

# Kentucky Stroke Encounter Quality Improvement Project (SEQIP)

Kentucky Heart Disease and Stroke Prevention Task Force

## 2024 Annual Report



SEQIP Registry 2023 Data Summary  
June 1, 2024



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## Acknowledgements

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Kentucky Department for Public Health (KDPH) employees who contributed to the process and data:

- Adam Berrones, Epidemiologist, Prevention and Quality Improvement
- Lonna Boisseau, Program Manager, Prevention and Quality Improvement
- Samantha Albuquerque, Epidemiologist, Prevention and Quality Improvement
- Breanna Walker, Task Force Coordinator, Prevention and Quality Improvement
- Natalie Littlefield, Health Policy Analyst, Prevention and Quality Improvement

Additional Contributors to Data:

- Kari Moore, Department of Neurology, University of Louisville
- Abigail Loechler, American Heart/Stroke Association

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## Executive Summary

### 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, KHDSPP, and American Heart Association/American Stroke Association (AHA/ASA). The mission of SEQIP is to **advance stroke systems of care** 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

In this year's report:

- Kentucky inpatient hospitalization charges for stroke and transient ischemic attack (TIA) increased in 2022 vs. 2021 by \$43,319,814 (5%)
- Stroke deaths in Kentucky were the number 5 leading killer in 2023
- Compared to USA, the statewide mortality rate in Kentucky ranked 14<sup>th</sup> out of 50 in 2021
- The top 5 counties with the highest number of patient records in the 2023 SEQIP data registry (rate per 10,000)
  1. Letcher (55.8)
  2. Johnson (50.4)
  3. Floyd (48.6)
  4. Pulaski (47.1)
  5. Harlan (46.3)




# Stroke Hospitalizations

## Quantifying Stroke Burden

The true cost burden for families and health care providers is challenging to estimate<sup>1</sup>. A recent report found that the highest average per patient per year cost by country was reported in the United States (\$59,900), followed by Sweden (\$52,725) and Spain (\$41,950)<sup>2</sup>; further, a greater increase in stroke burden has been determined in low-income and middle-income countries versus high-income countries<sup>3</sup>. Over the past three decades, in absolute terms, global stroke incidence increased by 70%, its prevalence increased by 85%, its mortality increased by 43%, and “disability-adjusted life years lost” due to stroke increased by 32%<sup>3</sup>.

Research from the early 2000’s predicted direct medical cost of stroke would increase nationally by 238% from 2010 to 2030, which was a higher percentage increase than that predicted for any other cardiovascular disease, including hypertension, coronary heart disease, or heart failure<sup>4</sup>. Currently, estimations in 2022 of direct and indirect costs for stroke are totaled at \$52.8 billion dollars annually nationally, on average<sup>5</sup>. Stroke financial predictions have come to fruition in devastating fashion.

**Table 1. Inpatient hospital charges for strokes (and TIA) total to nearly \$1B annually for calendar year 2022**

				
2022 Inpatient hospital charges for stroke and TIA* by patient Area Development District (ADD)				
Area Development District	Admissions (count)	Average length of stay (days)	Average Charge (\$)	Total Charges (\$)
01 - Purchase	443	3.93	\$53,467	\$23,685,835
02 - Pennyrile	322	4.65	\$49,871	\$16,058,469
03 - Green River	333	4.97	\$57,461	\$19,134,426
04 - Barren River	696	5.34	\$60,146	\$41,861,639
05 - Lincoln Trail	679	6.23	\$86,380	\$58,651,740
06 - KIPDA	2,325	6.98	\$101,437	\$235,840,057
07 - Northern Kentucky	883	4.79	\$37,099	\$32,758,835
08 - Buffalo Trace	95	6.80	\$85,543	\$8,126,562
09 - Gateway	191	4.71	\$68,147	\$13,016,067
10 - FIVCO	416	5.21	\$67,316	\$28,003,256
11 - Big Sandy	401	6.18	\$82,202	\$32,963,084
12 - Kentucky River	351	7.03	\$84,956	\$29,819,407
13 - Cumberland Valley	604	6.45	\$89,490	\$54,052,003
14 - Lake Cumberland	525	6.86	\$103,858	\$54,525,432
15 - Bluegrass	1,771	6.17	\$98,440	\$174,336,959
Out of State	1,132	6.30	\$101,520	\$114,921,051
<b>Total</b>	<b>11,167</b>	<b>6.05</b>	<b>\$83,976</b>	<b>\$937,754,819</b>

Source: Kentucky Health Facilities and Services Data, Inpatient Admissions, Kentucky Cabinet for Health and Family Services, Office of Data Analytics.  
\*ICD-10 codes: I60-I609, I61-I619, I63-I639, G450-G452, G458-G459.



# Stroke Mortality

## Stroke Death Statistics

A robust epidemiological investigation on USA deaths from 1975 to 2019 among people aged 18 to 84 years showed for both ischemic and hemorrhagic types, and in males and females, a decline in age-standardized stroke mortality rates which leveled off in 2010; the sex disparity in mortality rates narrowed for ischemic stroke, yet widened for hemorrhagic stroke<sup>6</sup>.

Despite this progress, stroke deaths were a top 5 leading cause of death for both Kentucky and the USA in 2023.

