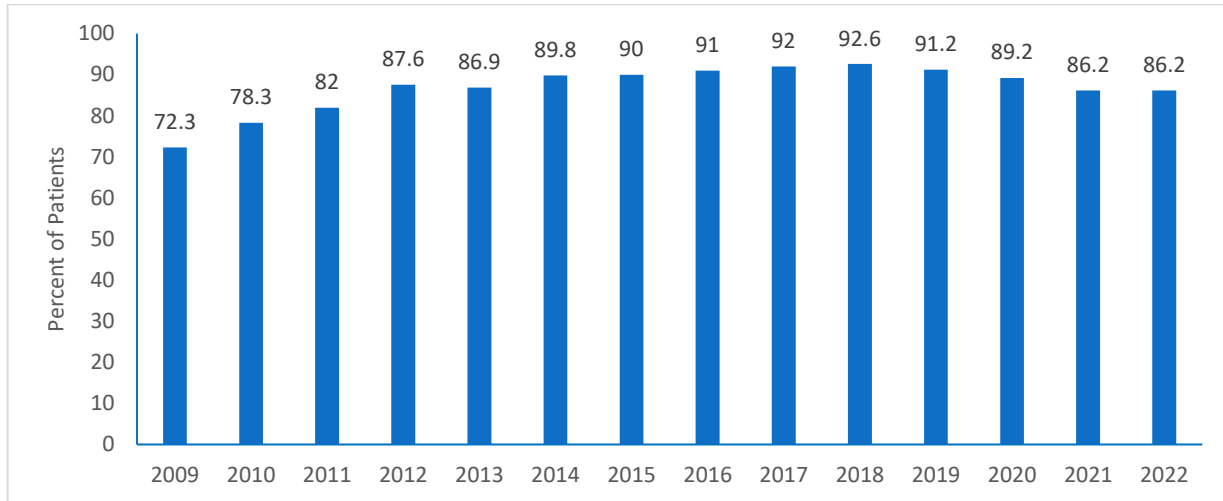
Figure 10: GWTG[®]-S performance measures 2021-2022



Dysphagia Screening

Measure: The percent of stroke patients who undergo screening for dysphagia with an evidence-based bedside testing protocol approved by the hospital before being given any food, fluids, or medication by mouth. In 2009, 72.3% of patients were screened for dysphagia before given any food, fluids, or medication by mouth. In 2022, 86.2% of patients were screened for dysphagia.

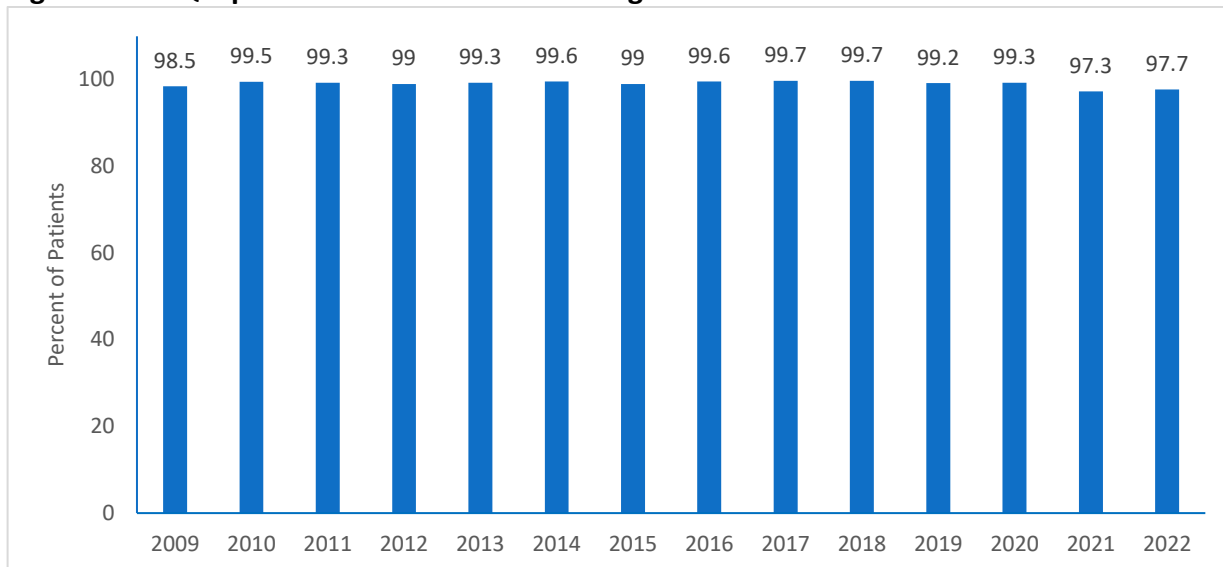
Figure 11: SEQIP dysphagia screening 2009-2022



Smoking Cessation

Measure: The percent of patients with ischemic stroke, hemorrhagic stroke, or TIA with a history of smoking cigarettes, who are, or whose caregivers are, given smoking cessation advice or counseling during hospital stay. In 2009, 98.5% of eligible patients were counseled on smoking cessation. In 2022, 97.7% of eligible patients were counseled on smoking cessation.

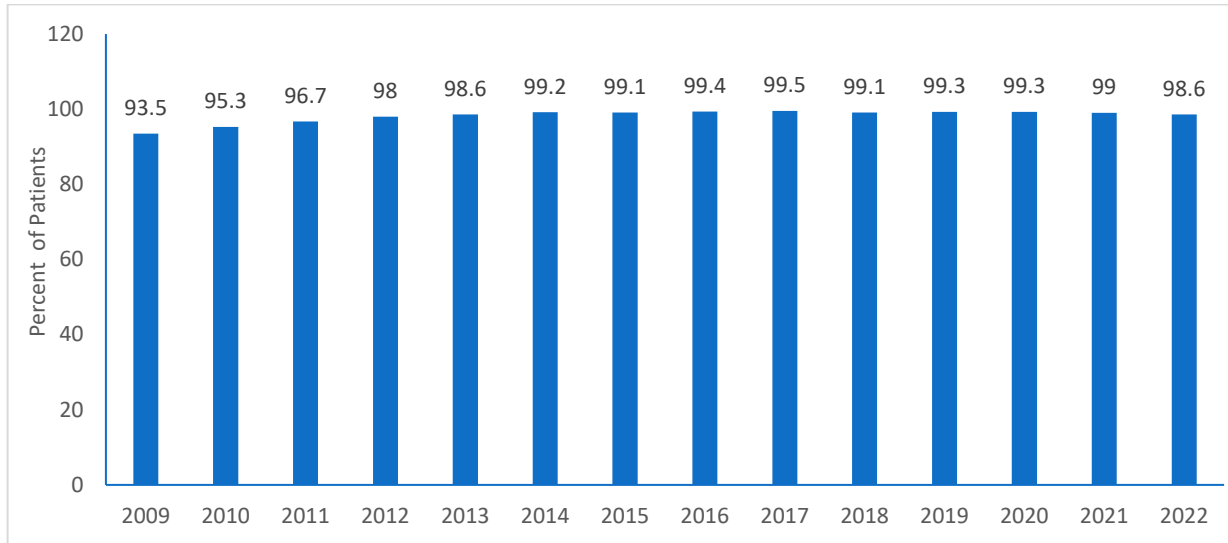
Figure 12: SEQIP patients counseled on smoking cessation 2009-2022



Rehabilitation Considered

Measure: The percent of patients with stroke who were assessed for rehabilitation services. In 2009, 93.5% of eligible patients were assessed for rehabilitation services. In 2022, 98.6% of eligible patients were assessed for rehabilitation.

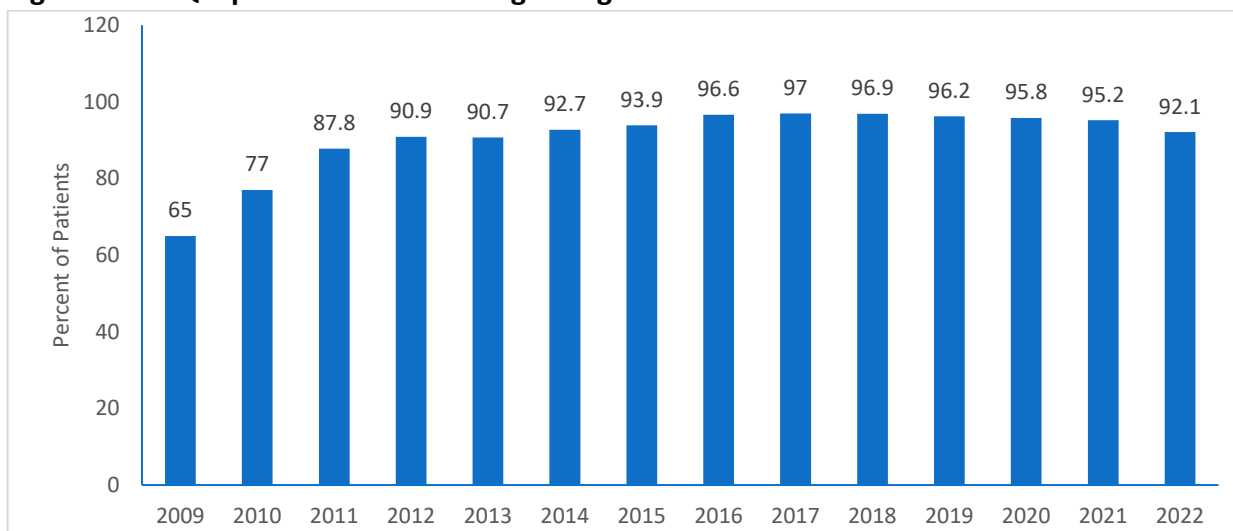
Figure 13: SEQIP patients assessed for rehabilitation services 2009-2022



Stroke Education

Measure: The percent of patients with stroke or TIA or their caregivers who were given education and/or educational materials during the hospital stay addressing all the following: personal risk factors for stroke; warning signs of stroke; activation of emergency medical system; the need for follow-up after discharge; and medications prescribed. In 2009, 65.0% of eligible patients were given stroke educational information. In 2022, 92.1% of eligible patients were given stroke educational information.

