

Kentucky Stroke Encounter Quality Improvement Project (SEQIP)



Kentucky Heart Disease and Stroke Prevention Task Force

SEQIP Registry 2017 Data Summary

2019 Annual Report



Kentucky Public Health
Prevent. Promote. Protect.

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Report Summary

Stroke was the fifth highest cause of death in Kentucky in 2016. Overall, Kentuckians have high rates of heart disease, heart attack, and stroke, as well as high blood pressure and high cholesterol, which increase the risk of stroke or heart disease.

KRS 211.575 requires the Kentucky Department for Public Health (KDPH) to establish and implement a plan to address continuous quality improvement for stroke care. The Kentucky Stroke Encounter Quality Improvement Project (SEQIP) was created in 2009 as a statewide quality improvement initiative to advance stroke systems of care in Kentucky by developing collaboration among member hospitals to improve evidence-based performance measures for stroke care.

In 2017, 42% of SEQIP stroke registry patients were 65 years or younger while 49.9% were female and 50.1% were male. The race of patients was predominantly white at 86%, followed by black at 10%, and 0.4% Latino/a or Hispanic. Records of previously known medical histories indicate 77% of SEQIP patients had hypertension, 30% had a previous stroke, 48% had high cholesterol, 25% used tobacco, and 36% had diabetes. Of the 2017 SEQIP patients, 55% had Medicare, 29% had private insurance, 13% had Medicaid, and 3.4% were uninsured. Twenty nine percent of patients arrived at the hospital via private vehicle, 37% arrived via Emergency Medical Services (EMS), 33% were transfers from other hospitals, and 1% of transport modes were not documented.

Strokes are caused by either a loss of blood flow to the brain due to blockage (ischemic) or bleeding into the brain due to breaking of the blood vessel (hemorrhagic). There are different types of strokes determined by the location of the blockage. In 2017, 77.5% of SEQIP patients had ischemic strokes, 9.0% had transient ischemic attacks, 9.2% had intracerebral hemorrhages, and 3% had subarachnoid hemorrhages.

SEQIP hospitals monitor 10 evidence-based performance measures endorsed by the American Heart/Stroke Association and the Joint Commission Stroke Center certification bodies for the treatment and management of stroke patients from hospital to discharge. The 10 measures are: IV Recombinant Tissue Plasminogen Activator (IV rt-PA) Administration; Early Antithrombotics; Venous Thromboembolism (VTE) Prophylaxis; Antithrombotics at Discharge; Anticoagulation for Atrial Fibrillation/Flutter; Smoking Cessation; Low Density Lipoprotein (LDL); Dysphagia Screening; Stroke Education; and Rehabilitation Considered.

The nationally recognized goal for the above performance measures by the American Heart Association/American Stroke Association (AHA/ASA) and the Joint Commission Stroke Center certifying bodies is >85% achievement for each measure. **SEQIP hospitals met this goal for all 10 measures during calendar year 2017.**

SEQIP will continue to work towards increasing the number of stroke certified hospitals in Kentucky along with increasing participation in SEQIP to enhance collaboration for performance measure quality improvement plans. SEQIP will also continue to partner with statewide organizations to improve data collection, educate the public, and strengthen the continuum of stroke care in Kentucky.

PURPOSE

This data summary report is compiled in pursuant to KRS 211.575, which requires the 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.

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Cerebrovascular/Cardiovascular Disease in Kentucky

What is Cardiovascular Disease?

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

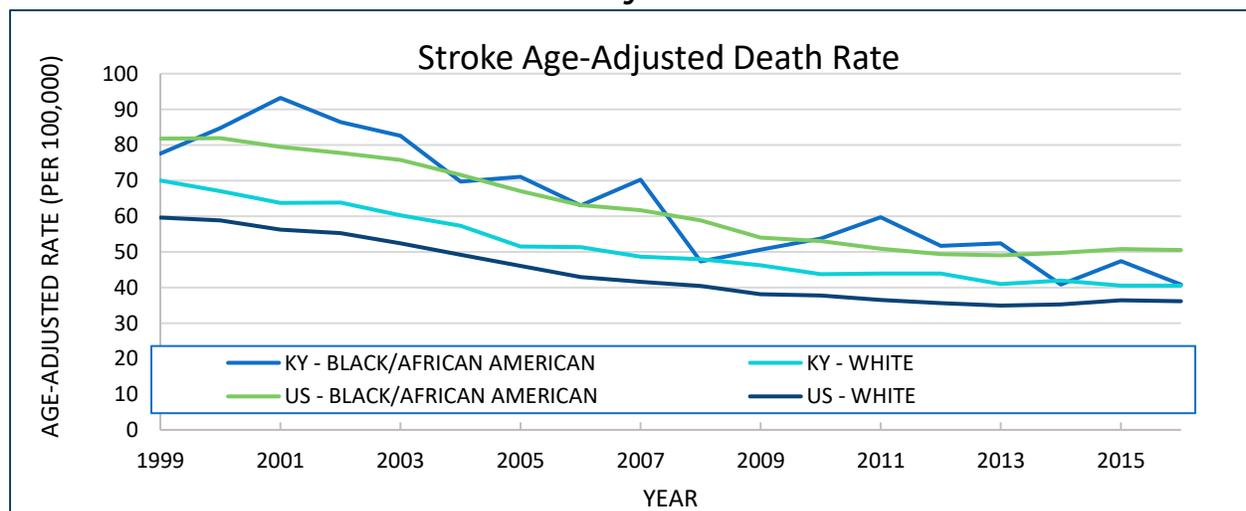
What is Cerebrovascular Disease?

Cerebrovascular disease includes all disorders that impact blood flow to the brain. Cerebrovascular disease includes stroke, transient ischemic attack (TIA), carotid stenosis, vertebral stenosis, intracranial stenosis, aneurysms, or vascular malformations. Many of these conditions involve narrowed or blocked blood vessels 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. The effects of a stroke depend on the severity of the brain damage, but range from temporary weakness of the arm or leg, to permanent paralysis, loss of the ability to speak, and sometimes death¹. Stroke is a significant cause of disability in the United States and reduces mobility in more than half of stroke survivors who are 65 years and older².

Some risk factors that increase one's likelihood of stroke are unable to be modified, such as age, gender, ethnicity, and genetic or heredity factors. Medical conditions that increase one's likelihood of having a stroke include high blood pressure, high cholesterol, heart disease, diabetes, being overweight or obese, and having a previous stroke or TIA³. Healthy behaviors such as avoiding tobacco, eating a balanced diet, getting enough physical activity, and not drinking too much alcohol all help reduce the risk of stroke.

The Burden of Stroke in Kentucky

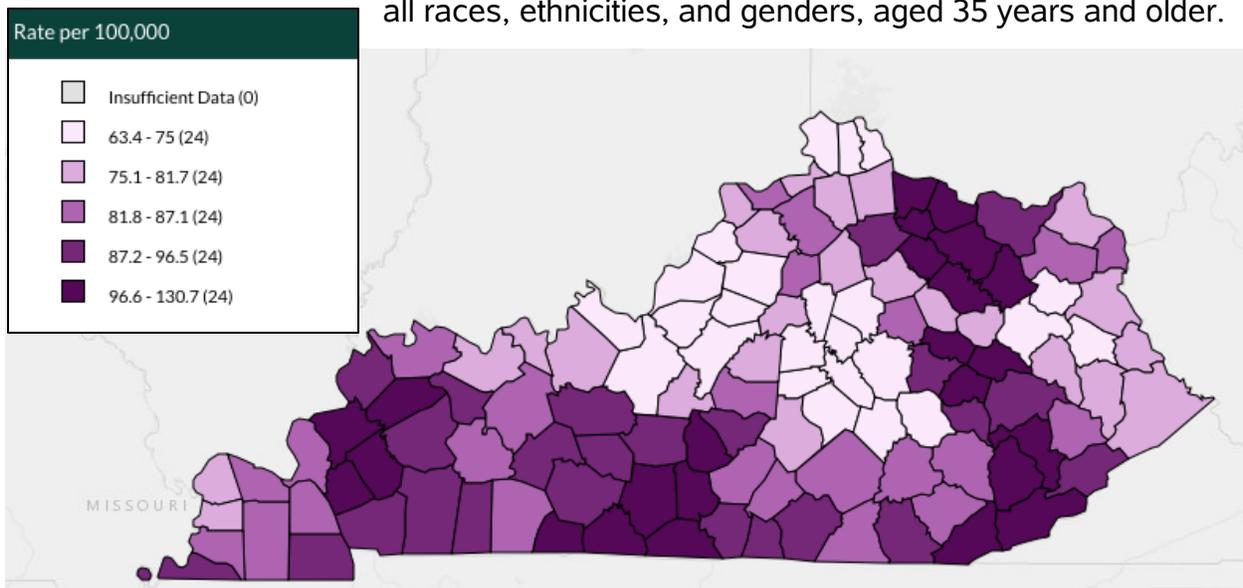


In 2016, stroke was the number five cause of death in Kentucky and in the United States⁴. Over 2,000 Kentuckians died in 2016 from stroke or stroke related complications⁴. When comparing the age-adjusted death rate for stroke in Kentucky to the US average rate, Kentucky consistently fares worse. In the figure⁴ above, the stroke age-adjusted death rates for Kentucky and the United States are presented for both white and black populations.

According to the Kentucky Behavioral Risk Factor Surveillance System (KyBRFS) data from 2017, 4.0% of Kentuckians reported they had experienced a stroke at some time in their life⁵. Additionally, over 36% of Kentuckians report they have hypertension, putting them at increased risk of having a stroke⁵.

Stroke Deaths by Kentucky County

In Kentucky, the age-adjusted death rate from stroke varies by county, as shown in the map below, when using stroke mortality data from 2014 through 2016, for individuals of all races, ethnicities, and genders, aged 35 years and older.



Why is early stroke treatment important?

Stroke is a medical emergency. The timely recognition of stroke symptoms, aided by using the F.A.S.T. acronym (Face drooping, Arm weakness, Speech difficulty, Time to call 911), can allow stroke patients greater benefit from symptom reversing medical therapies that are time dependent from the onset of stroke.

Early treatment may reduce long-term disability from stroke and prevent death. Stroke Systems of Care focuses on: increasing recognition of stroke symptoms; EMS protocols and treatment with immediate activation of EMS; patient care at a center equipped to treat acute stroke; offering FDA approved clot-busting therapy to appropriate patients; and arranging emergent transfer to tertiary centers for advanced stroke care, as appropriate. SEQIP was developed to improve these processes by sharing best practices, improving workflow when possible, and advocating for stroke systems improvements across Kentucky.

Stroke Encounter Quality Improvement Project (SEQIP)

Mission of SEQIP

The mission of SEQIP is to advance acute stroke care management 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.
- Collaborating on stroke related research throughout Kentucky.



History of SEQIP

SEQIP was created in 2009 as a statewide voluntary stroke quality improvement initiative of the Kentucky Heart Disease and Stroke Prevention Task Force - Cardiovascular Health Delivery Systems Subcommittee, the Kentucky Heart Disease and Stroke Prevention Program (KHDSPP), and the AHA/ASA. SEQIP initiated a voluntary participation in a stroke registry for hospitals, the first in Kentucky.

SEQIP includes hospitals that are stroke certified by the Joint Commission (TJC) as Comprehensive, Primary, and Acute Stroke Ready per KRS 211.275 (effective July 12, 2012), as well as hospitals seeking to advance stroke care in the community in which they serve. Participation in SEQIP is voluntary and open to all hospitals and stakeholders in Kentucky and surrounding areas. SEQIP member hospitals that are not Joint Commission stroke certified are not required to participate in the data registry.

Engaging Stakeholders

SEQIP was designed to encourage collaboration between hospitals and stakeholders in Kentucky in order to improve the quality of care given to stroke patients. At inception, 16 hospitals were geographically chosen and invited to participate to represent the state as a whole. Quality and process improvement reports were generated and reviewed by SEQIP member hospitals, and action plans were created and implemented by members. As the initiative has grown, additional hospitals have joined the effort. The data presented in this report are based on 23 of the 24 certified stroke centers that provided mandatory data for calendar year 2017. There are currently 35 hospitals

engaged in SEQIP. Data from these additional centers will be reflected in future reports as data use agreements are obtained.

SEQIP Goals

- To adopt evidence-based guidelines and standards for practice
- To implement evidence-based integrated cerebrovascular systems of care
- To support and advance the quality of care available to stroke patients in Kentucky
- To share best practices and encourage collaboration among membership
- To identify and map certified stroke centers in the state
- To engage and recruit hospitals to seek certification as Comprehensive Stroke Center, Primary Stroke Center, and Acute Stroke Ready Stroke Center
- Evaluate quality data and identify opportunities for collaboration with partners outside of SEQIP
- Address the entire stroke system of care including pre-hospital stroke care, stroke rehabilitation, and patient outcomes
- Develop and disseminate an annual report to the Governor and legislature, including recommendations for improving stroke systems of care
- Support the passage of state policies that advance the implementation of stroke systems of care

Structure of SEQIP

In 2017, the SEQIP Steering Committee approved the organization's charter, including mission statement (above), membership, policy, and governing structure.