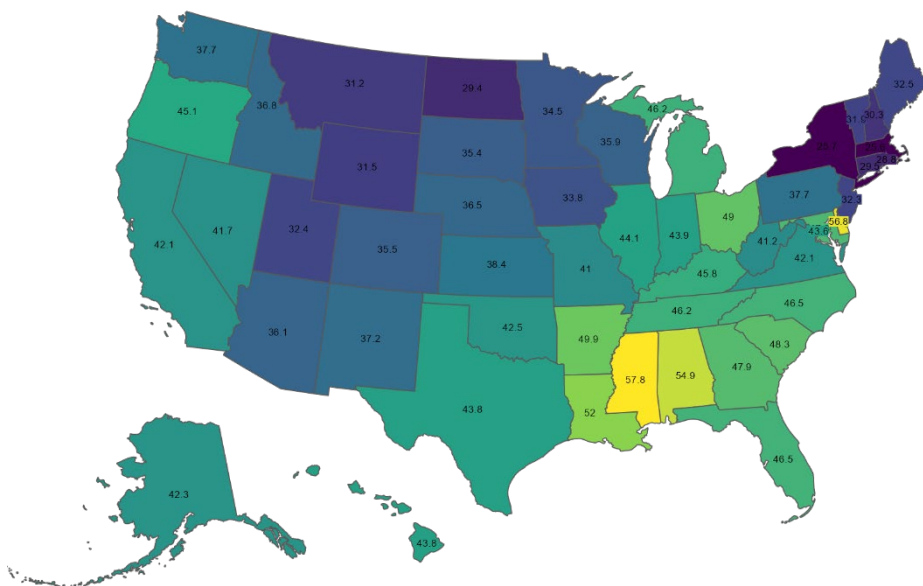
**Table 2. Deaths in Kentucky, 2023 (N = 55,910)** Source: CHFS, Kentucky Office of Vital Statistics

Rank	Kentucky: Top 5 Leading Causes of Death	Deaths	Percent
1	Diseases of heart (I00-I09,I11,I13,I20-I51)	11,227	20.1%
2	Malignant neoplasms (C00-C97)	10,875	19.5%
3	Accidents (unintentional injuries) (V01-X59,Y85-Y86)	4,069	7.3%
4	Chronic lower respiratory diseases (J40-J47)	3,454	6.2%
5	Cerebrovascular diseases (Strokes, I60-I69)	2,332	4.2%

**Table 3. Deaths in USA, 2023 (N = 3,088,346)** Source: CDC Wonder

Rank	USA: Top 5 Leading Causes of Death	Deaths	Percent
1	Diseases of heart (I00-I09,I11,I13,I20-I51)	679,267	22.0%
2	Malignant neoplasms (C00-C97)	613,146	19.9%
3	Accidents (unintentional injuries) (V01-X59,Y85-Y86)	175,513	5.7%
4	Cerebrovascular diseases (Strokes, I60-I69)	162,553	5.3%
5	Chronic lower respiratory diseases (J40-J47)	145,186	4.7%

**Figure 1. Stroke deaths in USA by state, 2021**



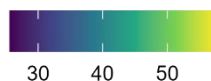
This USA map shows the age-adjusted stroke mortality rate for 2021 per capita.

The bottom five states, in terms of the highest stroke mortality rate includes:

1. Mississippi
2. Delaware
3. Alabama
4. Louisiana
5. Arkansas

Compared against the median value of 41.2 for the nation, **Kentucky in 2021 ranked 14<sup>th</sup> out of 50**, having a stroke mortality rate of 45.8, which is approximately 11% greater than the USA.

Age-adjusted stroke mortality rate for 2021 (per 100,000)