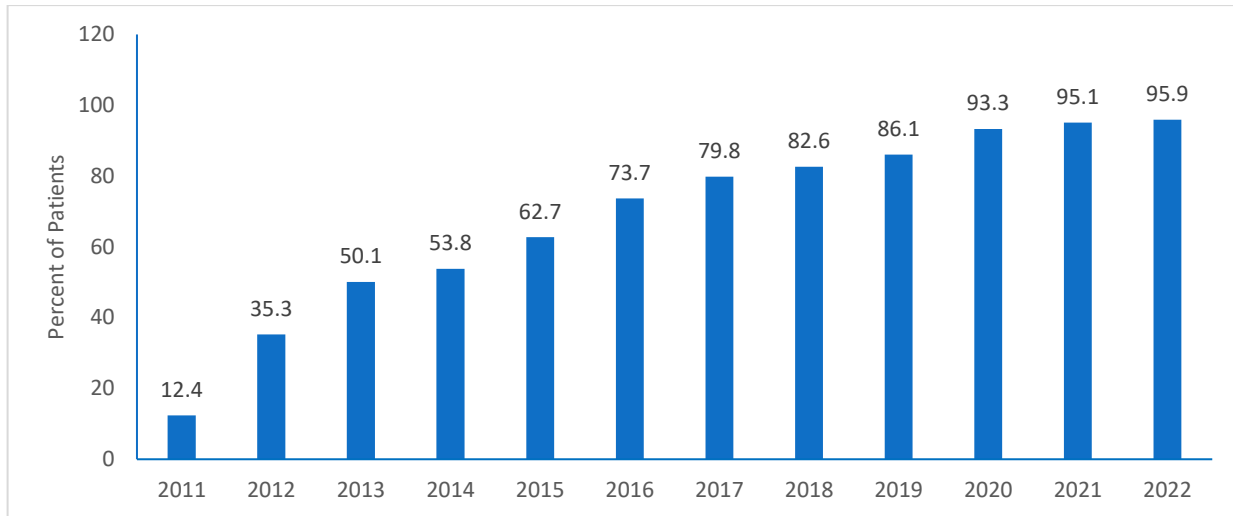
Figure 14: SEQIP patients or their caregivers given stroke education 2009-2022



Discharged on Intensive Statin Medication

Measure: The percent of ischemic stroke and TIA patients who are prescribed high-intensity statin therapy at discharge, or if greater than 75 years of age, are prescribed at least moderate-intensity statin therapy at discharge. This measure began in 2011. In 2011, 12.4% of eligible patients were discharged with a high intensity statin medication prescription. In 2022, 95.9% of eligible patients were discharged on a statin.

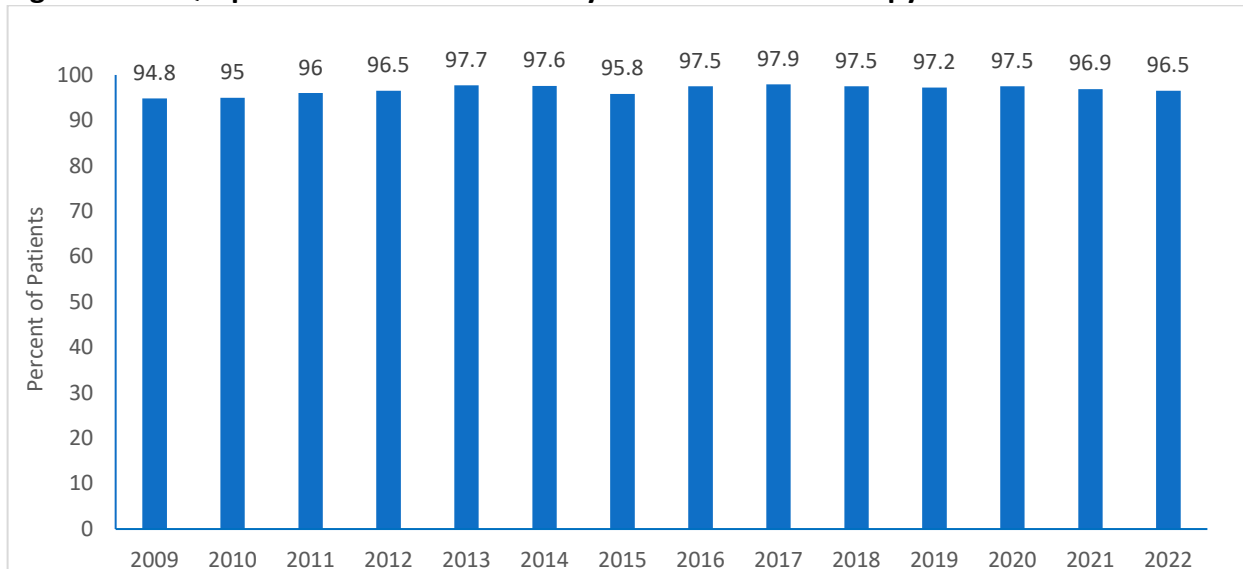
Figure 15: SEQIP patients prescribed intensive statin therapy at discharge 2011-2022



Early Antithrombotics

Measure: The percent of patients with ischemic stroke or TIA who receive antithrombotic therapy by the end of hospital day two. In 2009, 94.8% of eligible patients received antithrombotic therapy by the end of hospital day two. In 2022, 96.5% of patients received early antithrombotic therapy.

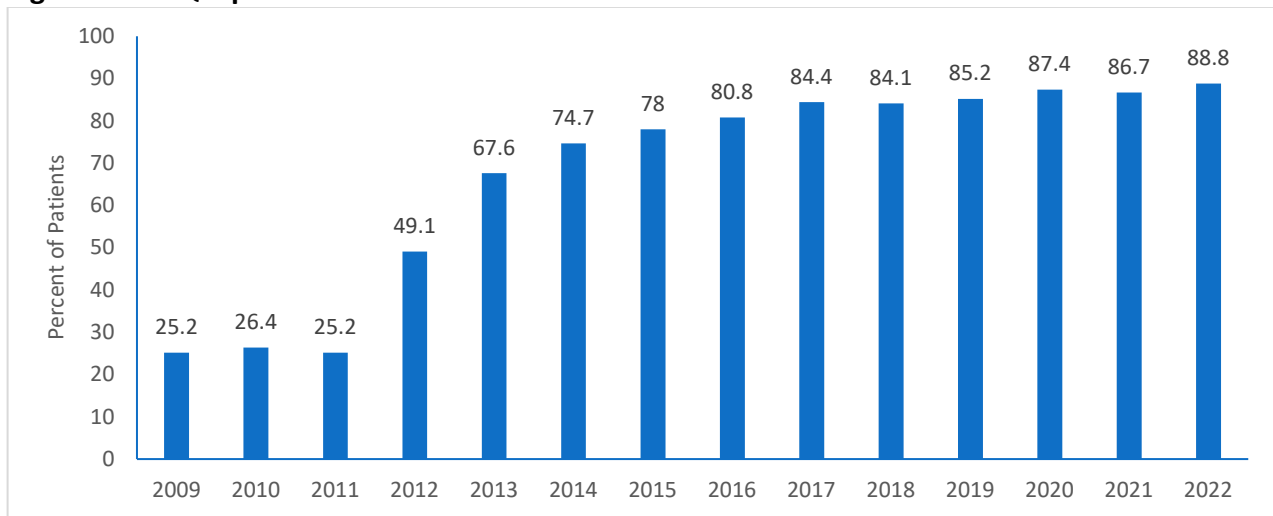
Figure 16: SEQIP patients who received early antithrombotic therapy 2009-2022



IV Alteplase (rt-PA) Initiated Within 60 Minutes

Measure: The percent of acute stroke patients receiving IV rt-PA therapy during the hospital stay who have a time of 60 minutes or less from hospital arrival to initiation of thrombolytic therapy administration (door-to-needle) time. In 2009, 25.2% of eligible patients received IV rt-PA within 60 minutes of arriving at the hospital. In 2022, 88.8% of eligible patients received IV rt-PA within 60 minutes.