To aid SEQIP in achieving its goals, the following subcommittees were created to focus on specific action-plan items:

- EMS Outreach and Education
- Disease Specific Certification Initiatives
 - o Comprehensive Stroke Centers
 - o Acute Stroke Ready Hospitals
 - o Primary Stroke Centers
 - o Thrombectomy-Capable Stroke Centers
- Data Analysis and Performance Improvement
- Navigating the Stroke Continuum of Care
- Community and Public Health Education and Outreach

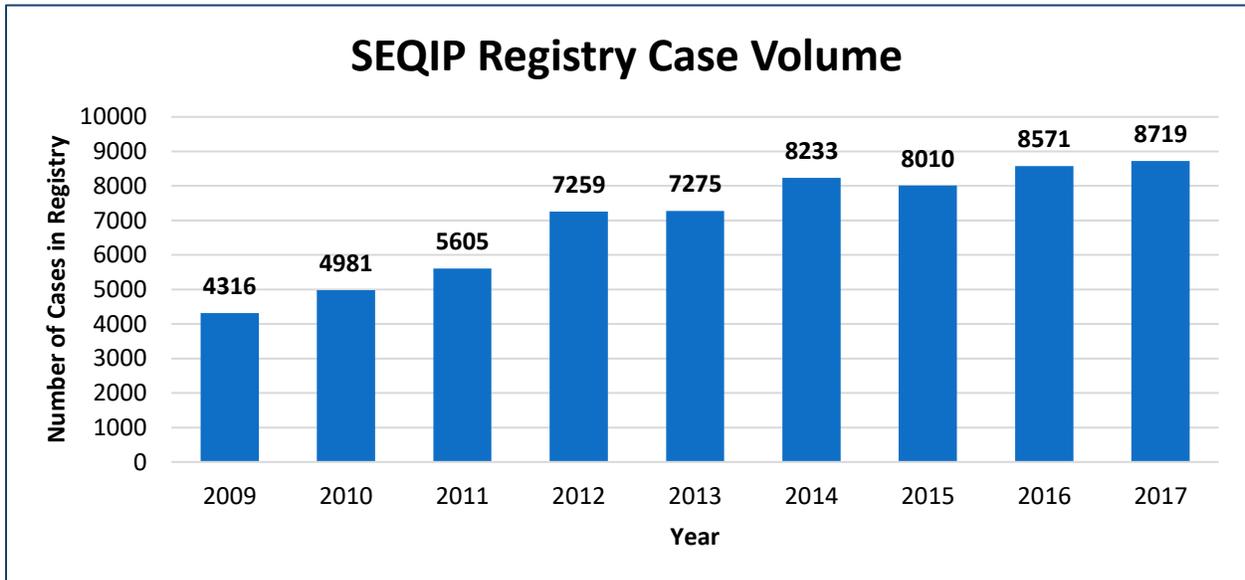
While all Kentucky hospitals with TJC certification are required to participate in the data registry, per KRS 211.575, any hospital may join SEQIP to improve the stroke systems of care. The following hospitals are members of SEQIP and participate in meetings and collaboration efforts. Denotations are made for those hospitals which submit stroke patient data to the SEQIP registry and for those which are required to report by Kentucky statute.

List of All SEQIP Hospitals

	Hospitals whose data are included in this report	Hospitals required to submit data per KRS 211.575
Baptist Health Floyd		
Baptist Health LaGrange	✓	✓
Baptist Health Lexington	✓	✓
Baptist Health Louisville	✓	✓
Baptist Health Paducah	✓	✓
Cardinal Hill Rehab Hospital		
Ephraim McDowell Regional Medical Center		
Fleming County Hospital		
Frankfort Regional Medical Center		
Georgetown Community Hospital		
Greenview Regional Hospital		✓
Hardin Memorial Health	✓	✓
Harlan ARH		
Highlands Regional Medical Center		
Jackson Purchase Medical Center	✓	✓
Jewish Hospital	✓	✓
King's Daughter's Medical Center	✓	✓
Lake Cumberland Regional Hospital	✓	✓
Morgan County ARH		
Norton Audubon Hospital	✓	✓
Norton Brownsboro Hospital	✓	✓
Norton Hospital	✓	✓
Norton Women's and Children's Hospital	✓	✓
Our Lady of Bellefonte Hospital		
Owensboro Health Regional Hospital	✓	✓
Pikeville Medical Center	✓	✓
Saint Joseph Hospital	✓	✓
St Elizabeth Edgewood	✓	✓
St Elizabeth Florence	✓	✓
St Elizabeth Ft Thomas	✓	✓
Sts. Mary and Elizabeth Hospital	✓	✓
The Medical Center at Bowling Green	✓	✓
Three Rivers Medical Center		
University of Kentucky Hospital	✓	✓
University of Louisville Hospital	✓	✓

SEQIP Data Registry

In 2009, 16 inaugural hospitals began the SEQIP data registry. In calendar year 2017, 23 of the 24 TJC stroke certified hospitals participated in the data registry, and 35 hospitals were active members of SEQIP's quality improvement initiatives. The following graph shows the growth of the SEQIP registry by case volume throughout the history of SEQIP. In 2009, over 4,300 cases were in the registry. By 2017, that number had grown to over 8,700. As SEQIP continues to grow and more hospitals join, the number of cases will grow, increasing the generalizability of SEQIP data to the state of Kentucky.



Explanation of SEQIP Reporting Year

Stroke cases are added to the SEQIP registry by individual hospital data abstractors, both in real-time and after patient discharge. The Joint Commission requires all data for the calendar year be entered in the registry by March 31 of the following year for consideration of award status. Because of this potential lag in reporting time, data for the yearly SEQIP report is not from the prior calendar year (i.e. calendar year 2018 data was not completely entered until March 31, 2019). This reporting deadline means the yearly SEQIP Report aggregates data from two calendar years prior.

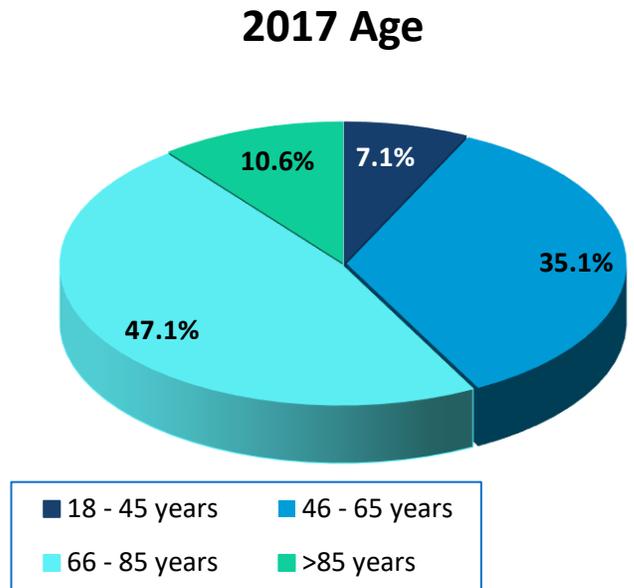
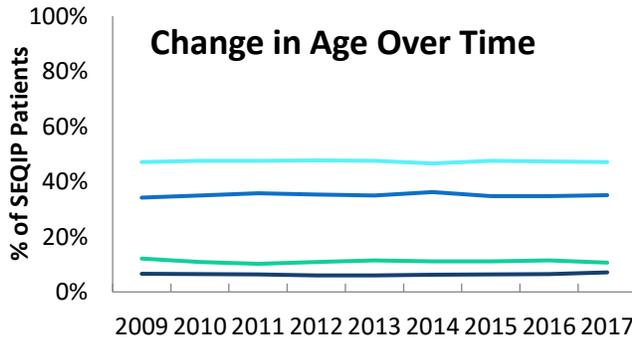
SEQIP Patient Demographics for 2017

The patient demographic section was compiled using aggregate, de-identified patient data from all participating Kentucky SEQIP hospitals. Patient demographic data is reported for calendar year 2017 and includes the variables of age, race, and gender.

Age

The age ranges of SEQIP patients from 2017 are shown in the chart, right. The majority of patients are between 66 and 85 years of age and the second most populous range is between 46 and 65 years of age.

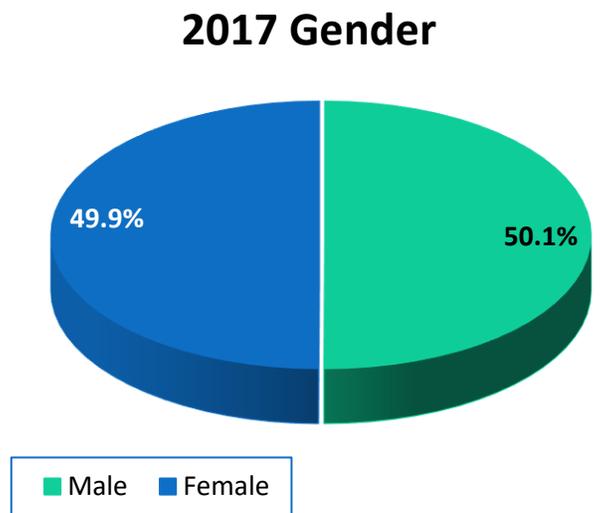
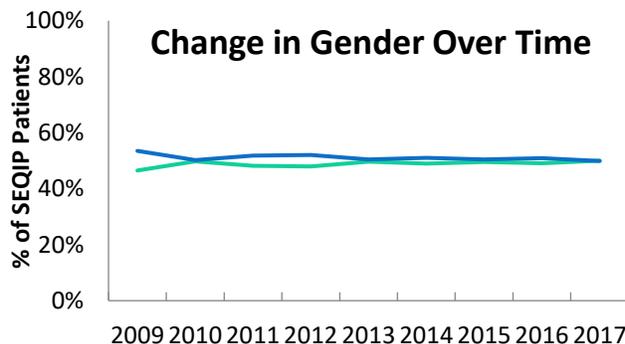
In 2017, over 40% of stroke patients were under the age of 65. This trend has been consistent for SEQIP cases since 2009.



Gender

The gender of SEQIP patients are nearly equally distributed between male and female with 50.1% of patients male and 49.9% female.

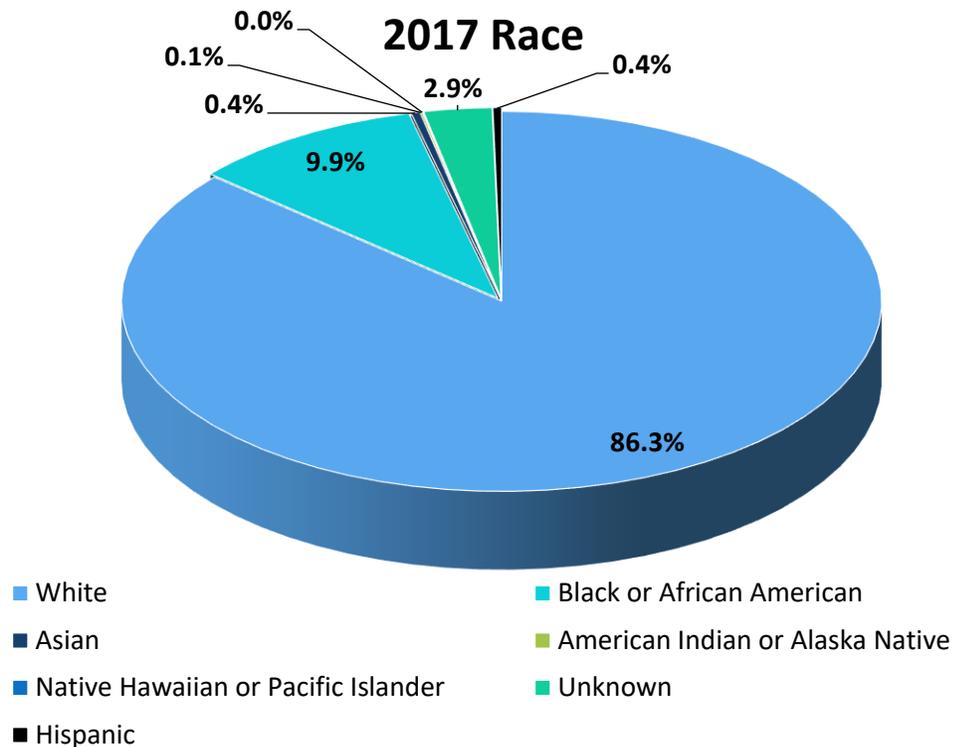
This trend of near-equal gender distribution has been stable since 2009.



Race

In 2017, 86.3% of SEQIP patients were white, 9.9% were black, 0.4% were Asian, 0.1% were American Indian or Alaska Native, 0.0% were Native Hawaiian or Pacific Islander, 2.9% had an unknown race, and 0.4% were Latino/a or Hispanic.