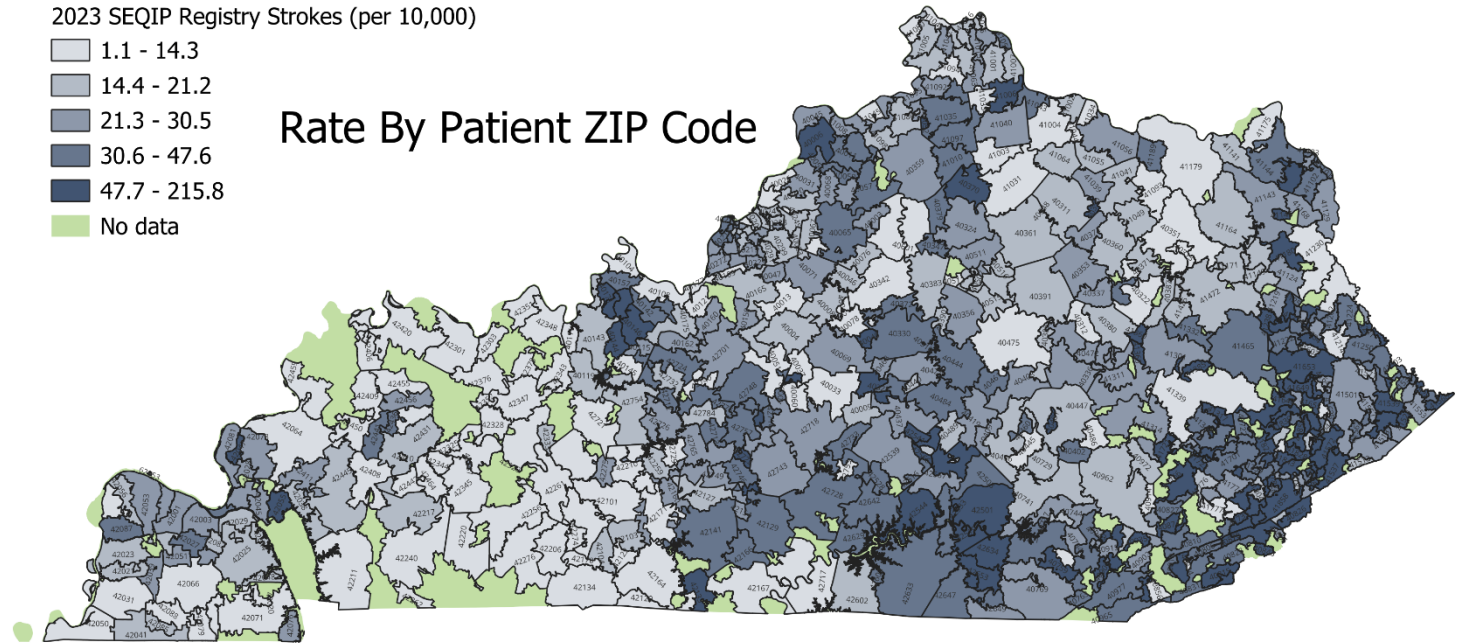
Data Source: CDC Wonder



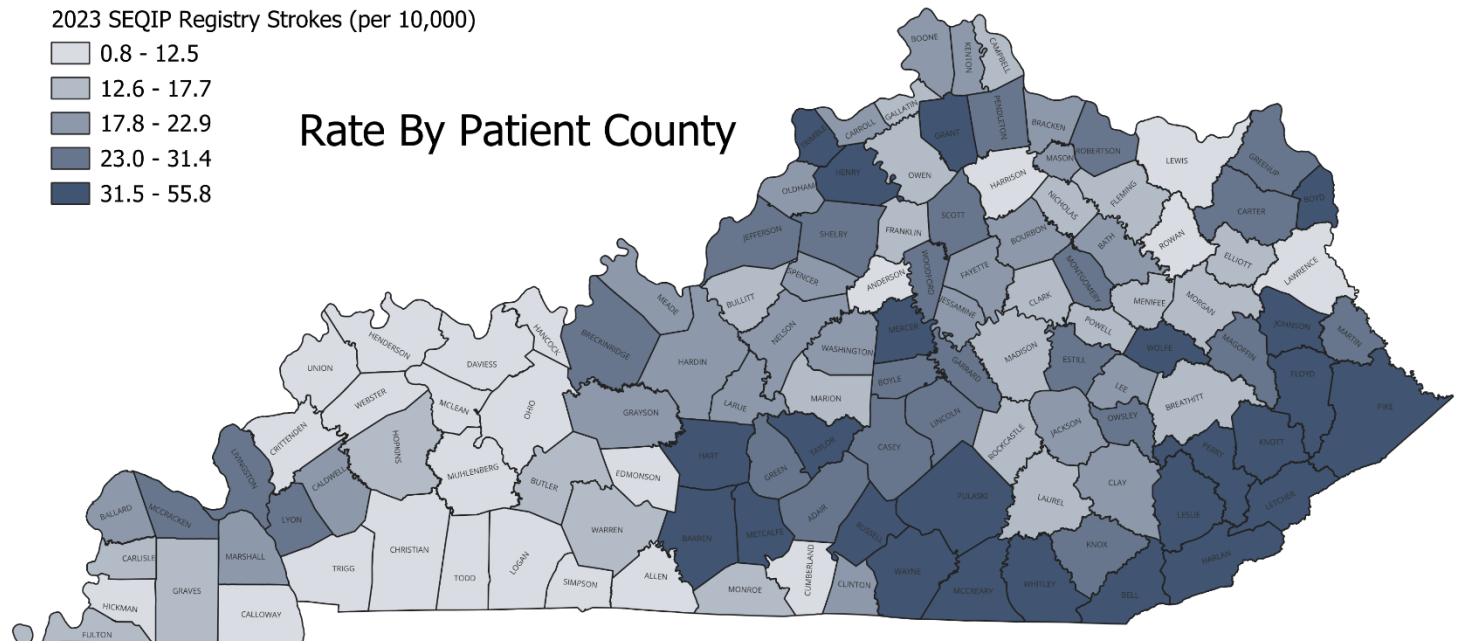
# 2023 Stroke Registry Data

The SEQIP stroke registry contains de-identified records but includes patient ZIP codes. In the below Rate By Patient ZIP Code map, of the 11,828 records in the 2023 registry, 10,907 (92.2%) were able to be linked to valid Kentucky ZIP codes. There were 921 records where the patient ZIP code could not be matched. For the Rate By Patient County map, 9,592 of the 11,828 records (81%) were able to be linked to valid Kentucky counties. There were 2,236 records where the patient county (by way of the ZIP code) could not be matched.

**Figure 2. Rate of strokes in registry, by patient ZIP code per capita (Kentucky residents only)**



**Figure 3. Rate of strokes in registry, by patient county per capita (Kentucky residents only)**



## Main Summary Table

There were 11,828 records in the SEQIP registry for 2023. 42 records were excluded from the below table owing to incompleteness, or age less than 18 years. 99.6% (11,786) of the registry records were included in the below summary analysis. The values in the table represent counts and the percentages (in the parentheses) show the relative proportion for that value within each age group.

Four groups of adult ages were created to highlight data trends across the lifespan; the “Overall” column is on the right.