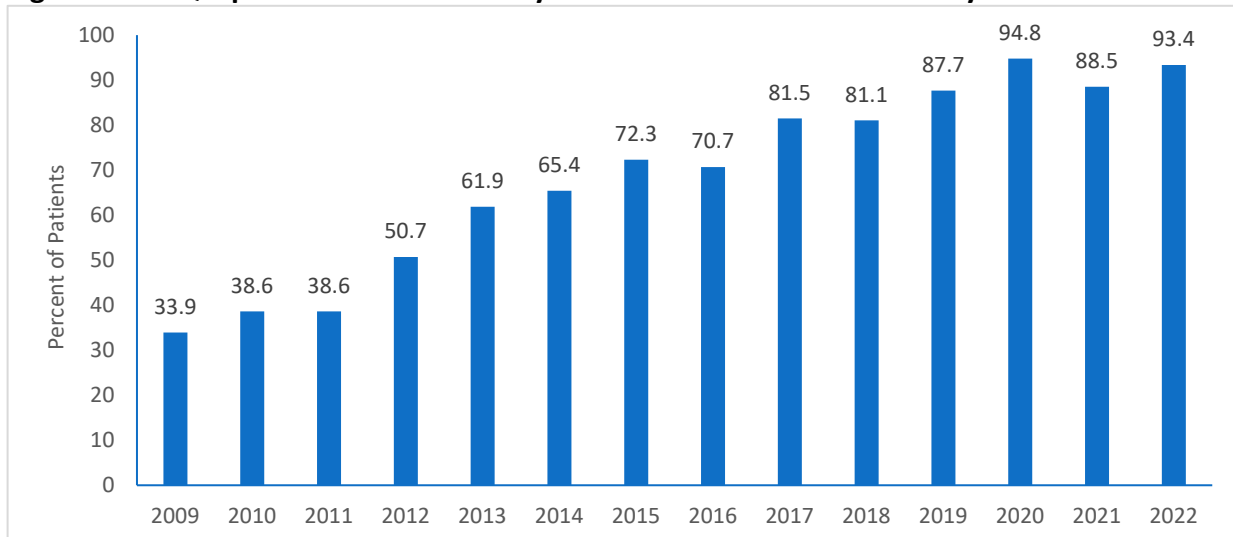
Figure 17: SEQIP patients who received IV rt-PA within 60 minutes 2009-2022



IV Alteplase (rt-PA) Initiated Within 4.5 Hours

Measure: The percent of acute stroke patients arriving at the hospital within 3.5 hours of time last known well and for whom IV rt-PA is initiated at the hospital within 4.5 hours of time last known well. In 2009, 33.9% of eligible patients received IV rt-PA within 4.5 hours of time last well known. In 2022, 93.4% of eligible patients received IV rt-PA within 4.5 hours.

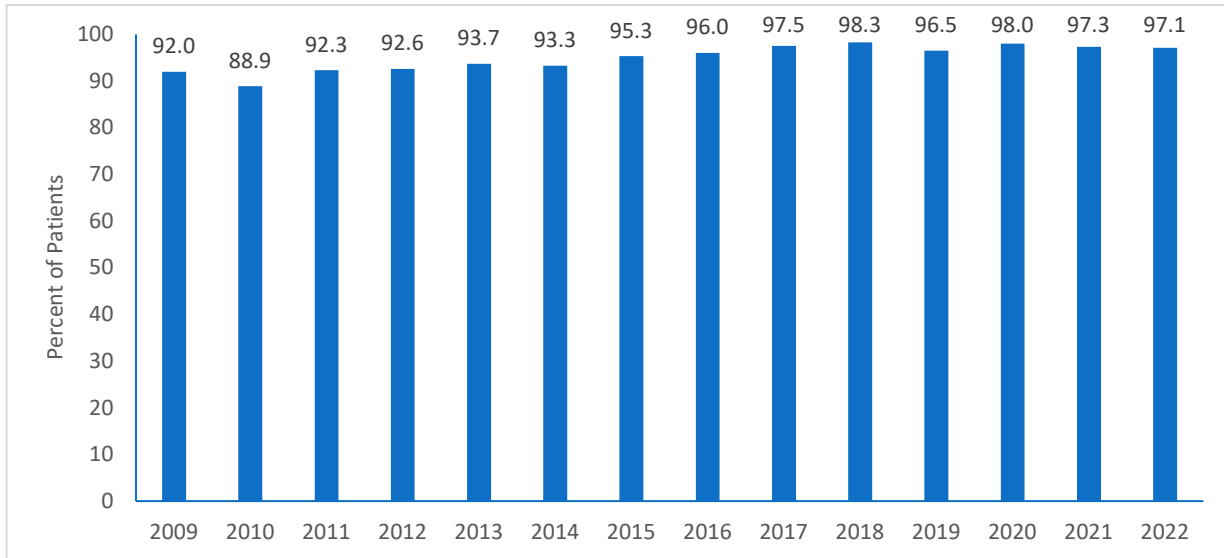
Figure 18: SEQIP patients who arrived by 3.5 hours & received IV rt-PA by 4.5 hours 2009-2022



Anticoagulation Therapy

Measure: The percent of patients with ischemic stroke or TIA with atrial fibrillation/flutter who are discharged on anticoagulation therapy. In 2009, 92.0% of eligible patients were prescribed anticoagulation therapy upon discharge. In 2022, 97.1% of eligible patients were prescribed anticoagulation therapy.

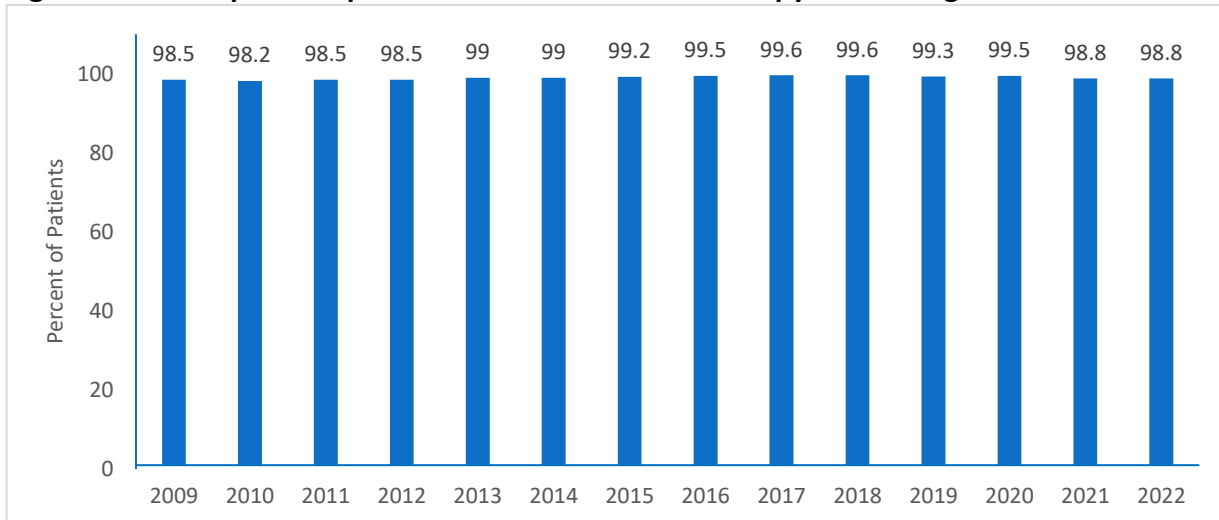
Figure 19: SEQIP patients prescribed anticoagulation therapy 2009-2022



Antithrombotics at Discharge

Measure: The percent of patients with an ischemic stroke or a TIA prescribed antithrombotic therapy at discharge. In 2009, 98.5% of eligible patients were prescribed antithrombotic therapy upon discharge. In 2022, 98.8% of eligible patients were prescribed antithrombotic therapy at discharge.

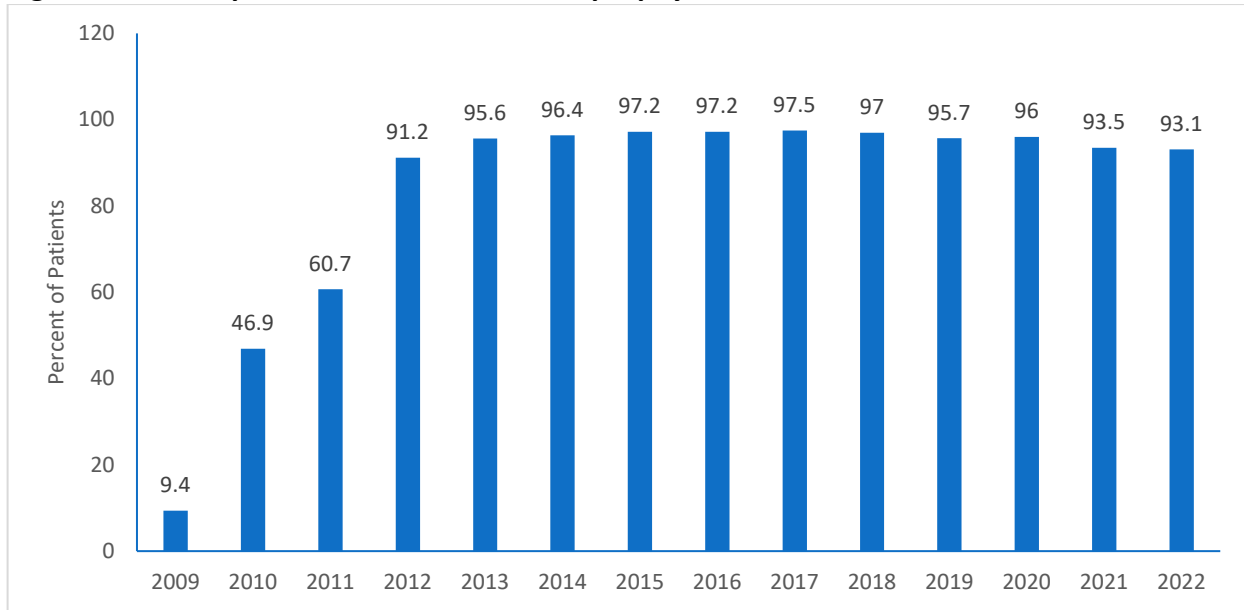
Figure 20: SEQIP patients prescribed antithrombotic therapy at discharge 2009-2022