Since 2009, the proportion of races represented by SEQIP patients has not significantly changed.

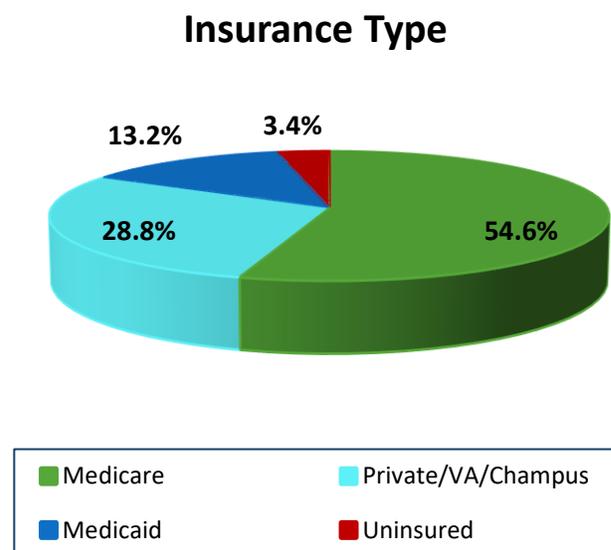


SEQIP Stroke Patient Descriptive Statistics for 2017

The patient descriptive statistics section was compiled using aggregate, de-identified patient data from all participating Kentucky SEQIP hospitals. Patient descriptive data is reported for calendar year 2017 and includes the variables of insurance type, previously known medical history, stroke type, arrival mode, dysphagia screen result, and National Institutes of Health Stroke Scale score at admission.

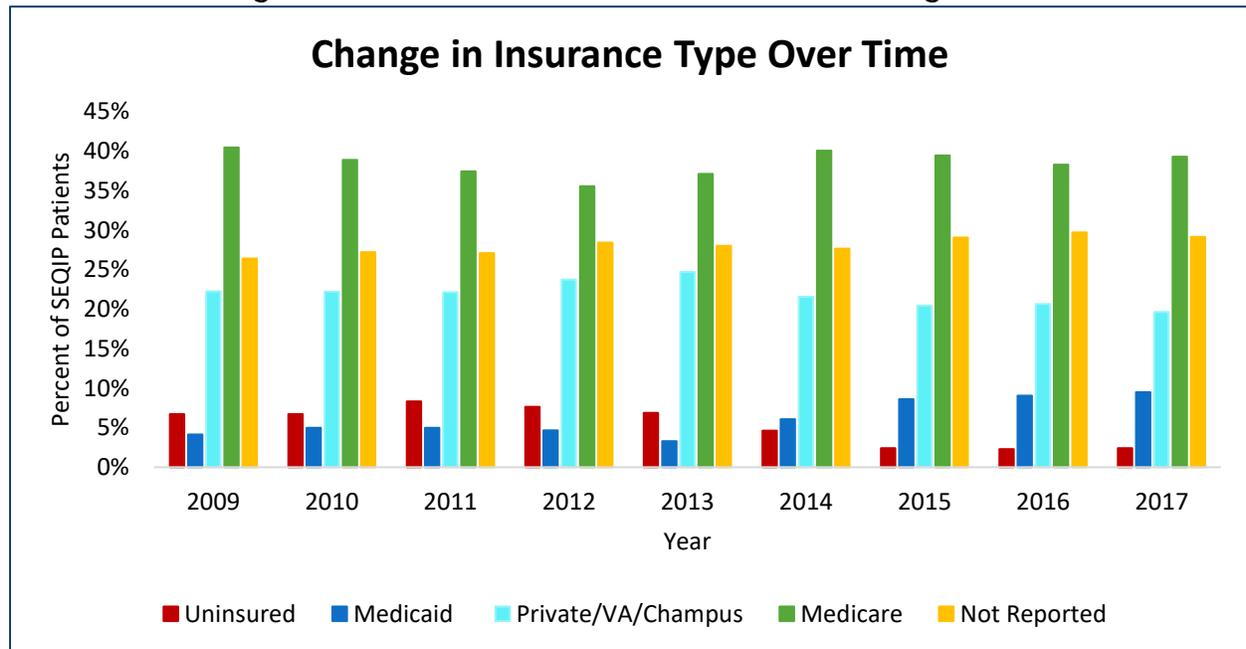
Insurance Type

Close to 55% of SEQIP patients in 2017 had Medicare for their health care insurance. Nearly 29% of patients had some type of private insurance, 13% had Medicaid, and 3.4% were uninsured.



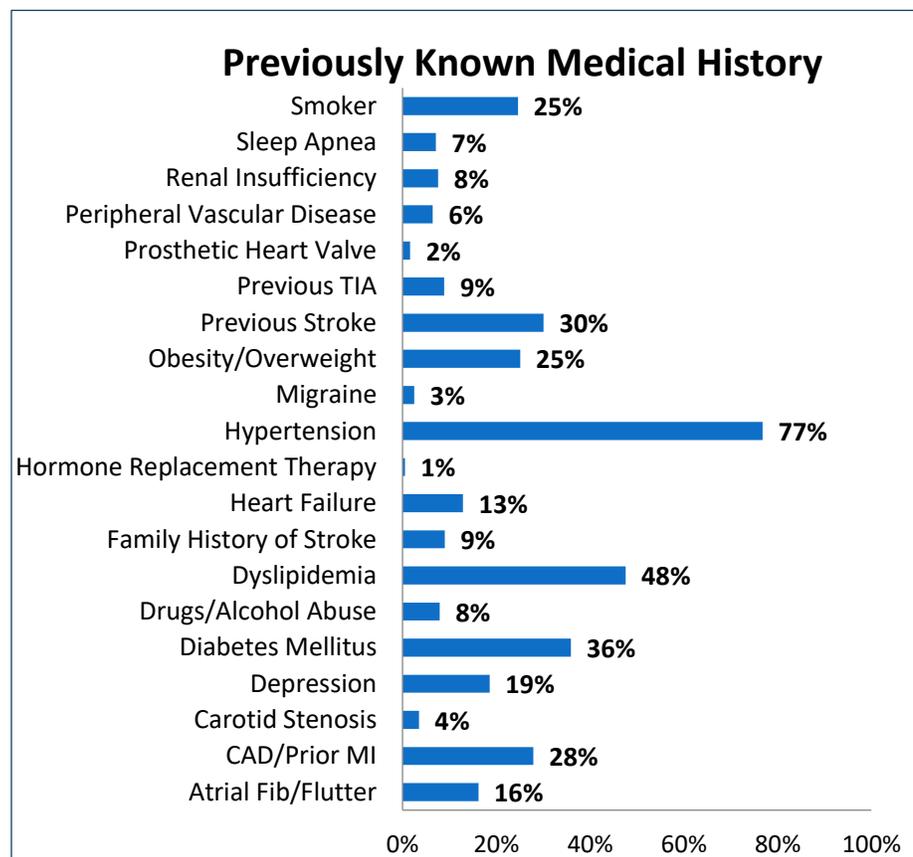
The trends for health insurance type are shown in the graph below. The percentage of SEQIP patients who are uninsured has decreased to 3.4% in 2017 from the peak of 8.3% in 2011. The percentage of patients with Medicare ranged between the low of

35.55% in 2012 and the high of 40.5% in 2009. The percent of SEQIP patients with Medicaid has ranged between the low of 3.3% in 2013 and the high of 9.5% in 2017.



Previously Known Medical History

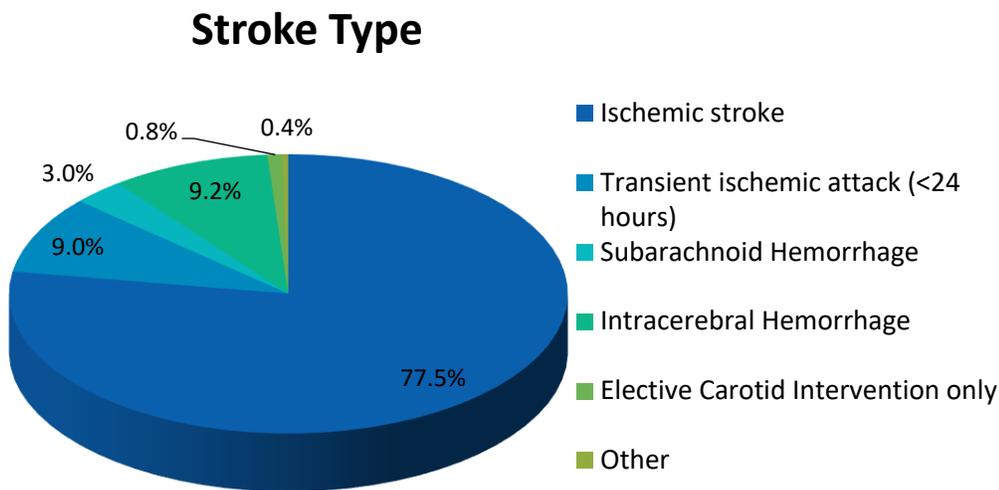
In 2017, hypertension was the most common prior medical condition with 77% of SEQIP patients having high blood pressure. Other common medical histories include being a smoker (25%), have a prior stroke (30%), being overweight/obese (25%), dyslipidemia or high cholesterol (48%), diabetes (36%), or coronary artery disease (28%).



Stroke Type

The majority, 77.5%, of the 2017 SEQIP patients experienced an ischemic stroke, where the brain receives inadequate blood supply and brain tissue dies. Intracerebral hemorrhages were the second most common, 9.2%, followed by TIAs, 9.0%. The various stroke subtypes are defined below.

Comparatively, in the US, 87% of strokes are ischemic, 10% are intracerebral hemorrhages, and 3% are subarachnoid hemorrhages⁶.



Stroke Type Definitions

Stroke: a clinical syndrome caused by disruption of blood supply to the brain resulting in brain cell death, characterized by rapidly developing signs of cerebral dysfunction.

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

Transient Ischemic Attack (TIA): occurs when a blood clot 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 before resolving completely and leaving no permanent damage.

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

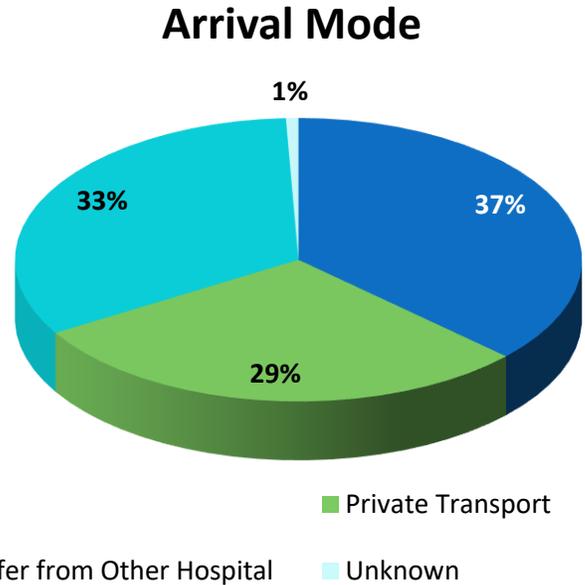
Intracerebral Hemorrhage (ICH): occurs when a blood vessel within the brain ruptures, allowing blood to leak inside the brain tissue.

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

Arrival Mode

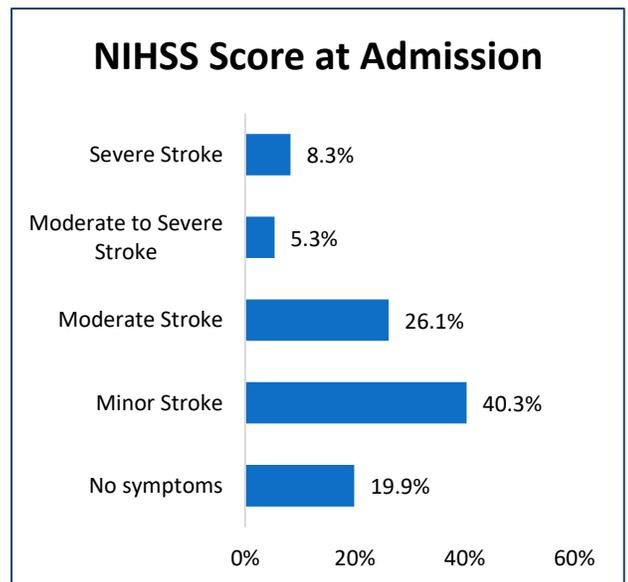
In 2017, 37% of SEQIP patients arrived at the hospital via EMS. 29% of patients arrived at the hospital via a private vehicle, and 33% of SEQIP stroke patients arrived at the hospital for treatment via transfer from another hospital.