**Table 4. 2023 SEQIP stroke registry patient demographic information and brief hospitalization summary**

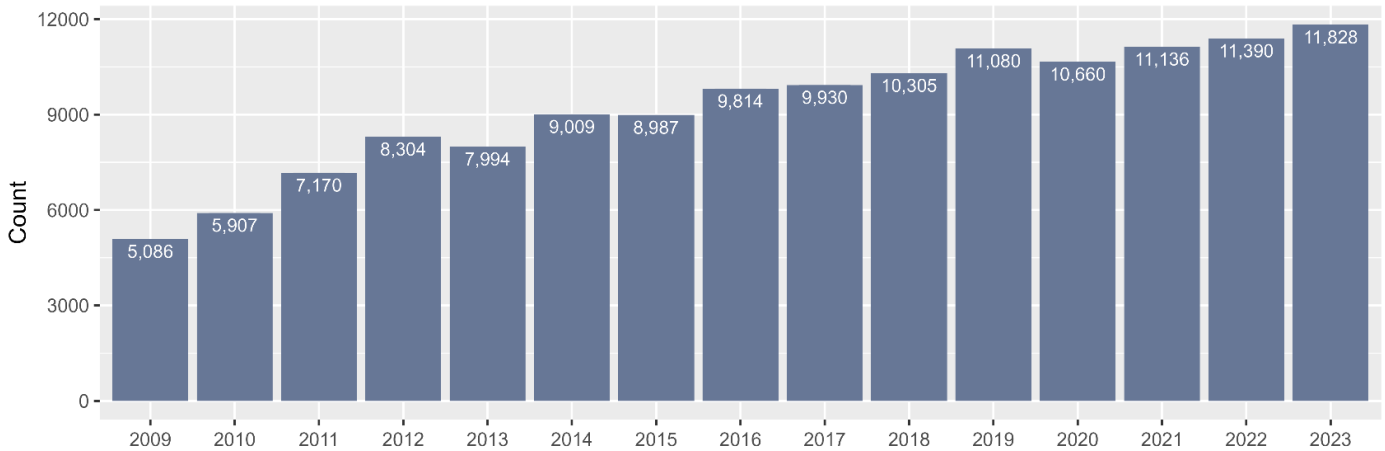
	18 to 45 years (N=747)	46 to 65 years (N=3953)	66 to 85 years (N=5838)	86+ years (N=1248)	Overall (N=11786)
<b>Sex</b>					
Female	364 (48.7%)	1699 (43.0%)	3007 (51.5%)	836 (67.0%)	5906 (50.1%)
Male	383 (51.3%)	2254 (57.0%)	2831 (48.5%)	412 (33.0%)	5880 (49.9%)
<b>Race</b>					
White	579 (77.5%)	3347 (84.7%)	5310 (91.0%)	1177 (94.3%)	10413 (88.4%)
Black	134 (17.9%)	495 (12.5%)	409 (7.0%)	52 (4.2%)	1090 (9.2%)
Unable to determine	22 (2.9%)	63 (1.6%)	79 (1.4%)	10 (0.8%)	174 (1.5%)
Asian/American Indian/Native Hawaiian	12 (1.6%)	48 (1.2%)	40 (0.7%)	9 (0.7%)	109 (0.9%)
<b>Is Hispanic?</b>					
No	723 (96.8%)	3882 (98.2%)	5790 (99.2%)	1239 (99.3%)	11634 (98.7%)
Yes	24 (3.2%)	71 (1.8%)	48 (0.8%)	9 (0.7%)	152 (1.3%)
<b>Body Mass Index</b>					
Mean (SD)	32.7 (8.99)	30.7 (7.79)	28.5 (6.40)	25.1 (6.27)	29.1 (7.29)
Median [Min, Max]	31.5 [15.6, 83.3]	29.7 [9.47, 86.4]	27.8 [11.7, 66.2]	24.5 [10.2, 151]	28.1 [9.47, 151]
Missing	193 (25.8%)	706 (17.9%)	937 (16.1%)	197 (15.8%)	2033 (17.2%)
<b>Stroke Type</b>					
Ischemic Stroke	487 (65.2%)	2972 (75.2%)	4355 (74.6%)	959 (76.8%)	8773 (74.4%)
Hemorrhagic	167 (22.4%)	545 (13.8%)	757 (13.0%)	156 (12.5%)	1625 (13.8%)
Transient Ischemic Attack (< 24 hours)	83 (11.1%)	399 (10.1%)	675 (11.6%)	122 (9.8%)	1279 (10.9%)
Unable to determine	10 (1.3%)	35 (0.9%)	46 (0.8%)	11 (0.9%)	102 (0.9%)
Elective Carotid Intervention only	0 (0%)	2 (0.1%)	5 (0.1%)	0 (0%)	7 (0.1%)
<b>Length of Stay (days)</b>					
Mean (SD)	5.17 (8.84)	5.52 (8.24)	5.13 (6.27)	4.81 (4.47)	5.23 (7.02)
Median [Min, Max]	2.68 [0.0300, 145]	2.99 [0.0300, 107]	3.19 [0.0100, 114]	3.91 [0.0400, 31.7]	3.11 [0.0100, 145]
<b>NIHSS Total Score</b>					
Mean (SD)	5.92 (7.59)	6.12 (7.75)	6.50 (8.27)	8.14 (9.01)	6.51 (8.16)
Median [Min, Max]	3.00 [0, 42.0]	3.00 [0, 42.0]	3.00 [0, 42.0]	5.00 [0, 42.0]	3.00 [0, 42.0]
Missing	74 (9.9%)	228 (5.8%)	344 (5.9%)	100 (8.0%)	746 (6.3%)
<b>Ambulatory Status on Admission</b>					
Able to ambulate independently (no help from another person) w/ or w/o device	227 (30.4%)	1143 (28.9%)	1356 (23.2%)	151 (12.1%)	2877 (24.4%)
Not determined	93 (12.4%)	451 (11.4%)	629 (10.8%)	154 (12.3%)	1327 (11.3%)
Unable to ambulate	60 (8.0%)	336 (8.5%)	684 (11.7%)	179 (14.3%)	1259 (10.7%)
With assistance (from person)	109 (14.6%)	722 (18.3%)	1391 (23.8%)	396 (31.7%)	2618 (22.2%)
Missing	258 (34.5%)	1301 (32.9%)	1778 (30.5%)	368 (29.5%)	3705 (31.4%)
<b>Discharge Status</b>					
Home	413 (55.3%)	2153 (54.5%)	2670 (45.7%)	357 (28.6%)	5593 (47.5%)
Other Health Care Facility	110 (14.7%)	969 (24.5%)	1957 (33.5%)	521 (41.7%)	3557 (30.2%)
Acute Care Facility	143 (19.1%)	479 (12.1%)	587 (10.1%)	99 (7.9%)	1308 (11.1%)
Expired	36 (4.8%)	149 (3.8%)	293 (5.0%)	89 (7.1%)	567 (4.8%)
Hospice	4 (0.5%)	80 (2.0%)	285 (4.9%)	177 (14.2%)	546 (4.6%)
Left Against Medical Advice/AMA	41 (5.5%)	123 (3.1%)	46 (0.8%)	5 (0.4%)	215 (1.8%)



## SEQIP Registry Volume

Participation in the SEQIP data registry is required per KRS 211.575 for all hospitals in Kentucky that are certified stroke centers. Stroke cases are added to the SEQIP registry by individual hospital data abstractors, in real time and after patient discharge. SEQIP collects data on measures related to stroke care that are for the treatment and management of stroke from hospital admission to discharge. The increase in records since 2009 is primarily due an increase in reporting hospitals.