VTE Prophylaxis

Measure: The percent of patients with an ischemic stroke, hemorrhagic stroke, or a stroke not otherwise specified who receive VTE prophylaxis the day of or the day after hospital admission. In 2009, 9.4% of eligible patients received VTE prophylaxis by the end of hospital day two. In 2022, 93.1% of eligible patients received VTE prophylaxis by the end of hospital day two.

Figure 21: SEQIP patients who received VTE prophylaxis 2009-2022



SEQIP members review performance data annually to evaluate current quality improvement processes, identify and discuss opportunities for implementing new initiatives, and set goals for the upcoming year. SEQIP also collaborates with the KHDSP Task Force to identify opportunities for collaboration with other programs in KDPH to advance SSOC.

Current SEQIP Initiatives

The KHDSP Task Force along with the KDPH have developed a strategic map outlining strategies and objectives to improve SSOC since 2006. In 2019, the Kentucky Heart Disease and Stroke Prevention Strategic Map and Plan was updated for 2020-2023. SEQIP members were active participants in the development and creation of the map and are committed to furthering the initiatives outlined in the plan for continued improvement in SSOC.

The strategic map is utilized as a directive for SEQIP work groups. SEQIP has created the following subcommittees (Table 2) to address the stroke continuum of care and chain of survival. The committee work is directed by a committee chair and supported by the SEQIP steering committee. Efforts to improve care delivery in Kentucky over the last 14 years have been successful, as reflected in the data. This is due to collaboration across geopolitical boundaries throughout the commonwealth among hospitals, the EMS community, public health officials, legislators, and community members.

Table 2: SEQIP subcommittees

SEQIP subcommittee	Committee chair
EMS outreach and education	Lacy Shumway – University of Kentucky Regional Extension Center
Disease specific care certification initiatives <ul style="list-style-type: none"> • Acute stroke ready certification • Primary stroke center certification • Thrombectomy-capable certification • Comprehensive stroke certification 	Lisa Bellamy, BHS, RN, CPHQ – UK Healthcare/Norton Healthcare Stroke Care Network Rachel Jenkins, MSN, RN – Appalachian Regional Healthcare Betty McGee, MSN, RN, CEN – St. Elizabeth Healthcare Polly Hunt, BSN, RN – King’s Daughter’s Hospital, Ashland Abigail Loechler, MPH – American Heart/Stroke Association
Data analysis and performance improvement	Robin Curnel, MSN, RN – University of Kentucky Regional Extension Center Rebecca Cheatham, MHA – University of Kentucky Regional Extension Center Abigail Loechler, MPH – American Heart/Stroke Association
Navigating the stroke continuum of care	Carrie Crockett, MSW, CSW – UofL Healthcare
Community and public health education and outreach	Natalie Littlefield, MPH – Kentucky Heart Disease and Stroke Prevention Program
Door in door out (DiDo)	Bill Singletary, BA, BSN, RN, MBM - The Medical Center

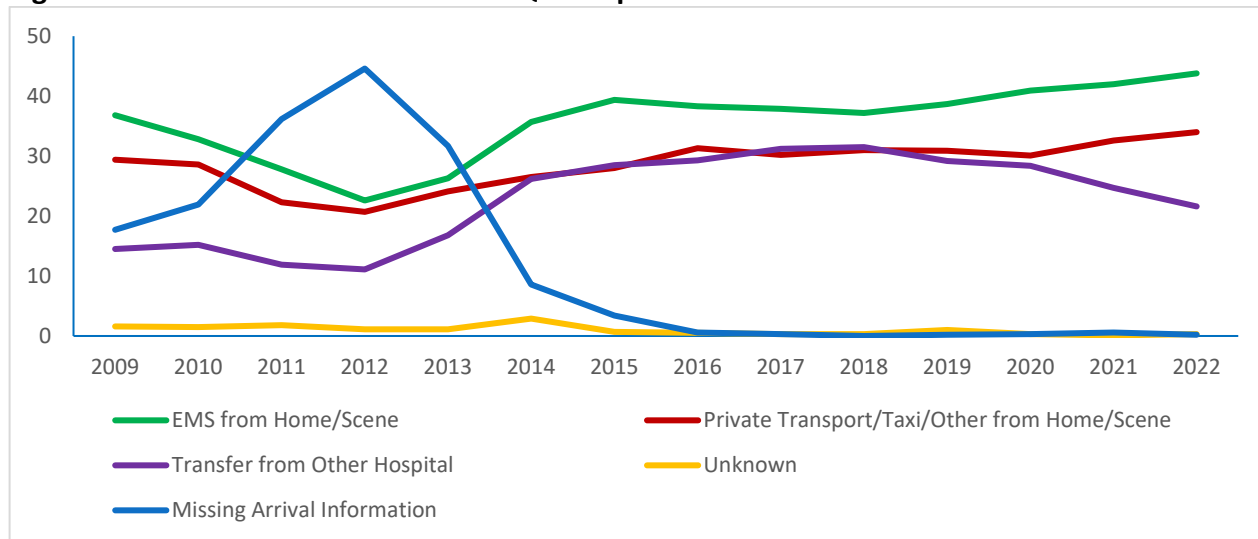
In 2021, Kentucky (one of nine other states in the US) was awarded Paul Coverdell National Acute Stroke Program funding through the CDC. The funding will expand collaboration among stakeholders in the commonwealth, and SEQIP members will play a key role in efforts to increase participation in the KHDSP Task Force; expand current and future participation of community partners, primary care clinics, EMS, and rehabilitation facilities; enhance existing systems of care to coordinate access to rural and underserved populations; and reduce stroke disparities and death over the long term with a focus on Appalachia and underserved communities at highest risk. Thirty-six of 47 hospitals have signed amendments to their GWTG[®]-S contracts to overlay the Coverdell data points into GWTG[®]-S.

In addition to the performance measures above, SEQIP is working to improve collaboration with EMS agencies across the commonwealth to expand best practices by educating Kentuckians to call 911 at the onset of stroke symptoms for transport to the hospital, performing a stroke screening and severity scale as part of their assessment, and to notify stroke centers prior to arrival at the hospital.

Nationally, hospitalized stroke patients utilize EMS 50-60% of the time for transport to the hospital.¹³ Transport mode to the hospital for stroke patients in Kentucky has been variable throughout the

years, nevertheless utilization in 2022 was 43.8% by EMS, followed by private vehicle (34%), and interfacility transfers (21.6%) (Figure 22).