The notification and response of EMS for a stroke involves a complex interaction between the public, the applicable EMS agencies, and the relevant hospital emergency departments. The CDC recommends hospitals develop partnerships with local EMS providers, as well as educate communities about how to recognize the symptoms of stroke and the importance of dialing 911 when someone is experiencing these symptoms. These recommendations promote timely life-saving treatment. It is also important for EMS and emergency dispatch operators to be trained in stroke symptom recognition and be able to assist patients in quickly getting to the nearest appropriate hospital that is able to provide the clot-busting drug IV rt-PA. See more info about the Kentucky Board of Emergency Medical Services (KBEMS) in the partnerships section.



NIHSS Score at Admission

The National Institutes of Health Stroke Scale (NIHSS) is a tool used by healthcare providers to quantify a patient’s physical impairment when they are suspected of having a stroke. The summed score ranges from 0 to 42, with stroke severity categories shown below. In 2017, about 40% of SEQIP patients had strokes categorized as minor. Nearly 20% had no stroke symptoms as determined by the NIHSS, 26% had a moderate stroke, 5.3% a moderate to severe stroke, and 8.3% a severe stroke.

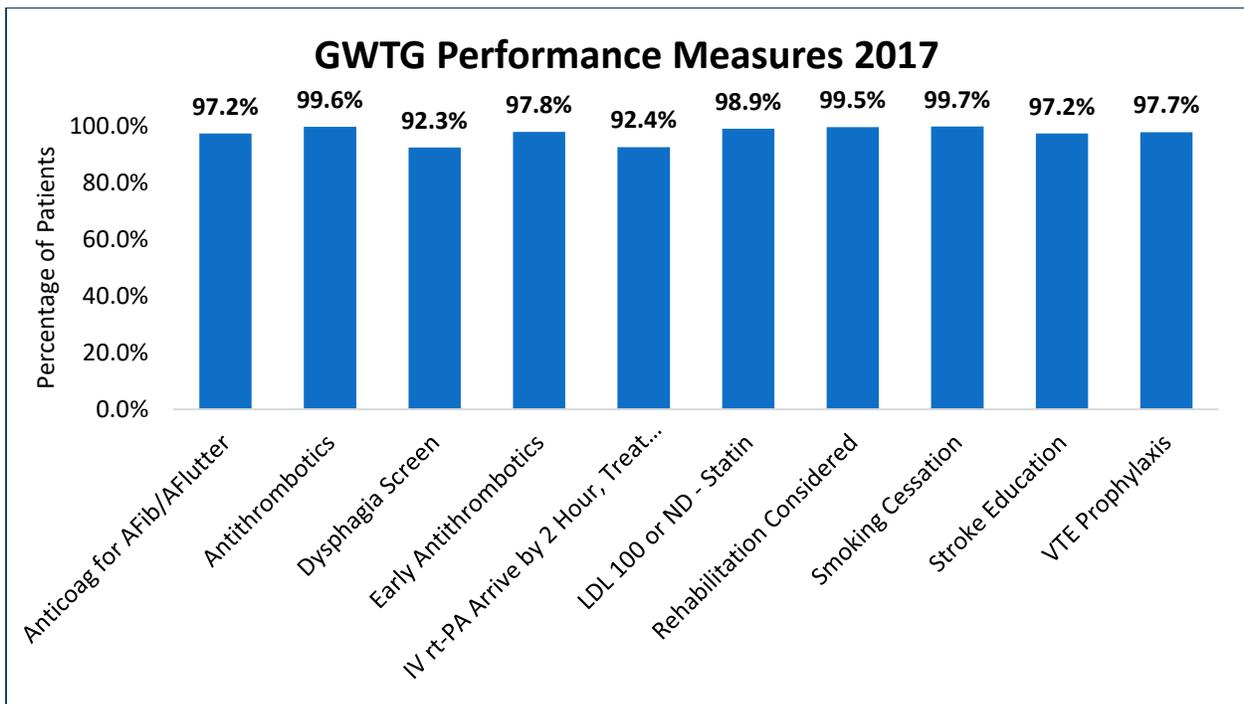


NIH Stroke Scale Score	Stroke Severity
0	No NIHSS stroke symptoms
1-4	Minor stroke
5-15	Moderate stroke
16-20	Moderate to severe stroke
21-42	Severe stroke

Get With the Guidelines Performance Measures

Kentucky SEQIP utilizes the performance measures developed by the AHA/ASA's nationally recognized Get With The Guidelines® (GWTG) – Stroke hospital-based quality improvement program recognized by the Joint Commission 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 data-set with patient confidentiality standards.

SEQIP collects data on measures related to stroke care that are evidence-based guidelines 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 chart below is based on performance measure data reported by the participating hospitals for calendar year 2017.



Participation in the SEQIP data registry is required per KRS 211.575 for all hospitals in Kentucky that are certified by the Joint Commission as Acute Stroke Ready, Primary Stroke Center, and Comprehensive Stroke Center. In 2018, Thrombectomy-Capable Stroke Centers were added to the list of stroke certification programs.

SEQIP hospitals collaborate to choose performance measures, share best practices, and develop an action plan to address their quality improvement efforts. SEQIP also works to encourage hospitals to become stroke certified or improve their certification. The Joint Commission Stroke Certifications for hospitals as of 2017 are described below.

Acute Stroke Ready Hospital: must have a dedicated stroke-focused program, have telemedicine available within 20 minutes, have transfer protocols in place for continuation of stroke care, have diagnostic imaging and laboratory testing done quickly, as well as ensure a stroke patient is assessed by a qualified practitioner within 15 minutes of arrival, among other requirements.

Primary Stroke Center: must meet all Acute Stroke Ready Hospital requirements as well as have dedicated beds for the acute care of stroke patients.

Comprehensive Stroke Center: must meet all Primary Stroke Center requirements as well as use a standardized method of delivering care centered on evidence-based guidelines for stroke care and must have dedicated neuro intensive care beds for complex stroke patients available around the clock.

SEQIP's History of Quality Improvement

The first quality improvement plan chosen for hospital collaboration was increasing the rate of patients screened for dysphagia prior to receiving any oral foods or liquids. Dysphagia, or difficulty in swallowing, is a common occurrence in an acute stroke. Early screening helps to manage stroke patients who could otherwise be vulnerable to weight loss, fluid depletion, malnutrition, and aspiration of food or liquid that can cause pneumonia. Patients who are unable to consume food or fluid by mouth may have poorer outcomes and prolonged hospital stays. In 2009, dysphagia screening was at 62.8% and by the end of the quality improvement project, dysphagia screening was at 91.81%. Dysphagia screening increased by 29.01% at SEQIP certified stroke center hospitals that participated in the first quality improvement plan.

The second quality improvement plan chosen by SEQIP was increasing the use of thrombolytic therapy. Thrombolytic therapy is given to acute ischemic stroke patients to dissolve the clot and improve blood flow to the brain. This quality improvement project began in February 2010 and focused on increasing the percent of eligible patients who receive intravenous recombinant tissue plasminogen activator (IV rt-PA) as thrombolytic therapy within three hours of the time they were last known to be well. In 2009, the percent of eligible patients receiving IV rt-PA within this timeframe was 60.4% and by the end of 2014, it was 85.7%. IV rt-PA increased by 25.3% for SEQIP hospitals that are certified stroke centers that participated in the second quality improvement plan.

In 2011, SEQIP implemented another quality improvement plan to reduce door-to-needle time for eligible acute stroke patients receiving IV rt-PA. In 2011, 23.6% of SEQIP patients received IV rt-PA within 60 minutes of arriving at the hospital. By 2015, the proportion had increased to 74.6%, a 51.0% increase for SEQIP hospitals that are participating certified stroke centers.

Performance Measure Definitions

Anticoagulation for Atrial Fibrillation/Atrial Flutter: The percent of patients with an ischemic stroke or TIA with atrial fibrillation/flutter discharged on anticoagulation therapy.

Antithrombotics at Discharge: The percent of patients with an ischemic stroke or TIA prescribed antithrombotic therapy at discharge.

Dysphagia Screening: 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.

Early Antithrombotics: The percent of patients with ischemic stroke or transient ischemic attack, TIA, who receive antithrombotic therapy by the end of hospital day two.

IV Recombinant Tissue Plasminogen Activator (IV rt-PA): The percent of acute ischemic stroke patients who arrive at the hospital within 120 minutes (2 hours) of time last known well and for whom IV t-PA was initiated at this hospital within 180 minutes (3 hours) of time last known well.

Low Density Lipoprotein (LDL) 100: The percent of ischemic stroke or TIA patients with LDL ≥ 100 , or LDL not measured, or on cholesterol-reducer prior to admission who are discharged on statin medication.

Rehabilitation Considered: The percent of patients with stroke who were assessed for rehabilitation services.

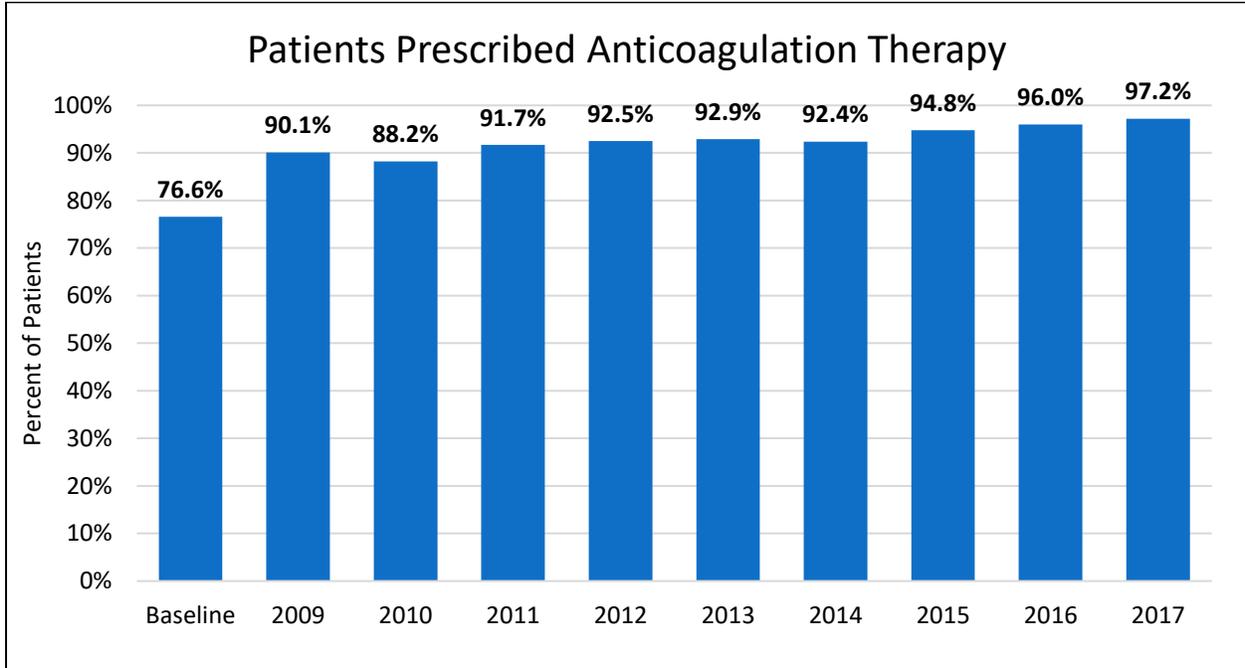
Smoking Cessation: The percent of patients with ischemic stroke, hemorrhagic stroke, or TIA with a history of smoking cigarettes, who are, or whose caregivers are, given smoking cessation advice or counseling during hospital stay.

Stroke Education: 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 of the following: personal risk factors for stroke, warning signs for stroke, activation of emergency medical system, the need for follow-up after discharge, and medications prescribed.

VTE Prophylaxis: The percent of patients with an ischemic stroke, or a hemorrhagic stroke, or a stroke not otherwise specified who receive venous thromboembolism (VTE) prophylaxis by the end of hospital day two.

Anticoagulation Therapy

Measure: The percent of patients with ischemic stroke or TIA with atrial fibrillation/flutter who are discharged on anticoagulation therapy.