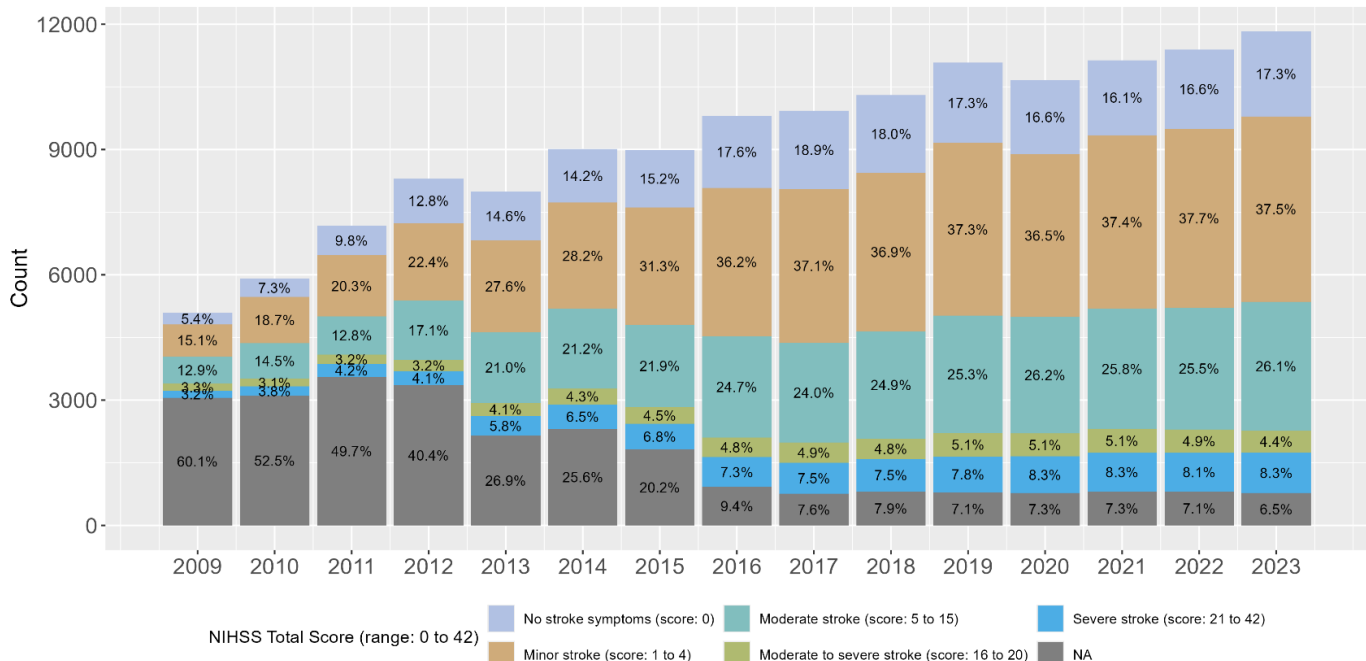
**Figure 4. Number of all patient records by year in the SEQIP stroke registry**



## National Institute of Health Stroke Scale (NIHSS) Score

The cost of stroke management increases with a higher NIHSS score at admission, indicating that more severe cases leads to more complications, increased medication use and lengthier hospital stays, which can explain the high healthcare costs<sup>7</sup>. Further, a higher NIHSS score predicts early mortality<sup>8</sup> and also determines functional outcomes at discharge, as a 6% increase in the odds of inpatient mortality has been associated with a one unit increase in the NIHSS score<sup>9</sup>.

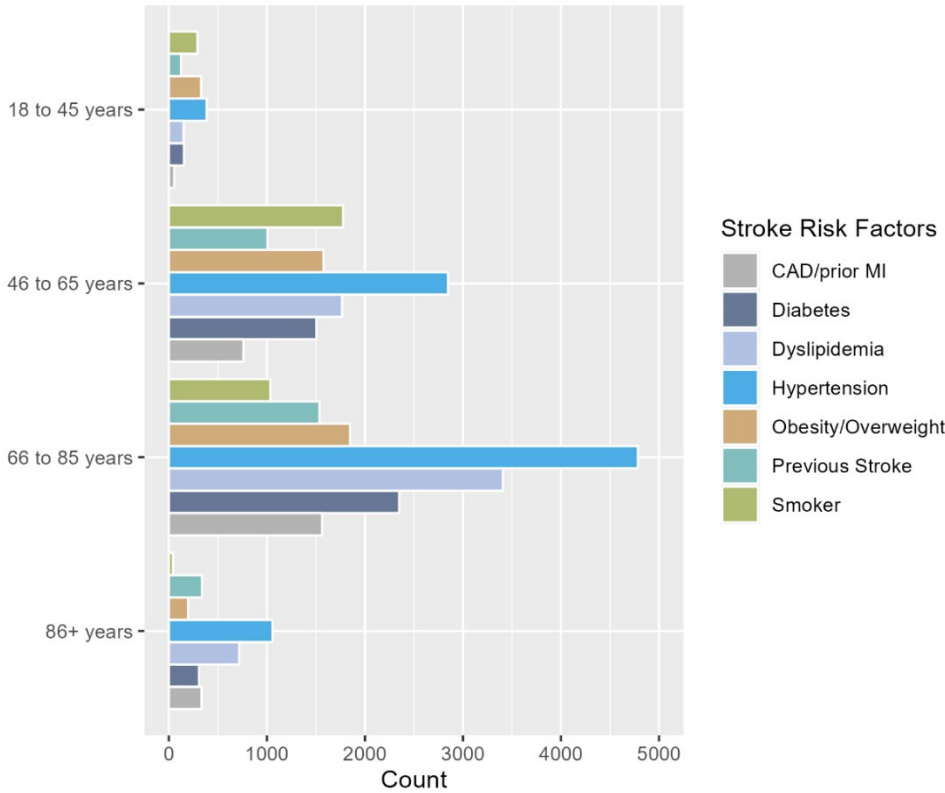
**Figure 5. Distribution of NIHSS scores (range: 0 to 42) grouped by severity in the 2023 SEQIP registry**