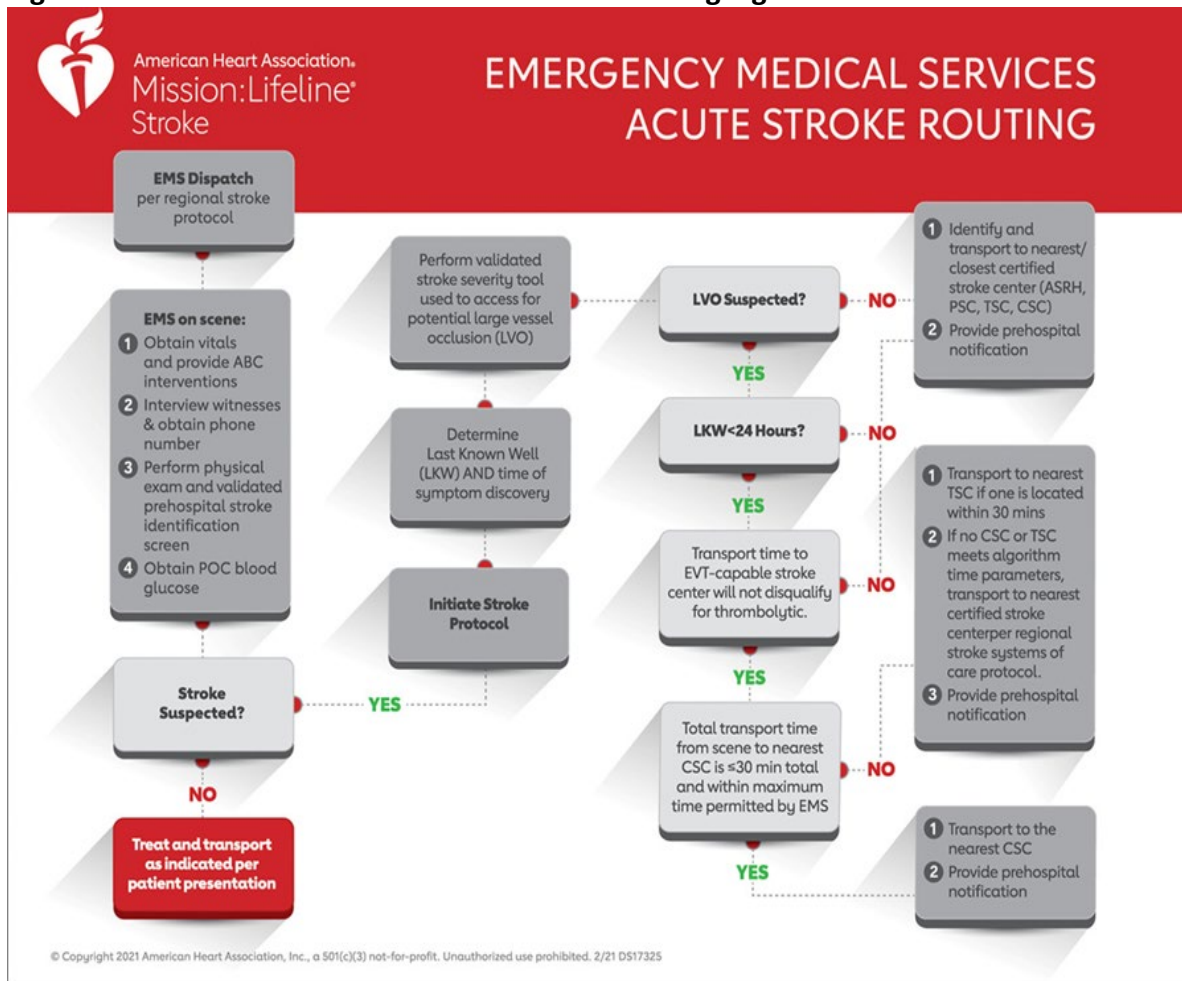
Figure 22: Patients' arrival mode to SEQIP hospitals 2009-2020



Stroke screening scales are recommended for utilization by EMS to identify stroke patients in the field for transport to a stroke center capable of delivering a clot busting drug to eligible patients. A validated stroke severity scale should be performed when there is a positive stroke screening scale to potentially identify stroke patients with a large vessel occlusion (LVO) eligible for endovascular thrombectomy (EVT). Treatment with IV alteplase and EVT are time sensitive and delays in providing these acute treatments lead to worse outcomes.^{14,15}

In 2018, the Kentucky Board of Emergency Medical Services (KBEMS) added performing a stroke severity scale and a prenotification algorithm to their recommended stroke triage protocol. The KBEMS also endorsed the Mission: Lifeline® EMS acute stroke routing algorithm (Figure 23)¹⁶ recommending transport to a CSC for those patients with a positive stroke severity scale if transport could be provided to the higher level of care without delaying arrival by more than 30 minutes.

Figure 23: Mission: Lifeline® EMS acute stroke routing algorithm



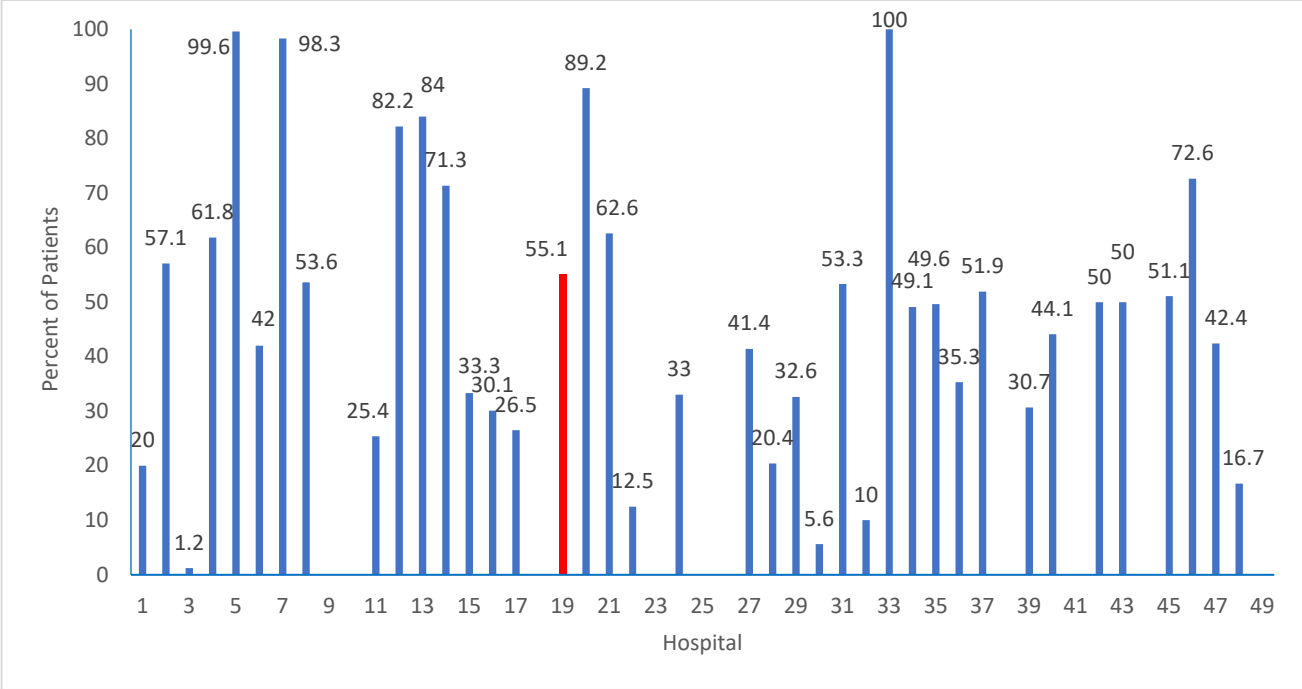
Source: Jauch, E., Schwamm, L., Panagos, P., et al., 2021.¹⁶

Unfortunately, utilization of a stroke severity scale by EMS throughout Kentucky has been inconsistent, and most agencies have not adopted a scale as part of their field protocols. The reasons for this are variable throughout the state. SEQIP is working to identify EMS agencies who do not have a stroke severity scale as part of their transport protocols. SEQIP will work with them to adopt a scale, provide staff education on performing the scale, and implement the scale into their protocols. To begin this work, in 2020 Louisville based hospital systems collaborated with air ambulance services to utilize the Cincinnati Prehospital Stroke Severity Scale or a validated scale of their choice. Due to the COVID-19 pandemic, education for EMS ground agencies was delayed until 2022. Throughout 2022, the three healthcare systems in the Louisville Metro area were working together with EMS to provide evidence-based updates on stroke care delivery in the field, utilization of a severity scale to identify possible LVO patients in the field, and education on acute stroke treatments. These efforts have resulted in the revision of the Louisville Metro stroke triage protocol to include a stroke severity scale and a destination protocol for suspected LVO stroke patients consistent with nationally recommended EMS guidelines for the routing of acute stroke patients. An evaluation will be performed, and a best practice model for hospital and EMS collaboration and implementation will be created.

Nationally, hospital prenotification occurs in 67% of EMS transports.¹⁵ Based on data available, in 2022 hospital prenotification throughout Kentucky was inconsistent by facility/region (Figure 24). For the entire SEQIP group, on average advanced prenotification occurred in 55% of EMS transports. Over the years, data collection for hospital prenotification has been difficult to collect in Kentucky due to missing documentation in the EMS run sheet or the hospital record. The state currently lacks a method of linking pre-hospital data collected as a routine part of EMS care to in-hospital stroke data entered as part of GWTG®-S. This represents a missed opportunity, as combining these information sources can improve the quality of stroke-related treatment and better our understanding of how pre-hospital care is related to in-hospital treatment and post-stroke outcomes. Therefore, one primary strategy of the Coverdell grant is to match EMS and GWTG®-S data in the absence of a common identifier.

Working with partners at KBEMS, EMS agencies, and SEQIP hospitals, the Coverdell team has implemented an exact matching algorithm that identifies common patients across the data sources using EMS run sheet number, arrival date, date of birth, gender, and destination hospital. In 2021, 4,676 GWTG®-S patients were transported via EMS, of which 3,624 were successfully matched with EMS records, resulting in a matching rate of 77.5%. This matching algorithm will be applied to the 2022 data, and an additional probabilistic matching algorithm is being developed to increase matching rates further. This previously unavailable data will be leveraged for quality improvement projects and as a source of peer-reviewed research publications.