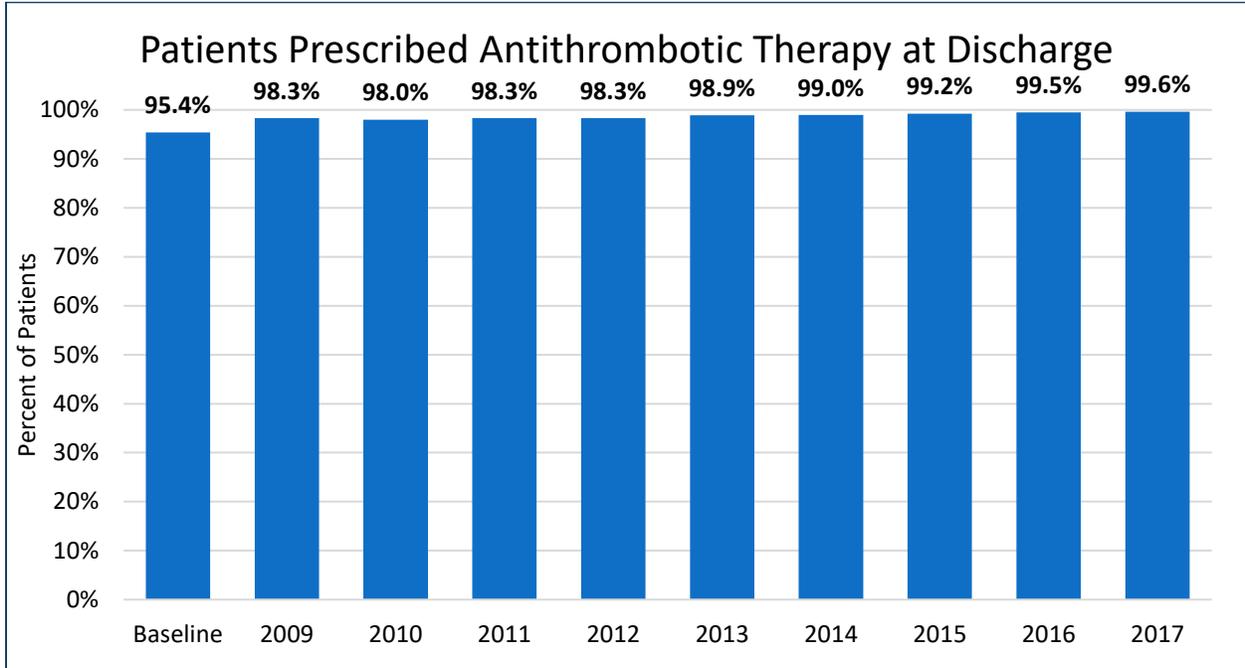
Achievement Goal: 85%

At baseline, 76.6% of eligible patients were prescribed anticoagulation therapy upon discharge. In 2017, 97.2% of eligible patients were prescribed anticoagulation therapy, a 20.6% increase.

Anticoagulation Therapy Data Table					
Year	Numerator	Denominator	Proportion of Patients	Confidence Interval	Number of Sites
Baseline	36	47	0.766	(0.620, 0.877)	16
2009	410	455	0.901	(0.870, 0.927)	16
2010	447	507	0.882	(0.851, 0.909)	16
2011	497	542	0.917	(0.891, 0.939)	17
2012	625	676	0.925	(0.902, 0.944)	17
2013	670	721	0.929	(0.909, 0.947)	18
2014	732	792	0.924	(0.904, 0.942)	19
2015	851	898	0.948	(0.932, 0.962)	22
2016	931	970	0.960	(0.946, 0.972)	23
2017	951	978	0.972	(0.961, 0.982)	23

Antithrombotics at Discharge

Measure: The percentage of patients with an ischemic stroke or a TIA prescribed antithrombotic therapy at discharge.



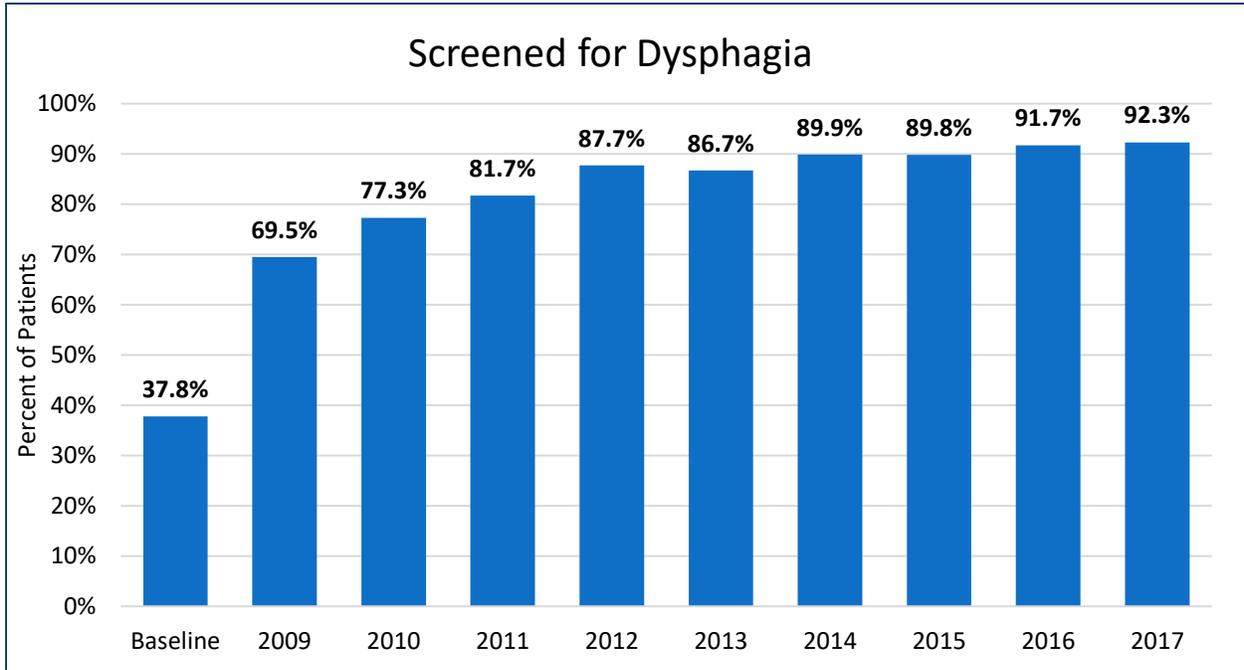
Achievement Goal: 85%

At baseline, 95.4% of eligible patients were prescribed antithrombotic therapy upon discharge. In 2017, 99.6% of eligible patients were prescribed antithrombotic therapy at discharge, a 4.2% increase.

Antithrombotic Therapy Data Table					
Year	Numerator	Denominator	Proportion of Patients	Confidence Interval	Number of Sites
Baseline	371	389	0.954	(0.928, 0.973)	16
2009	2991	3044	0.983	(0.978, 0.987)	16
2010	3609	3684	0.98	(0.975, 0.984)	16
2011	3692	3754	0.983	(0.979, 0.988)	17
2012	4600	4678	0.983	(0.980, 0.987)	17
2013	4592	4643	0.989	(0.986, 0.992)	18
2014	4956	5008	0.99	(0.987, 0.993)	19
2015	5140	5181	0.992	(0.990, 0.995)	22
2016	6047	6080	0.995	(0.993, 0.997)	23
2017	6108	6134	0.996	(0.994, 0.998)	23

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.



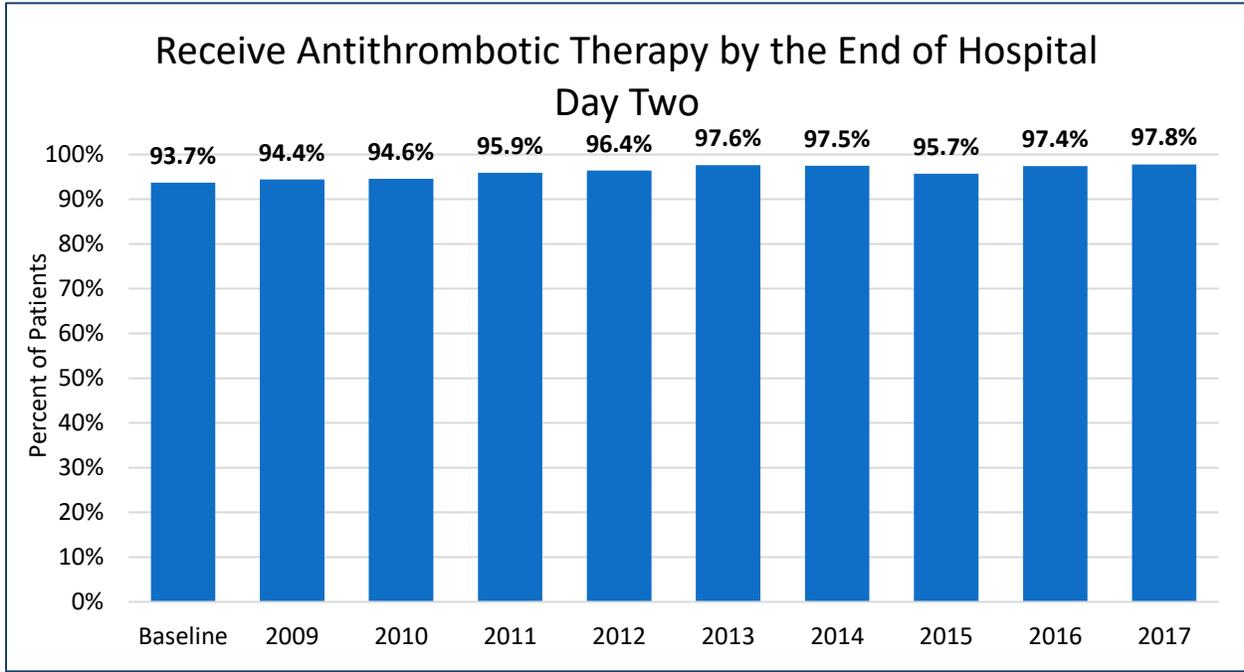
Achievement Goal: 85%

At baseline, 37.8% of patients were screened for dysphagia before given any food, fluids, or medication by mouth. In 2017, 92.3% of patients were screened for dysphagia, a 54.5% increase.

Dysphagia Screen Data Table					
Year	Numerator	Denominator	Percent of Patients	Confidence Interval	Number of Sites
Baseline	150	397	37.80%	(0.330, 0.428)	16
2009	2017	2903	69.50%	(0.678, 0.712)	16
2010	2655	3436	77.30%	(0.759, 0.787)	16
2011	2766	3385	81.70%	(0.804, 0.831)	17
2012	3907	4453	87.70%	(0.868, 0.887)	17
2013	4088	4715	86.70%	(0.857, 0.877)	18
2014	4677	5202	89.90%	(0.891, 0.908)	19
2015	4950	5514	89.80%	(0.890, 0.906)	23
2016	5790	6311	91.70%	(0.911, 0.925)	23
2017	6114	6623	92.30%	(0.917, 0.930)	23

Early Antithrombotics

Measure: The percent of patients with ischemic stroke or TIA who receive antithrombotic therapy by the end of hospital day two.



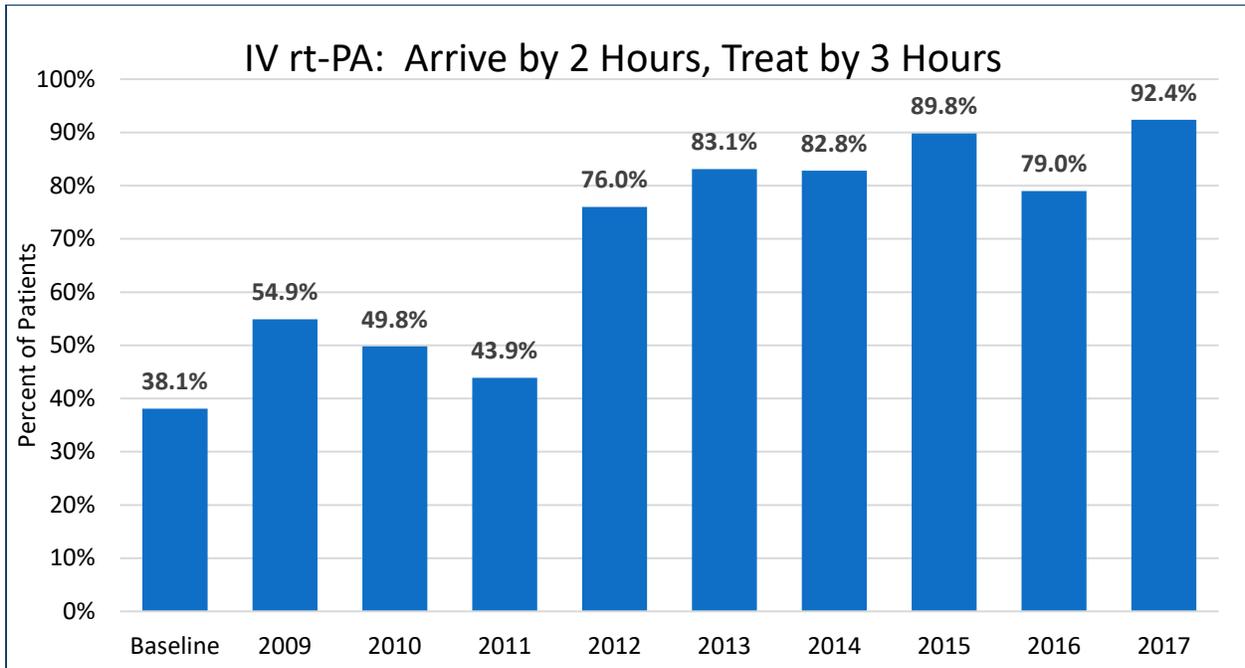
Achievement Goal: 85%

At baseline, 93.7% of eligible patients received antithrombotic therapy by the end of hospital day two. In 2017, 97.8% of patients received early antithrombotics, a 4.1% increase.