## Stroke Risk Factors

Figure 6. SEQIP registry stroke risk factors as identified on patient records



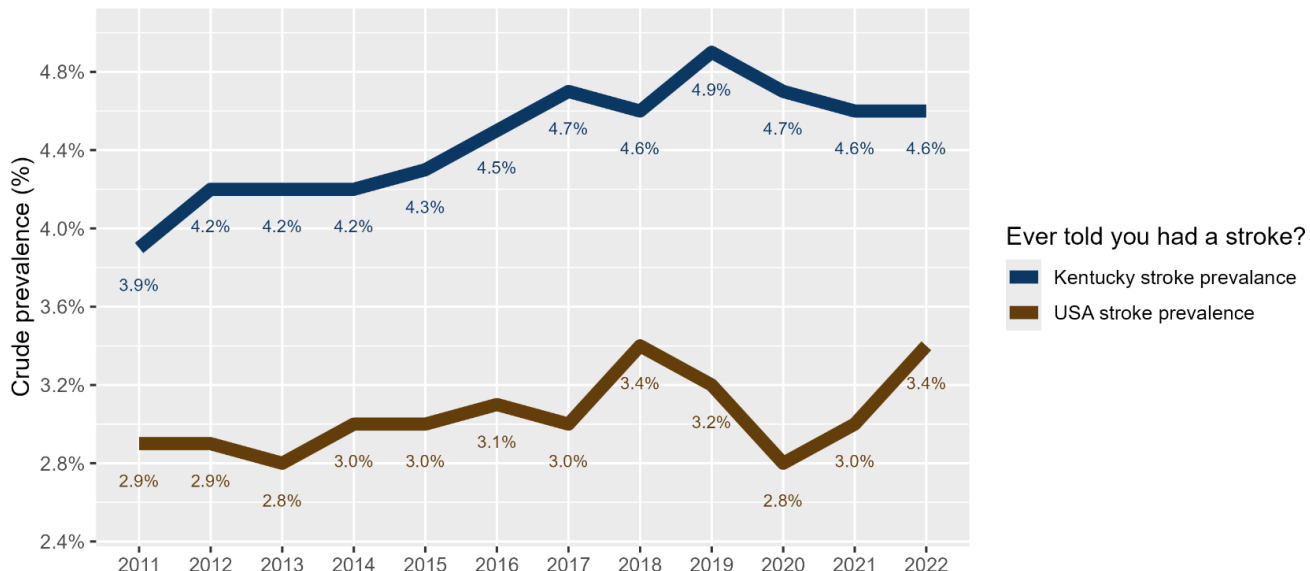
Overall, the national incidence of stroke under 44 years has increased from 5–17 per 100,000 person-years (in the 1990s) to 11–28 in more recent estimates<sup>10</sup>. As aging and genetics (family history) are immutable and arguably the most predictive stroke risk factors<sup>11</sup>, traditionally modifiable risk factors for strokes have been highlighted (in the context of aging using the four groups) with the 2023 SEQIP registry data; for example, hypertension, dyslipidemia, obesity (BMI), smoking, diabetes, previous stroke, and coronary artery disease/prior myocardial infarction<sup>12–14</sup> are also strong predictors of stroke.

The top three stroke risk factors by age group in the 2023 SEQIP registry for **18 to 45 years**: 1) Hypertension, 2) Obesity, 3.) Smoker; for **46 to 65 years**: 1) Hypertension, 2) Smoker, 3) Dyslipidemia; for **66 to 85 years**: 1) Hypertension, 2)

Dyslipidemia, 3) Diabetes; and for **86+ years**: 1) Hypertension, 2) Dyslipidemia, and 3) Previous Stroke. An individual record could have more than one risk factor.

Hypertension was number one stroke risk factor for all age groups in the 2023 SEQIP registry.

Figure 7. Stroke prevalence data from the CDC Behavioral Risk Factor Surveillance System (BRFSS), KY vs. USA