Figure 24: EMS prenotification at SEQIP hospitals 2022



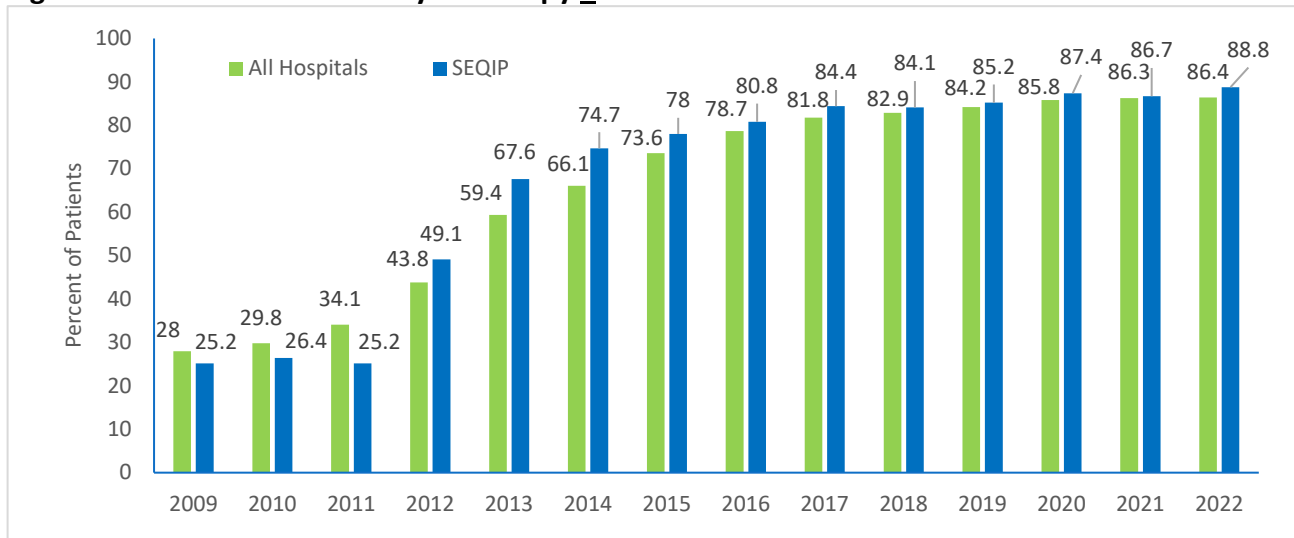
Note: The bar in red represents the average EMS prenotification by SEQIP member hospitals.

Reperfusion Therapies

“Time is brain” and outcomes are better when faster reperfusion therapies can be delivered to restore blood flow to the brain in the setting of ischemic stroke. Hospitals need to have streamlined

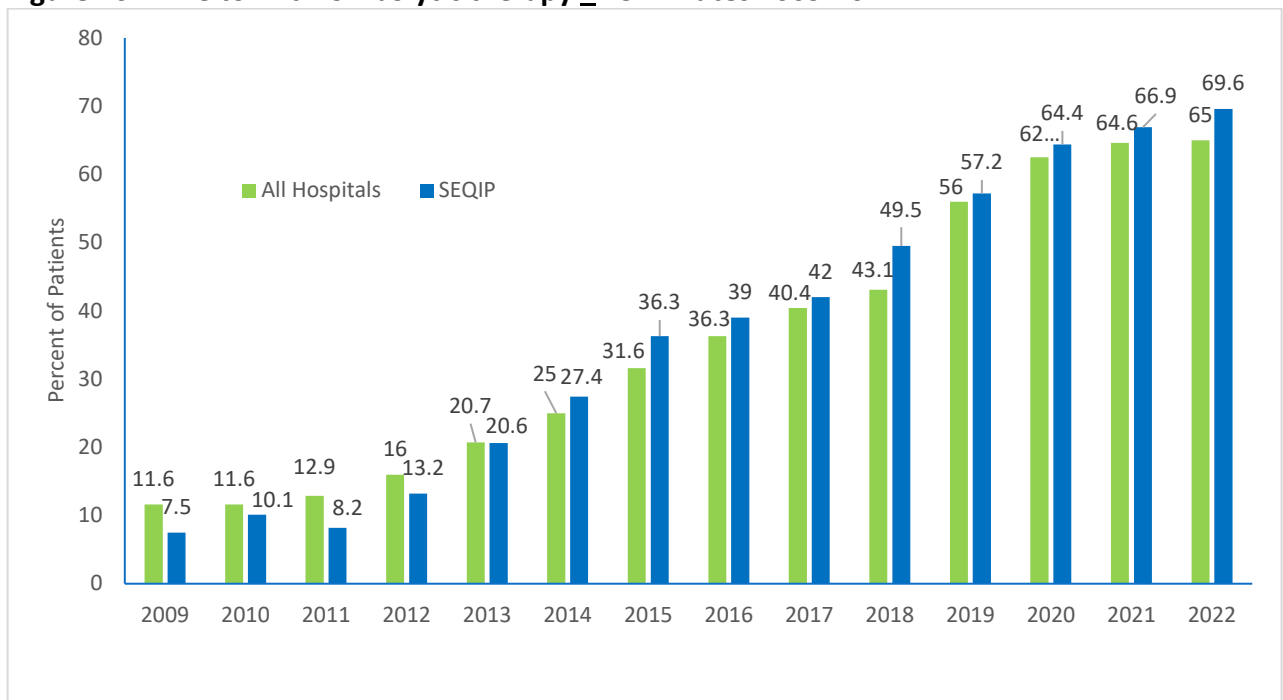
processes upon EMS arrival to deliver IV alteplase and EVT therapies to appropriate patients. SEQIP member hospitals have made it a priority to deliver the IV clot busting drug as soon as safely possible. The national quality measure for door to drug time is ≤ 60 minutes, however, national recommendations since 2020 have endorsed a door to drug time of ≤ 45 minutes and even ≤ 30 minutes when safely possible. SEQIP hospitals are performing well in the effort to “save brain”. Kentucky is outperforming the nation in door to drug delivery with IV alteplase as seen in the graphs below.

Figure 25: Time to IV thrombolytic therapy ≤ 60 minutes 2009-2022



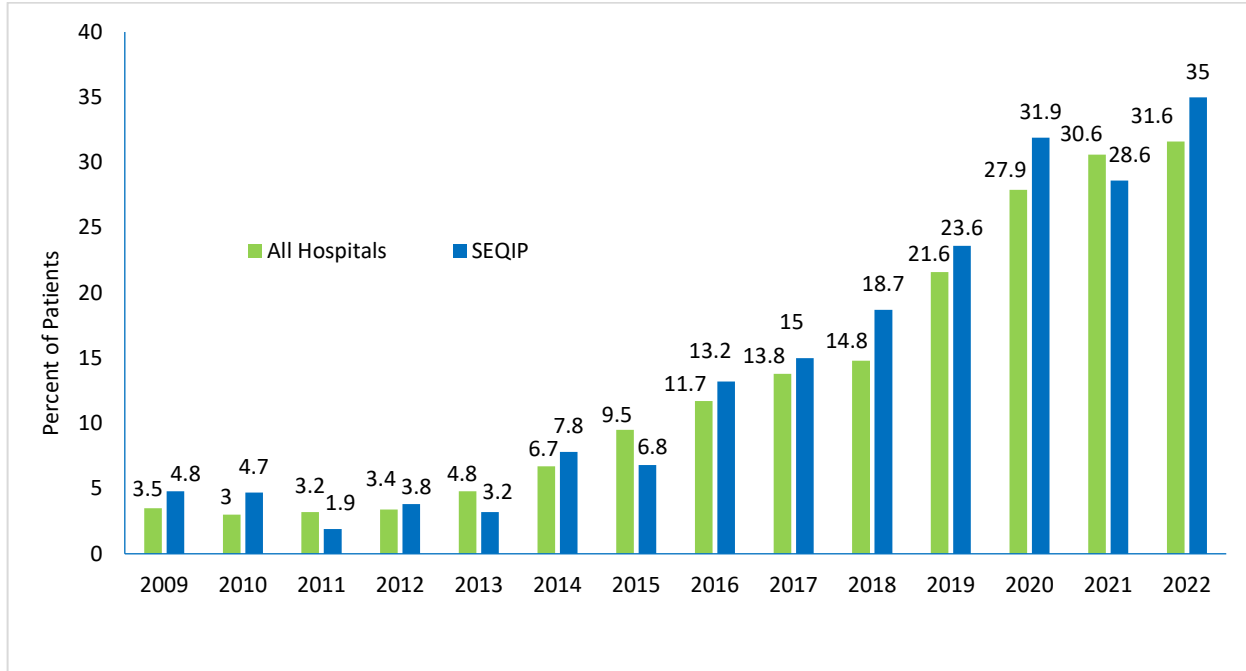
Note: All hospitals refer to all GWTG®-S registry hospitals.

Figure 26: Time to IV thrombolytic therapy ≤ 45 minutes 2009-2022



Note: All hospitals refer to all GWTG®-S registry hospitals.