Early Antithrombotics Data Table					
Year	Numerator	Denominator	Percent of Patients	Confidence Interval	Number of Sites
Baseline	296	316	93.70%	(0.904, 0.961)	16
2009	2581	2735	94.40%	(0.935, 0.953)	16
2010	3100	3276	94.60%	(0.938, 0.954)	16
2011	3256	3394	95.90%	(0.953, 0.966)	17
2012	3926	4073	96.40%	(0.958, 0.970)	17
2013	3917	4012	97.60%	(0.972, 0.981)	18
2014	4198	4305	97.50%	(0.971, 0.980)	19
2015	4183	4373	95.70%	(0.951, 0.963)	23
2016	4840	4967	97.40%	(0.970, 0.979)	23
2017	4969	5081	97.80%	(0.974, 0.982)	23

IV rt-PA Initiated Within 3 Hours

Measure: The percent of acute stroke patients arriving at the hospital within two hours of time last known well and for whom IV rt-PA is initiated at the hospital within three hours of time last known well.



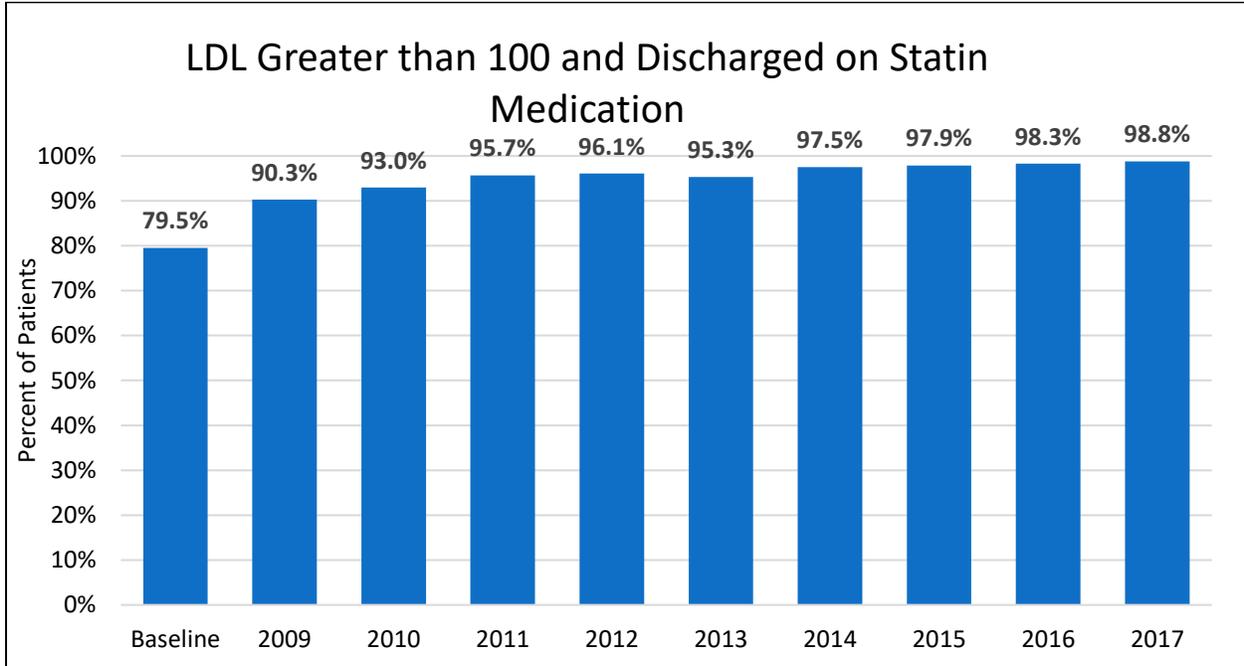
Achievement Goal: 85%

At baseline, 38.1% of eligible patients received IV-rt-PA within three hours of time last known well. In 2017, 92.4% of patients received IV rt-PA within three hours, a 54.3% increase.

IV rt-PA Within Three Hours Data Table					
Year	Numerator	Denominator	Percent of Patients	Confidence Interval	Number of Sites
Baseline	16	42	38.10%	(0.236, 0.544)	16
2009	95	173	54.90%	(0.472, 0.625)	16
2010	104	209	49.80%	(0.428, 0.568)	16
2011	98	223	43.90%	(0.374, 0.508)	16
2012	171	225	76.00%	(0.699, 0.815)	17
2013	202	243	83.10%	(0.779, 0.877)	18
2014	212	256	82.80%	(0.777, 0.873)	18
2015	318	354	89.80%	(0.862, 0.928)	23
2016	407	515	79.00%	(0.753, 0.825)	23
2017	411	445	92.40%	(0.895, 0.947)	23

Low Density Lipoprotein

Measure: The percent of ischemic stroke or TIA patients with LDL ≥ 100 , or LDL not measured, or on cholesterol-reducer prior to admission who are discharged on statin medication.



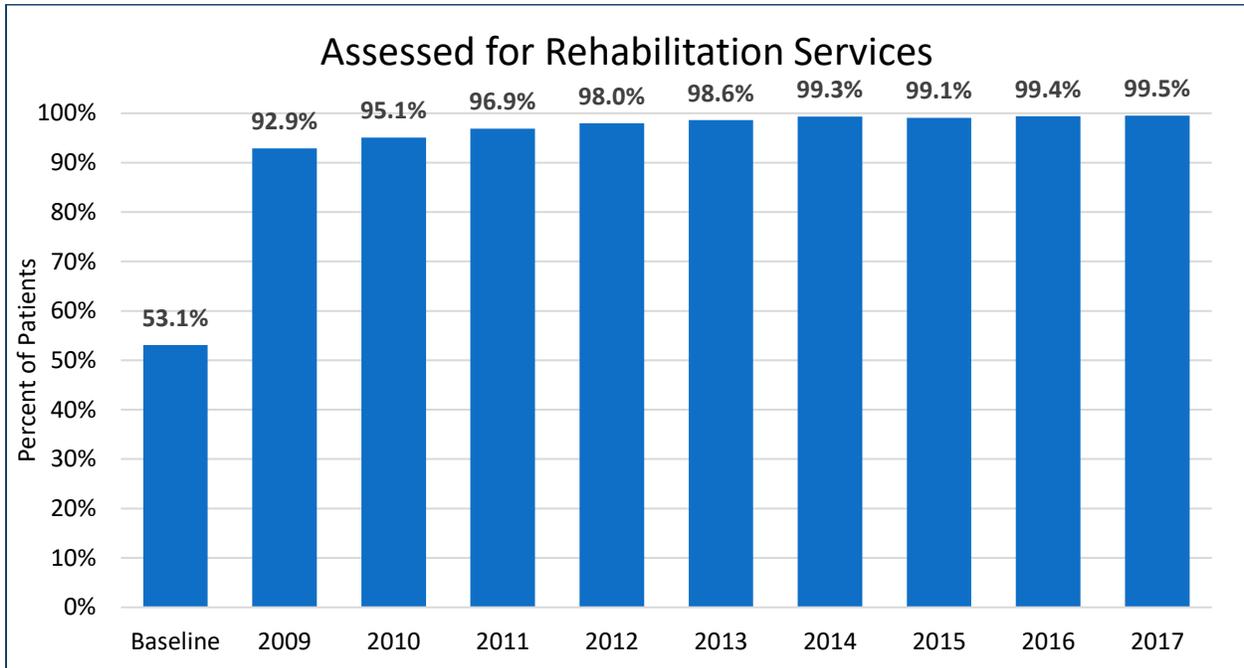
Achievement Goal: 85%

At baseline, 79.5% of eligible patients were discharged with a statin medication prescription. In 2017, 98.8% of eligible patients were discharged on a statin, a 19.3% increase.

LDL Statin Data Table					
Year	Numerator	Denominator	Percent of Patients	Confidence Interval	Number of Sites
Baseline	190	239	79.50%	(0.739, 0.845)	16
2009	1966	2176	90.30%	(0.891, 0.916)	16
2010	2480	2667	93.00%	(0.920, 0.940)	16
2011	2670	2791	95.70%	(0.949, 0.964)	17
2012	3363	3500	96.10%	(0.954, 0.968)	17
2013	3286	3448	95.30%	(0.946, 0.960)	18
2014	3620	3713	97.50%	(0.970, 0.980)	19
2015	3778	3861	97.90%	(0.974, 0.983)	22
2016	4404	4481	98.30%	(0.979, 0.987)	23
2017	4502	4556	98.80%	(0.985, 0.992)	23

Rehabilitation Considered

Measure: The percent of patients with stroke who were assessed for rehabilitation services.



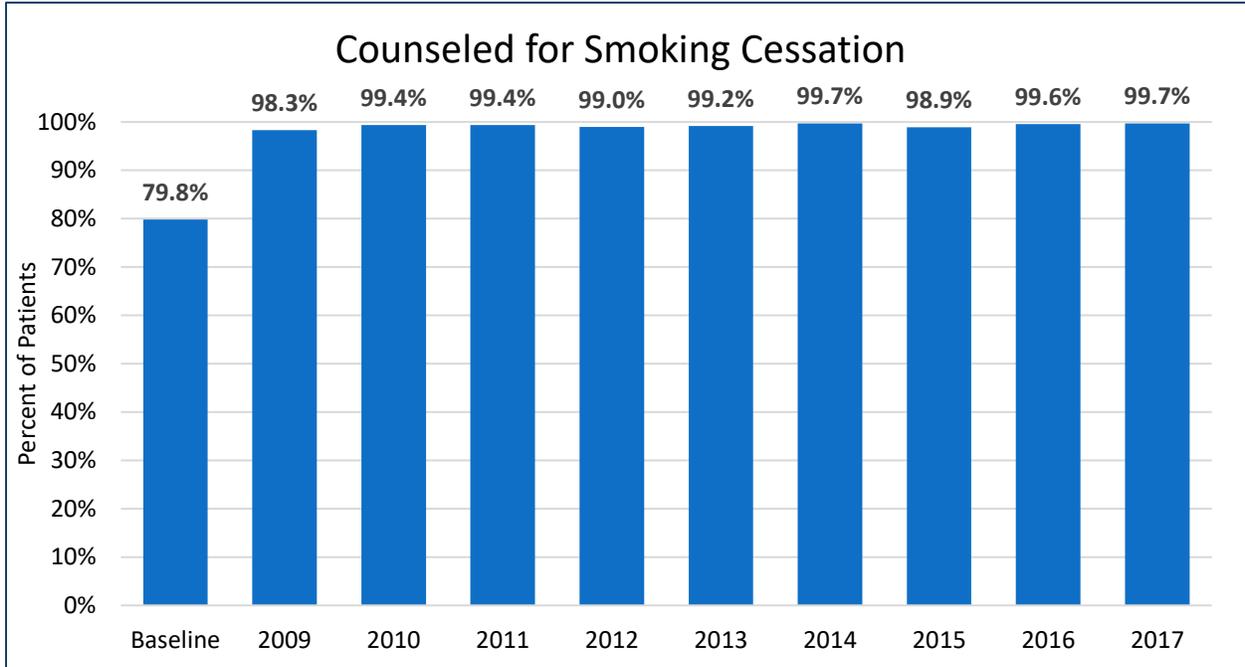
Achievement Goal: 85%

At baseline, 53.1% of eligible patients were assessed for rehabilitation services. In 2017, 99.5% of eligible patients were assessed for rehabilitation, a 46.4% increase.

Rehabilitation Considered Data Table					
Year	Numerator	Denominator	Percent of Patients	Confidence Interval	Number of Sites
Baseline	198	373	53.10%	(0.479, 0.583)	16
2009	2626	2828	92.90%	(0.919, 0.938)	16
2010	3159	3323	95.10%	(0.943, 0.958)	16
2011	3226	3328	96.90%	(0.963, 0.975)	17
2012	4424	4516	98.00%	(0.976, 0.984)	17
2013	4571	4634	98.60%	(0.983, 0.990)	18
2014	5091	5127	99.30%	(0.991, 0.996)	19
2015	5200	5247	99.10%	(0.989, 0.994)	23
2016	6118	6155	99.40%	(0.992, 0.996)	23
2017	6305	6338	99.50%	(0.993, 0.997)	23

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.