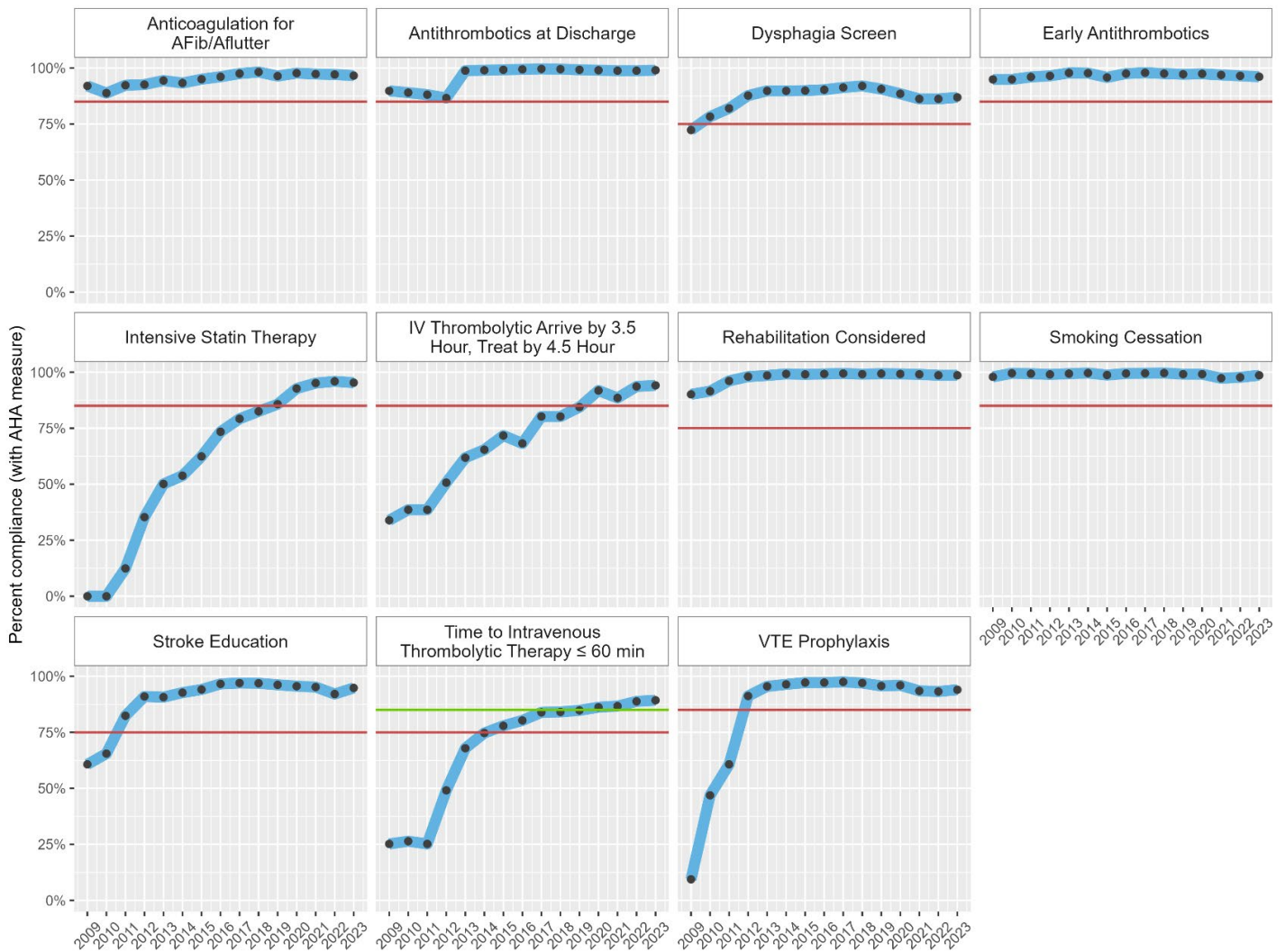
# AHA/ASA Stroke Performance Measures

SEQIP utilizes the performance measures developed by the AHA/ASA’s nationally recognized GWTG®-S hospital-based quality improvement program recognized by The Joint Commission (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.

**Stroke performance measures focus on:** 1) Delivering time sensitive acute stroke therapies to eligible patients, 2) Providing appropriate medications proven to reduce the risk of recurrent stroke, 3) 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, 4), Preventing complications during hospitalization, 5) Providing access to rehabilitation specialists to aid in recovery, and 6) Ensuring appropriate follow up care post hospitalization<sup>15</sup>.

The nationally recognized goals for performance measures by the AHA/ASA and stroke center certifying bodies depend on award status. The levels of achievement (such as Honor Roll vs. Honor Roll Elite/Plus) are indicated by the colored lines, where the **red line** is  $\geq 75\%$  compliance for that measure and the **green line** is  $\geq 85\%$  compliance. SEQIP hospitals met their compliance goals for all 11 measures in 2023.