Figure 27: Time to IV thrombolytic therapy \leq 30 minutes 2009-2022



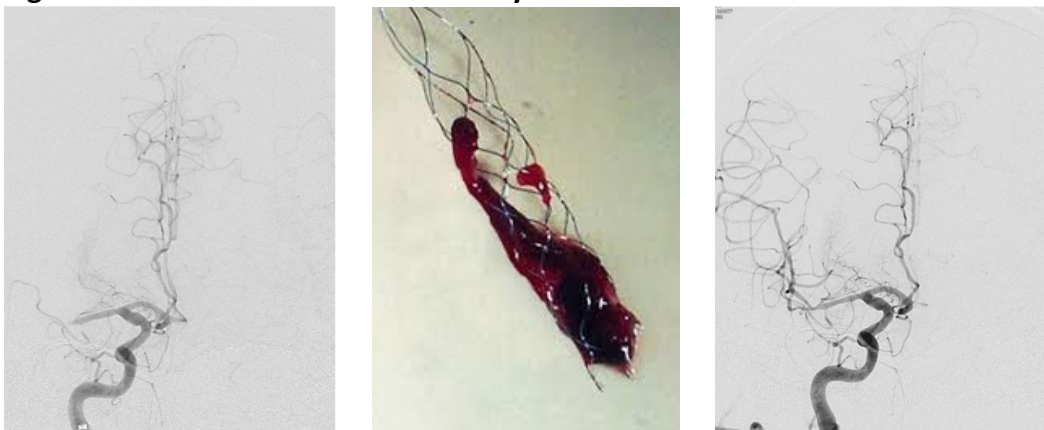
Note: All hospitals refer to all GWTG[®]-S registry hospitals.

The greatest risk with administering the IV clot busting drug is bleeding throughout the body or the brain. The expected bleeding risk, based on prior clinical trials, is up to 6% when stringent inclusion and exclusion criteria are followed. In Kentucky, delivering the clot busting therapy faster has not resulted in increased bleeding. The symptomatic bleeding transformation rate for SEQIP hospitals was 5.9% in 2022.

Endovascular Thrombectomy

A physician threads a catheter through a blood vessel (artery) in the arm or leg directly up to the blood vessel in the brain where the clot is blocking blood flow to brain tissue. The clot is then removed by inserting a device into the blood clot and pulling the clot out restoring blood flow to the brain (Figure 28).

Figure 28: Endovascular thrombectomy



Note: Photographs courtesy of Dr. Kerri Rimmel, University of Louisville.

In 2022, five hospitals in Kentucky could perform EVT and contributed data to the stroke registry. Recommended hospital time goals for EVT therapy are arrival to puncture of the blood vessel within 90 minutes; and restoration of blood flow by opening the vessel and retrieving the blood clot within 120 minutes of arrival to the hospital. Nationally, a good clinical outcome is considered when patients still have some disability but can look after themselves without daily help [Modified Rankin Score (mRS) of 0-2].

In Kentucky, blood vessel access within 90 minutes of arrival was achieved in 76% of patients; 66% of the time physicians were able to open the blood vessel and restore blood flow to the brain within 120 minutes from arrival; and successful recanalization rates of the blood vessel restoring adequate blood flow to the brain were achieved 79% of the time with favorable outcomes in 39% of patients within 90 days. The table below reflects how SEQIP hospitals compare with other EVT facilities (Table 3) in the country.

Table 3: Endovascular thrombectomy performance

Performance measure	Kentucky SEQIP hospitals	All GWTG-S® stroke registry hospitals performing EVT
Percent of patients with a door to puncture of blood vessel within 90 minutes	76%	68%
Percent of patient’s blood flow restored within 120 minutes of arrival	66%	78%
Percent of patient’s blood flow restored (TICI 2B or higher)	79%	71%
Percent of patients with a favorable outcome (mRS 0-2) in 90 days	39%	38%

Source: GWTG®-S registry.

Door In Door Out

When patients are transferred to a higher level of care to receive treatment, the time goal is less than 90 minutes from arrival to the initial facility to transfer of the patient enroute to the tertiary center. This is called door in door out (DiDo). The DiDo Committee has established best practices, which have been shared nationally, with recommendations for hospitals to achieve this goal.¹⁷ Work continues in Kentucky to establish and improve these processes in Kentucky hospitals. Only 29% of patients were transferred within the DiDo recommended timeframe of ≤ 90 minutes in 2022. SEQIP members have elected to make this a priority for 2023 and will develop process improvement initiatives utilizing quality improvement methodology to track and trend data as well as sharing barriers and best practices. In addition, three hospitals are using this as their quality improvement initiative through Coverdell.

SSOC should support local and regional initiatives to increase stroke awareness.¹³ SEQIP continues to work with the KHDSP to provide standardized messaging materials on stroke warning signs, risk factors, and stroke prevention. These materials are reviewed and updated annually by the subcommittee and are available on the KHDSP website for download.

SEQIP is also addressing stroke care post discharge through the Navigating the Stroke Continuum of Care Committee and has created tools for patients and stroke center staff to help navigate the healthcare system. Thus far, the following tools have been created, and are available for use and download on the SEQIP website:

- Community resource list;
- Preparing for follow up appointments;
- Questions to ask during follow up appointments;
- List of stroke support groups;
- Importance of having a primary care provider;
- Pseudobulbar affect educational handout;
- Caregiver stress; and
- Effects of stress.

Coverdell Measures

In addition to AHA and stroke certifying agency performance measures, the following Coverdell Measures are being tracked and reported to the CDC:

C1: Leverage electronic health records (EHRs) and health information technology (HIT) to identify patients with stroke risk factors (e.g., undiagnosed hypertension) and monitor health care disparities for those at highest risk for stroke events.

- One federally qualified health center (FQHC) and five primary care offices are participating in this strategy.
- Five hundred and twenty new patients participated in the Cardiovascular, Assessment, Risk Reduction, and Education (CARE) Collaborative at primary care sites.
- Forty-six patients reported an improvement in blood pressure.

C2: Establish and expand statewide data infrastructure through an integrated data management system that links pre-hospital, hospital, and post-hospital follow up data for measurement, tracking, and assessment of quality of stroke care data.

- Thirty-six total hospitals signed amendments to their GWTG[®]-S contracts to overlay the Coverdell data points onto GWTG[®]-S.
- Thirteen hospitals are utilizing the EMS tab in GWTG[®]-S.
- In 2021, there were 4,676 EMS transports of a potential stroke patient and 2,167 run sheets were entered into GWTG[®]-S.
- In 2021, 3,608 run sheets were exact matches resulting in a 77.26% matching percent between EMS transports and GWTG[®]-S records.

C3: Number and percent of hospitals with an implemented referral tracking system to support transitions of care for stroke patients post discharge.

- Six hospitals are participating in implementing a referral tracking system for improving transitions of care.
- In 2021, there were 1,335 total discharges with a primary diagnosis of stroke.
- Five hundred and ninety-two patients were referred to another provider/service level.
- One hospital attempted 218 discharge follow-up calls, and 151 were successful.

C4a: Analyze data and identify areas to improve the efficiency and quality of care within EMS and hospital settings and to improve transitions of care between settings through systematic quality improvement methods and interventions (e.g., PDSA, Lean, Six Sigma).

- Seven total EMS agencies are being trained on systematic quality improvement methods utilizing the plan do study act (PDSA) method.
- Quality improvement initiatives are being initiated to improve documentation of call ahead to hospitals by EMS.

C4b: Analyze data and identify areas to improve the efficiency and quality of care within EMS and hospital settings and to improve transitions of care between settings through systematic quality improvement methods and interventions (e.g., PDSA, Lean, Six Sigma).

- Four certified stroke centers (two acute stroke ready hospitals and two primary stroke centers) were involved in the pilot year of this strategy.
- Three hospitals working to improve DiDo times had an average baseline DiDo time of 245 minutes. The goal is to improve these times to less than 120 minutes.
- In 2021, SEQIP hospitals reported 85% (44/52) of patients received a thrombolytic in ≤ 60 minutes and 63% (24/38) of patients received a thrombolytic in ≤ 45 minutes.

C5a&b: Coordinate, develop, and implement professional and workforce development opportunities to improve evidence-based clinical knowledge for stroke care and recognition of disparities in stroke care.

- Twenty clinical knowledge workforce development opportunities were provided to EMS agencies to improve clinical knowledge and to improve the recognition of disparities in stroke care.

C5c&d: Coordinate, develop, and implement professional and workforce development opportunities to improve evidence-based clinical knowledge and recognition of disparities in stroke care.

- Six clinical knowledge webinars were provided to the community of practice, consisting of 26 hospitals throughout the commonwealth who have shown an interest in becoming a certified stroke center.

C7: Establish and strengthen partnerships with relevant state or local stroke coalitions, initiatives, professional organizations, providers, and health systems that provide resource support for stroke patients as well as those at highest risk for stroke.

- Sixty-six partnerships established with community organizations, health systems, hospitals, professional organizations, and government entities for the purposes of providing resource support for stroke patients and those at the highest risk for stroke events.

C8a&b: Facilitate engagement of community health workers (CHWs) in the management of those at highest risk for stroke events and post-event discharge support and follow-up of stroke patients across clinical and community settings.

- In 2021, 254 stroke patients were discharged home within Kentucky from two of our participating stroke centers.
- Thirty-two stroke patients accepted referrals to the CHWs in eastern and western Kentucky.
- Twenty-three patients received CARE Collaborative interventions.