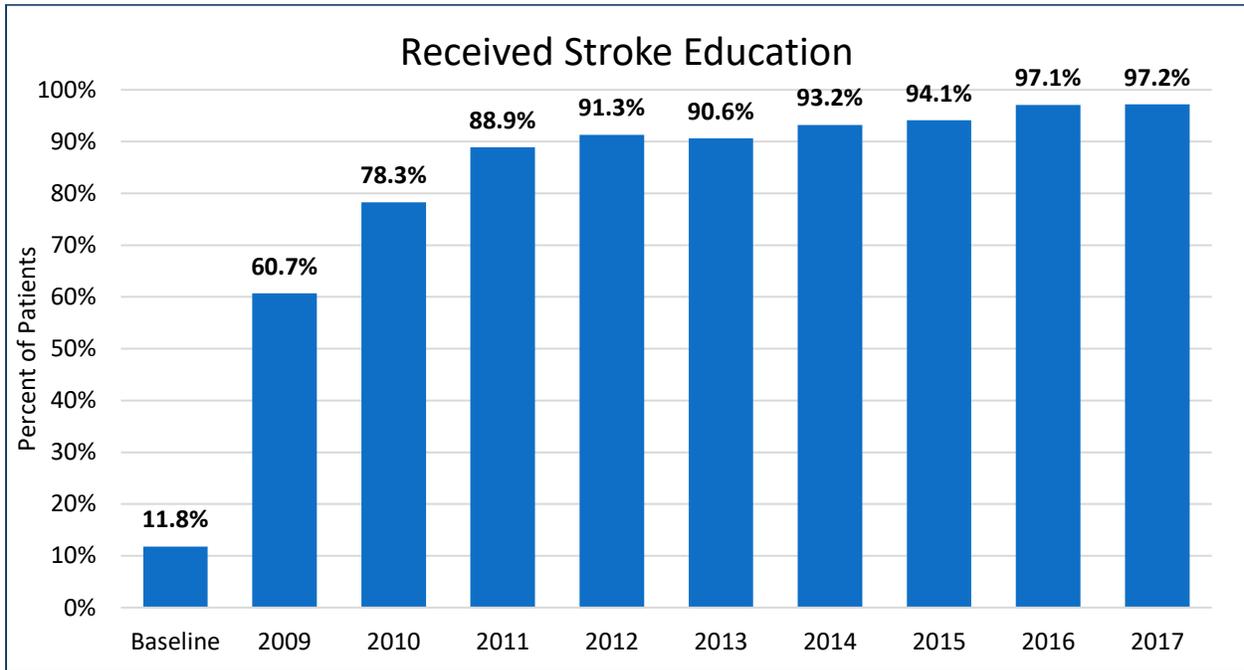
Achievement Goal: 85%

At baseline, 79.8% of eligible patients were advised to quit smoking. In 2017, 99.7% of eligible patients were counseled to quit, a 19.9% increase.

Smoking Cessation Data Table					
Year	Numerator	Denominator	Percent of Patients	Confidence Interval	Number of Sites
Baseline	71	89	79.80%	(0.700, 0.876)	16
2009	868	883	98.30%	(0.973, 0.991)	16
2010	1028	1034	99.40%	(0.988, 0.998)	13
2011	1094	1101	99.40%	(0.987, 0.998)	17
2012	1470	1485	99.00%	(0.984, 0.995)	17
2013	1303	1313	99.20%	(0.987, 0.997)	18
2014	1536	1541	99.70%	(0.993, 0.999)	19
2015	1506	1522	98.90%	(0.983, 0.994)	23
2016	1579	1585	99.60%	(0.992, 0.999)	23
2017	1756	1761	99.70%	(0.994, 1.000)	23

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 of the following: personal risk factors for stroke, warning signs for stroke, activation of emergency medical system, the need for follow-up after discharge, and medications prescribed.



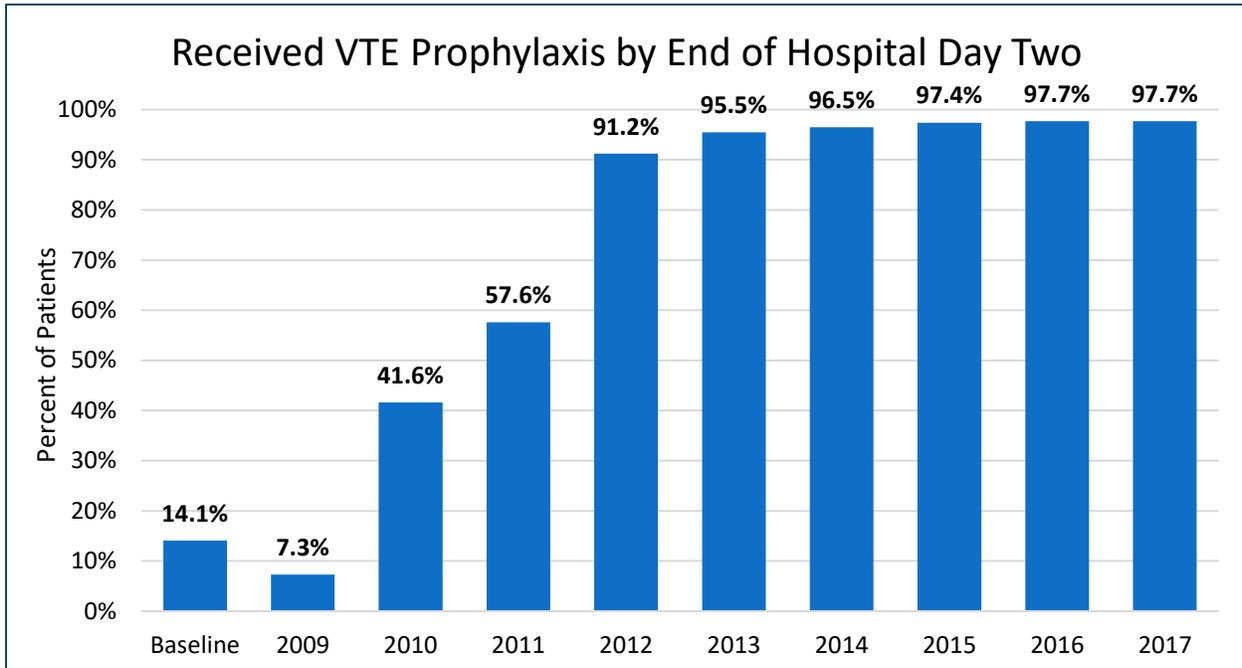
Achievement Goal: 85%

At baseline, 11.8% of eligible patients were given stroke educational information. In 2017, 97.2% of eligible patients were given stroke education, an 85.4% increase.

Stroke Education Data Table					
Year	Numerator	Denominator	Percent of Patients	Confidence Interval	Number of Sites
Baseline	29	245	11.80%	(0.081, 0.166)	16
2009	1307	2154	60.70%	(0.586, 0.628)	16
2010	2051	2619	78.30%	(0.767, 0.799)	16
2011	2433	2737	88.90%	(0.877, 0.901)	17
2012	2941	3223	91.30%	(0.903, 0.923)	17
2013	2953	3260	90.60%	(0.896, 0.916)	18
2014	3136	3365	93.20%	(0.923, 0.941)	19
2015	3290	3496	94.10%	(0.933, 0.949)	23
2016	3845	3960	97.10%	(0.966, 0.976)	23
2017	3940	4054	97.20%	(0.967, 0.977)	23

VTE Prophylaxis

Measure: The percent of patients with an ischemic stroke, hemorrhagic stroke, or a stroke not otherwise specified who receive VTE prophylaxis by the end of hospital day two.



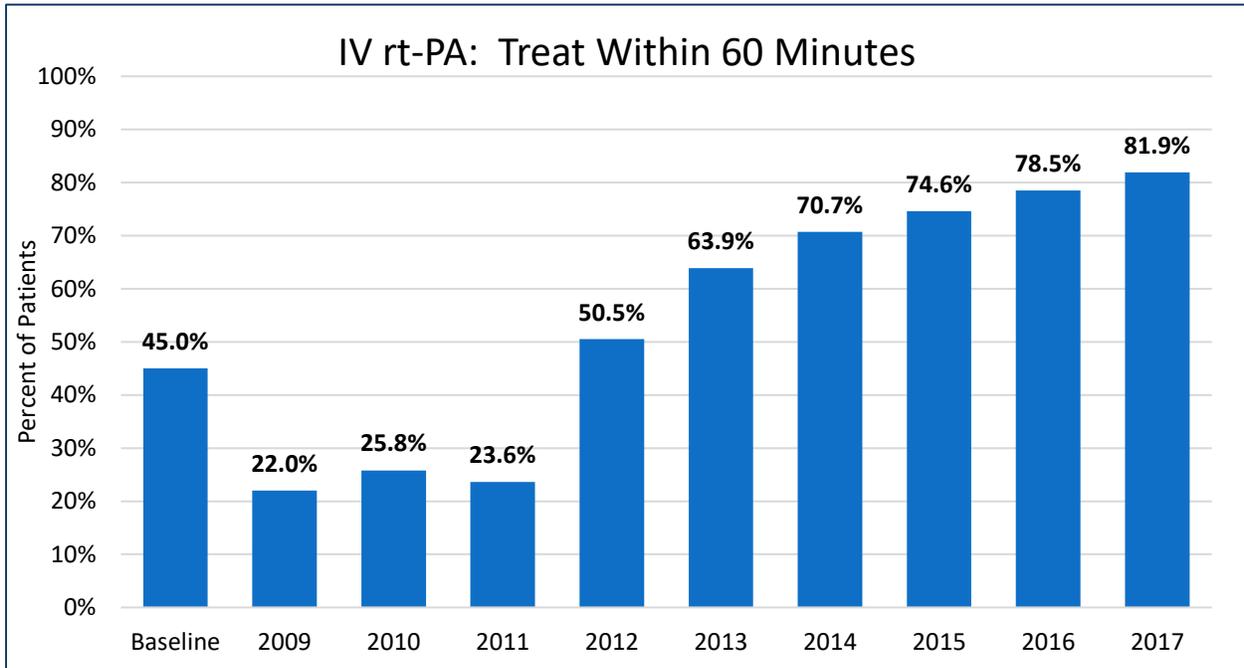
Achievement Goal: 85%

At baseline, 14.1% of eligible patients received VTE prophylaxis by the end of hospital day two. In 2017, 97.7% of eligible patients received VTE prophylaxis, an 83.6% increase.

VTE Prophylaxis Data Table					
Year	Numerator	Denominator	Percent of Patients	Confidence Interval	Number of Sites
Baseline	55	390	14.10%	(0.109, 0.180)	16
2009	212	2888	7.30%	(0.065, 0.084)	16
2010	1394	3354	41.60%	(0.399, 0.433)	16
2011	1971	3424	57.60%	(0.559, 0.593)	17
2012	4043	4435	91.20%	(0.903, 0.920)	17
2013	4384	4589	95.50%	(0.949, 0.962)	18
2014	4877	5052	96.50%	(0.960, 0.971)	19
2015	5002	5137	97.40%	(0.969, 0.978)	23
2016	5825	5964	97.70%	(0.973, 0.981)	23
2017	6079	6219	97.70%	(0.974, 0.982)	23

Additional PM: IV rt-PA Initiated Within 60 Minutes

Measure: The percent of acute stroke patients receiving intravenous tissue plasminogen activator therapy during the hospital stay who have a time from hospital arrival to initiation of thrombolytic therapy administration (door-to-needle) time of 60 minutes or less.



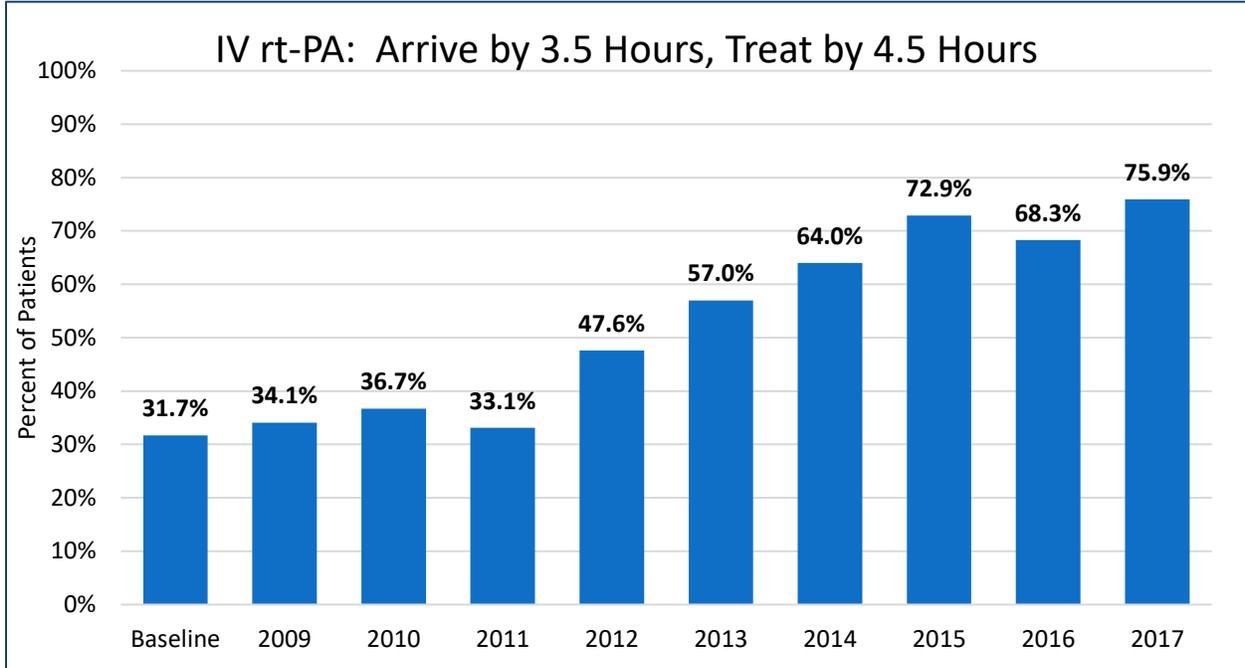
Achievement Goal: 75%

At baseline, 45.0% of eligible patients received IV rt-PA within 60 minutes of arriving at the hospital. In 2017, 81.9% of eligible patients received IV rt-PA within 60 minutes, a 36.9% increase.

IV rt-PA Within 60 Minutes Data Table					
Year	Numerator	Denominator	Percent of Patients	Confidence Interval	Number of Sites
Baseline	9	20	45.00%	(0.231, 0.685)	16
2009	24	109	22.00%	(0.147, 0.310)	16
2010	31	120	25.80%	(0.183, 0.347)	13
2011	29	123	23.60%	(0.164, 0.321)	14
2012	94	186	50.50%	(0.432, 0.580)	17
2013	133	208	63.90%	(0.571, 0.705)	18
2014	171	242	70.70%	(0.645, 0.764)	18
2015	276	370	74.60%	(0.699, 0.790)	23
2016	336	428	78.50%	(0.744, 0.824)	23
2017	348	425	81.90%	(0.779, 0.855)	22

Additional PM: IV rt-PA Initiated Within 4.5 Hours

Measure: The percent of acute stroke patients arriving at the hospital within three and a half hours of time last known well and for whom IV rt-PA is initiated at the hospital within four and a half hours of time last known well.



Achievement Goal: 85%

At baseline, 31.7% of eligible patients received IV rt-PA within 4.5 hours of time last well known. In 2017, 75.9% of eligible patients received IV rt-PA within 4.5 hours, a 44.2% increase.

IV rt-PA Within 4.5 Hours Data Table					
Year	Numerator	Denominator	Percent of Patients	Confidence Interval	Number of Sites
Baseline	19	60	31.70%	(0.203, 0.450)	16
2009	113	331	34.10%	(0.291, 0.396)	15
2010	124	338	36.70%	(0.316, 0.421)	16
2011	120	362	33.10%	(0.284, 0.383)	17
2012	202	424	47.60%	(0.429, 0.526)	17
2013	262	460	57.00%	(0.523, 0.616)	18
2014	292	456	64.00%	(0.595, 0.685)	18
2015	428	587	72.90%	(0.692, 0.765)	23
2016	531	778	68.30%	(0.649, 0.716)	23
2017	540	711	75.90%	(0.727, 0.791)	23

Recommendations

The Kentucky Heart Disease and Stroke Prevention Task Force along with the Kentucky Department for Public Health developed the Kentucky Heart Disease and Stroke Prevention Strategic Map and Plan for 2017-2019. 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 stroke systems of care in the commonwealth. The following objectives and action items are outlined in the plan and recommended for ongoing development and growth of stroke systems of care in the commonwealth.

Identify and Improve Current Cerebrovascular Systems of Care

- To continue the collaboration with SEQIP and the AHA/ASA to identify and map certified stroke centers by certification levels as defined in KRS 216B.0425 (Comprehensive, Primary, and Acute Stroke Ready) and disseminate to KBEMS;
- To continue the collaboration with SEQIP and the Kentucky Hospital Association's (KHA) Rural Hospital Flexibility Program;
- To educate and partner with Kentucky hospitals to increase appropriate utilization of intravenous therapy (IV) recombinant tissue plasminogen activator (rt-PA);
- To disseminate KBEMS statewide inter-facility stroke transfer protocol during or after IV rt-PA protocol;
- To identify which EMS agencies have a field transport protocol for stroke;
- To partner with KBEMS to determine specific data points available for capture;
- To implement a pilot project for EMS feedback and data sharing utilizing proposed data elements in the Louisville Metro area;
- To continue collaboration with KBEMS Cardiac and Stroke Care subcommittee;
- To enhance EMS interaction and support of dispatch centers;
- To partner with KBEMS for continued development of inter-facility transport protocols for all stroke subtypes.

Continue the Stroke Encounter Quality Improvement Project (SEQIP) through Fiscal Year 2020

- Recruit at least one additional hospital pursuing acute stroke ready certification by March 2020;
- Utilize registry to develop and implement an action plan around quality metrics and education;
- Develop and disseminate Stroke Registry Data Summary in accordance with KRS 211.575.

Continue to Engage Hospitals to become Stroke Certified

- Disseminate the Kentucky State Plan for stroke systems of care and statewide map to target hospitals;
- Monitor and provide support for development of effective stroke program development in target hospitals;
- Update and disseminate KHA stroke resources.

Develop Collaboration Among Healthcare Systems and Public Health in the State to Standardize Messaging

Provide patient and family education regarding:

- Signs and symptoms of stroke;
- The importance of calling 911;
- Primary and secondary prevention of stroke.

Partnerships

KY Board of Emergency Medical Services (KBEMS)

KRS 311A.180 requires emergency medical services directors to establish pre-hospital care protocols for the assessment, treatment, and transport of stroke patients. Specific objectives include:

- Identify and convene experts and partners to guide the statewide approach to definitive treatment of cardiac and stroke cases and recommend project interventions;
- Implement and evaluate a comprehensive acute myocardial infarction (AMI) and stroke access assessment targeting 120 counties in the commonwealth;
- Collaborate with system engineers to analyze EMS system capabilities and the capabilities of regional healthcare facilities and specialty care centers;
- Begin implementation of quality improvement initiatives prioritized by expert groups;
- Identify policy initiatives based on the findings of the assessment and the expert group recommendations;
- Promote and advocate for educational programs, protocol updates, and regionalized EMS system of care;
- Establish a minimum set for cardiac and stroke care that can be reported by EMS systems and healthcare facilities for ongoing research;
- Implement a reassessment to evaluate progress, remaining challenges, clarify questions on the initial assessment, and develop a gap analysis for ongoing evaluation.

Sources

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2. Benjamin EJ, Blaha MJ, Chiuve SE, et al. on behalf of the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics—2017 update: a report from the American Heart Association. *Circulation*. 2017;135:e229-e445.
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Appendix A

KRS 211.575 Statewide system for stroke response and treatment.

(1) As used in this section, "department" means the Department for Public Health.

(2) The Department for Public Health shall establish and implement a plan for achieving continuous quality improvement in the quality of care provided under a statewide system for stroke response and treatment. In implementing the plan, the department shall:

(a) Maintain a statewide stroke database to compile information and statistics on stroke care as follows:

1. The database shall align with the stroke consensus metrics developed and approved by the American Heart Association, the American Stroke Association, the Centers for Disease Control and Prevention, and the Joint Commission;

2. The department shall utilize the "Get With The Guidelines-Stroke" quality improvement program maintained by the American Heart Association and the American Stroke Association or another nationally recognized program that utilizes a data set platform with patient confidentiality standards no less secure than the statewide stroke database established in this paragraph; and

3. Require primary stroke centers as established in KRS 216B.0425 to report to the database each case of stroke seen at the facility. The data shall be reported in a format consistent with nationally recognized guidelines on the treatment of individuals within the state with confirmed cases of stroke;

(b) To the extent possible, coordinate with national voluntary health organizations involved in stroke quality improvement to avoid duplication and redundancy;

(c) Encourage the sharing of information and data among health care providers on methods to improve the quality of care of stroke patients in the state;

(d) Facilitate communication about data trends and treatment developments among health care professionals involved in the care of individuals with stroke;

(e) Require the application of evidence-based treatment guidelines for the transition of stroke patients upon discharge from a hospital following acute treatment to community-based care provided in a hospital outpatient, physician office, or ambulatory clinic setting; and

(f) Establish a data oversight process and a plan for achieving continuous quality improvement in the quality of care provided under the statewide system for stroke response and treatment, which shall include:

1. Analysis of the data included in the stroke database;

2. Identification of potential interventions to improve stroke care in specific geographic regions of the state; and

3. Recommendations to the department and the Kentucky General Assembly for improvement in the delivery of stroke care in the state.

(3) All data reported under subsection (2)(a) of this section shall be made available to the department and all government agencies or contractors of government agencies which are responsible for the management and administration of emergency medical services throughout the state.

(4) On June 1, 2013, and annually on June 1 thereafter, the department shall provide a report of its data and any related findings and recommendations to the Governor and to the Legislative Research Commission. The report also shall be made available on the department's Web site.

(5) Nothing in this section shall be construed to require the disclosure of confidential information or data in violation of the federal Health Insurance Portability and Accountability Act of 1996.

Effective: July 12, 2012

History: Created 2012 Ky. Acts ch. 106, sec. 1, effective July 12, 2012.

Appendix B

KRS 216B.0425 Certification designations for stroke care for acute care hospitals.

(1) Except as otherwise provided, for purposes of this section:

(a) "Acute care hospital" means a licensed facility providing inpatient and outpatient medical or surgical services to an individual that seeks care and treatment, regardless of the individual's ability to pay for services, on an immediate and emergent basis through an established emergency department and a continuous treatment basis on its premises for more than twenty-four (24) hours; and

(b) "Primary stroke center certification," "acute stroke ready hospital certification," and "comprehensive stroke center certification" mean certification for acute care hospitals issued by the Joint Commission, the American Heart Association, or another cabinet-approved nationally recognized organization that provides disease-specific certification for stroke care, that:

1. Complies with census-based national standards and safety goals;
2. Effectively uses evidence-based clinical practice guidelines to manage and optimize care; and
3. Uses an organized approach to measure performance.

(2) The secretary of the Cabinet for Health and Family Services shall designate as a primary stroke center any acute care hospital which has received an acute stroke ready hospital certification, a comprehensive stroke center certification, or a primary stroke center certification.

(3) The secretary shall suspend or revoke an acute care hospital's designation as an acute stroke ready hospital, a comprehensive stroke center, or a primary stroke center if certification is withdrawn by the Joint Commission, the American Heart Association, or another cabinet-approved certifying organization.

(4) (a) The cabinet shall maintain a list of certified acute stroke ready hospitals, comprehensive stroke centers, and primary stroke centers and post the list on its Web site. The cabinet shall provide the list and periodic updates to the Kentucky Board of Emergency Medical Services.

(b) The Kentucky Board of Emergency Medical Services shall share the list with each local emergency medical services provider at least annually, and as new centers and hospitals are designated and certified.

Effective: June 24, 2015

History: Amended 2015 Ky. Acts ch. 9, sec. 1, effective June 24, 2015. -- Created 2010 Ky. Acts ch. 67, sec. 1, effective July 15, 2010.

Appendix C

KRS 311A.180 Medical control documents – Review – Approval – Appeal – Schedule for submission and review.

- (1) Each emergency medical services medical director for an ambulance service, or other emergency medical services provider, shall submit:
 - (a) His or her protocols, including the pre-hospital care protocols related to the assessment, treatment, and transport of stroke patients;
 - (b) His or her standing orders; and
 - (c) Similar medical control documents to the board for approval prior to placing the document in use.
- (2) The medical advisor for the board shall review each document submitted to ascertain if it is in accordance with accepted standards of medical care and in accordance with the provisions of this chapter and administrative regulations promulgated thereunder. If the protocol, standing order, or other medical control document clearly violates the accepted standards of medical care, this chapter, or an administrative regulation, the medical advisor shall notify the emergency medical services medical director of the exact violation and recommend a correction thereof.
- (3) Following review of protocol, standing order, and medical control documents and giving the emergency medical services medical director who submitted the documents an opportunity to review the medical advisor's comments, the medical advisor shall submit the documents together with his or her comments to the board for approval or disapproval.
- (4) The board shall approve, disapprove, or approve with modifications protocol, standing order, and medical control documents submitted by the emergency medical services medical director at its next regular or special meeting following the submission of the documents.
- (5) If a protocol, standing order, or other medical control document is disapproved by the board, the emergency medical services medical director who submitted it may appeal the decision to the Franklin Circuit Court. If the decision of the board is appealed to the Franklin Circuit Court, the board shall bear the burden of proving that the protocol, standing order, or other medical control document violates the accepted standards of medical care, or an administrative regulation.
- (6) The board shall, by administrative regulation, specify a schedule for submission and prompt review and decision making with regard to protocols, standing orders, and medical control documents submitted to the board.

Effective: June 24, 2015

History: Amended 2015 Ky. Acts ch. 9, sec. 2, effective June 24, 2015. -- Created 2002 Ky. Acts ch. 211, sec. 33, effective July 15, 2002.