Recommendations

The impact of stroke centers and coordinated stroke systems of care is proven to drive evidence-based stroke care and reduce stroke mortality. As noted in the infographic on page 4, Kentucky had the 14th highest mortality rate for stroke in 2021 compared to 5th in 2020. The cost of stroke care continues to rise with more than \$894 million charged in 2021.

Sustaining SSOC and impacting care gaps across the chain of survival with a renewed focus on assessing and impacting social determinants of health is vital to the health of Kentuckians. SEQIP has sustained itself voluntarily for 13 years and seen membership grow from 16 to 47 hospitals.

To continue and expand these efforts, the SEQIP steering committee is recommending the funding of SEQIP in the amount of \$500,000-\$1,000,000. The funds will help SEQIP continue to work on the objectives and action items identified in the KHDSF Task Force Strategic Map and Plan: 2020-2023 (Appendix B).

In addition, the SEQIP steering committee is requesting a legislative change to the deadline for the SEQIP report to September 1 and will follow up on appropriate channels for this request. This will allow the steering committee to include the most recent data from the previous calendar year in the annual report.

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Appendix A: Kentucky Hospitals Submitting Data to the Kentucky Stroke Registry

2022 Hospitals	Hospitals whose data are included in this report	Hospitals required to submit data per KRS 211.575
ARH Our Lady of the Way	√	
Baptist Health, La Grange	√	√
Baptist Health, Corbin	√	
Baptist Health, Hardin	√	√
Baptist Health, Lexington	√	√
Baptist Health, Louisville	√	√
Baptist Health, Madisonville	√	
Baptist Health, Paducah	√	√
Barbourville ARH Hospital	√	
CHI St. Joseph East	√	√
CHI St. Joseph Healthcare, Kentucky	√	√
Clark Regional Medical Center		√
Ephraim McDowell J.B. Haggin Hospital, Harrodsburg		√
Ephraim McDowell Regional Medical Center	√	√
Ephraim McDowell Fort Logan Stanford		√
Frankfort Regional Medical Center		√
Georgetown Community Hospital	√	√
Greenview Regional Hospital (TriStar)	√	√
Harlan ARH Hospital	√	√
Hazard ARH Regional Medical Center	√	√
Highlands ARH Regional Medical Center	√	√
Jackson Purchase Medical Center	√	
King's Daughter's Medical Center	√	√
Lake Cumberland Regional Hospital	√	√
Mary Breckinridge Healthcare	√	√
McDowell ARH Hospital	√	√
Mercy Health Lourdes Hospital	√	√
Middlesboro ARH Hospital	√	√
Morgan County ARH Hospital	√	√
Norton Audubon Hospital	√	√
Norton Brownsboro Hospital	√	√
Norton Hospital	√	√
Norton Women's and Children's Hospital	√	√
Owensboro Health	√	√
Paintsville ARH Hospital	√	
Pikeville Methodist Hospital	√	√

2022 Hospitals	Hospitals whose data are included in this report	Hospitals required to submit data per KRS 211.575
St. Elizabeth Healthcare, Covington		√
St. Elizabeth Healthcare, Edgewood	√	√
St. Elizabeth Healthcare, Florence	√	√
St. Elizabeth Healthcare, Fort Thomas	√	√
St. Elizabeth Healthcare, Grant		√
Sts. Mary and Elizabeth Hospital	√	√
Summers County ARH Hospital	√	
T.J. Samson Community Hospital	√	√
The Medical Center, Bowling Green	√	√
The Medical Center, Caverna	√	
The Medical Center, Franklin	√	√
The Medical Center, Scottsville	√	
Tug Valley ARH Regional Medical Center	√	
University of Kentucky Hospital	√	√
University of Louisville Hospital	√	√
University of Louisville Health-Jewish Hospital	√	√
Whitesburg ARH Hospital	√	√

Appendix B: KHDSP Task Force Strategic Map and Plan: 2020-2023

KHDSP Task Force Strategic Map and Plan: 2020-2023		SEQIP Progress and Gap Analysis
Objective: Improve statewide cerebrovascular systems of care		Performed Q4 2021
Strategy 1	Action Items	
Continue to identify and improve current cerebrovascular systems of care.	Continue to identify and map certified stroke centers by certification levels as defined by KRS 216B.0425 and disseminate to Kentucky Board of Emergency Medical Services (KBEMS). <ul style="list-style-type: none"> - Acute stroke ready hospitals - Primary stroke centers - Thrombectomy-capable stroke centers - Comprehensive stroke centers 	Achieved Map is updated quarterly.
	Continue collaboration with Kentucky Hospital Association's (KHA) Rural Hospital Flexibility Program.	
	Continue to partner with Kentucky hospitals to increase acute stroke treatments (intravenous tissue plasminogen activator and mechanical thrombectomy).	Improved Continue as goal 2020-2023.
	Assess inter-facility emergent transfer needs to meet recommended time goals.	Partially Met Gap analysis has been performed with 32 certified stroke centers to identify barriers; door in door out (DiDo) committee has developed best practices for stroke centers to follow to meet recommended transfer times.
	Continue to identify EMS agencies which have a field transport protocol for stroke and provide expert consultation/evaluation to ensure said protocols are up to date with the most current science.	Gap Working with KBEMS to identify which agencies use the recommended state protocol vs. KBEMS Medical Director approved protocols.
	Partner with KBEMS to determine stroke specific data points available for capture.	Achieved First KBEMS annual stroke report created in 2019; KBEMS continues to identify methods for improving data collection.
	Implement pilot project for EMS feedback, training and education to improve local stroke systems of care.	Partially Met Pilot started with Louisville hospital systems and air medical ambulances in 2020; ground implementation delayed due to COVID-19 pandemic until 2022.
	Continue collaboration with the KBEMS subcommittee, cardiac and stroke care.	Achieved SEQIP leaders serve on the committee and participate in meetings.

	Disseminate and provide access to current evidence-based dispatch protocols for stroke.	Gap Need to identify best practices for stroke dispatch protocols.
	Partner with KBEMS for continued development of inter-facility transport protocols for all stroke subtypes.	Gap Need to develop acute ischemic stroke without thrombolytic therapy and hemorrhagic stroke protocols.
	Disseminate KBEMS inter-facility transport protocols at local and regional levels.	Partially Met Current protocols are available but not well utilized due to paper documentation tool.
Strategy 2	Action Items	
Continue Stroke Encounter Quality Improvement Project (SEQIP) through FY 2023.	Assess current SEQIP members for continued participation by March 2020.	Achieved
	Recruit at least one hospital pursuing thrombectomy-capable certification by March 2022.	Achieved Currently one thrombectomy-capable stroke center certified in 2021.
	Continue to utilize registry to develop and implement an action plan around quality metrics and education.	Achieved
	Continue to develop and disseminate stroke registry data summary in accordance with KRS 211.575, which goes to the Governor and Legislative Research Commission and includes recommendations for improving stroke systems of care.	Achieved
Strategy 3	Action Items	
Continue to engage and support hospitals maintaining and achieving stroke center certification.	Disseminate the Kentucky state plan for stroke systems of care and statewide map to target hospitals by December 2020.	Achieved
	Continue to provide support for stroke program development to target hospitals.	Achieved
	Update and disseminate stroke resources through Kentucky Heart Disease and Stroke Prevention (KHDSP) Task Force website (KHDSPtaskforce.com) annually.	Achieved Website created with resources updated quarterly.
Strategy 4	Action Items	
Continue collaboration among healthcare systems and public health to disseminate standardized messaging.	Implement action items from Goal A – Objective 1A: Strategy 1: Promote and reinforce healthy behaviors and standardized messaging.	Achieved SEQIP committee meets quarterly.

Appendix C: Glossary of Acronyms

ADD	Area Development District
AHA	American Heart Association
ARH	Appalachian Regional Healthcare
ASA	American Stroke Association
ASRH	Acute Stroke Ready Hospital
CARE	Cardiovascular Assessment, Risk Reduction, and Education
CDC	Centers for Disease Control and Prevention
CHI	Catholic Health Initiatives
CHW	Community Health Worker
COVID-19	Coronavirus Disease 2019
CSC	Comprehensive Stroke Center
CT	Computerized Tomography
CVD	Cardiovascular Disease
DiDo	Door In Door Out
DNV	Det Norske Veritas
EMS	Emergency Medical Services
EVT	Endovascular Therapy
FDA	Food and Drug Administration
FQHC	Federally Qualified Health Center
GWTG [®] -S	Get With The Guidelines [®] -Stroke
HFAP	Healthcare Facilities Accreditation Program
HIT	Health Information Technology
IV	Intravenous
KBEMS	Kentucky Board of Emergency Medical Services
KDPH	Kentucky Department for Public Health
KHA	Kentucky Hospital Association
KHDSP	Kentucky Heart Disease and Stroke Prevention Program
KyBRFS	Kentucky Behavioral Risk Factor Survey
LVO	Large Vessel Occlusion
PDSA	Plan Do Study Act
PSC	Primary Stroke Center
rt-PA	Recombinant Tissue Plasminogen Activator
SEQIP	Stroke Encounter Quality Improvement Project
SSOC	Stroke Systems of Care
TIA	Transient Ischemic Attack
TJC	The Joint Commission
TSC	Thrombectomy-Capable Stroke Center
VTE	Venous Thromboembolism