**Figure 8. GWTG®-S Performance measures in SEQIP registry from 2009 to 2023**

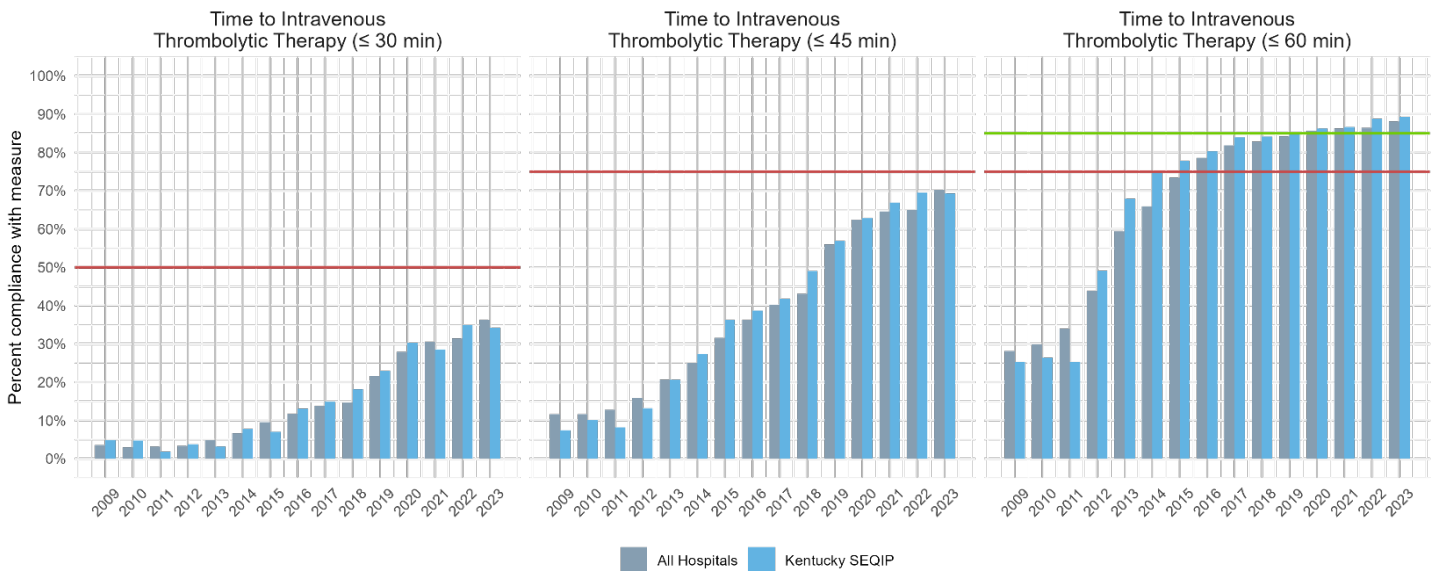


## Reperfusion Therapies

Outcomes are better when faster reperfusion therapies can be delivered to restore blood flow to the brain in the setting of ischemic stroke<sup>16,17</sup>. Hospitals need to have streamlined processes upon EMS arrival to deliver intravenous thrombolytic therapy to appropriate patients. SEQIP member hospitals have made it a priority to deliver the clot-busting drug as soon as safely possible. The national quality measure for door to drug time is  $\leq 60$  minutes, however, national recommendations since 2020 have endorsed a door to drug time of  $\leq 45$  minutes and even  $\leq 30$  minutes when safely possible. SEQIP hospitals are performing well in the effort to “save brain”. The greatest risk with administering the clot-busting drug is bleeding throughout the body or the brain.

The levels of achievement (such as Honor Roll vs. Honor Roll Elite/Plus) are indicated by the colored lines, where the **red line** is  $\geq 75\%$  compliance for that measure and the **green line** is  $\geq 85\%$  compliance.

**Figure 9. Percent of acute ischemic stroke patients receiving intravenous thrombolytic therapy during the hospital stay within 30, 45, and 60 minutes from arrival**



## Patient Arrival Mode

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. 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.

**Table 5. Patient hospital arrival data from the 2023 SEQIP registry**

	18 to 45 years (N=747)	46 to 65 years (N=3953)	66 to 85 years (N=5838)	86+ years (N=1248)	Overall (N=11786)
<b>How Patient Arrived</b>					
EMS from home/scene	232 (31.1%)	1481 (37.5%)	2555 (43.8%)	775 (62.1%)	5043 (42.8%)
Private transport/taxi/other from home/scene	308 (41.2%)	1467 (37.1%)	1970 (33.7%)	269 (21.6%)	4014 (34.1%)
Transfer from other hospital	204 (27.3%)	983 (24.9%)	1278 (21.9%)	202 (16.2%)	2667 (22.6%)
Missing	3 (0.4%)	22 (0.6%)	35 (0.6%)	2 (0.2%)	62 (0.5%)



## Paul Coverdell National Acute Stroke Program Grant

The state of Kentucky 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<sup>®</sup>-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<sup>®</sup>-S data in the absence of a common identifier.**

Working with partners at the Kentucky Board of Emergency Medical Services and participating GWTG<sup>®</sup>-S 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. **We matched 81%, 78%, and 77% of the average 4,500 EMS arrivals in the years 2021-2023, respectively.** This previously unavailable data is being leveraged for quality improvement projects and as a source of peer-reviewed research publications.

## 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 Figure 1, Kentucky had the 14<sup>th</sup> highest mortality rate in the nation for strokes in 2021. Statewide, the cost of stroke care in Kentucky continues to rise with more than \$937 million charged in 2022.

Sustaining stroke systems of care 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 15 years and seen membership grow from 16 to 48 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 KHDSP Task Force Strategic Map and Plan.

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: Biological Variables in 2023 SEQIP Registry

	18 to 45 years (N=747)	46 to 65 years (N=3953)	66 to 85 years (N=5838)	86+ years (N=1248)	Overall (N=11786)
<b>Systolic Blood Pressure (mmHg)</b>					
Mean (SD)	151 (30.9)	156 (31.1)	157 (29.5)	158 (29.7)	156 (30.2)
Median [Min, Max]	147 [85.0, 300]	153 [51.0, 285]	155 [44.0, 272]	158 [67.0, 247]	154 [44.0, 300]
Missing	215 (28.8%)	963 (24.4%)	1439 (24.6%)	305 (24.4%)	2922 (24.8%)
<b>Diastolic Blood Pressure (mmHg)</b>					
Mean (SD)	92.7 (21.1)	90.3 (19.4)	83.5 (18.3)	82.0 (18.0)	86.2 (19.2)
Median [Min, Max]	90.0 [44.0, 170]	89.0 [7.00, 202]	82.0 [7.00, 191]	80.0 [11.0, 166]	85.0 [7.00, 202]
Missing	215 (28.8%)	964 (24.4%)	1442 (24.7%)	307 (24.6%)	2928 (24.8%)
<b>Heart Rate (bpm)</b>					
Mean (SD)	87.0 (17.4)	84.2 (16.6)	80.9 (18.4)	80.0 (17.5)	82.2 (17.8)
Median [Min, Max]	85.0 [50.0, 155]	82.0 [38.0, 156]	78.0 [9.00, 195]	78.0 [41.0, 155]	80.0 [9.00, 195]
Missing	289 (38.7%)	1441 (36.5%)	1980 (33.9%)	415 (33.3%)	4125 (35.0%)
<b>Total Triglycerides (mg/dL)</b>					
Mean (SD)	147 (123)	149 (111)	127 (120)	101 (58.5)	133 (113)
Median [Min, Max]	117 [19.0, 1230]	121 [8.00, 1450]	105 [12.0, 4950]	87.0 [20.0, 664]	108 [8.00, 4950]
Missing	398 (53.3%)	1856 (47.0%)	2678 (45.9%)	587 (47.0%)	5519 (46.8%)
<b>Total Cholesterol (mg/dL)</b>					
Mean (SD)	172 (44.8)	172 (55.6)	156 (48.7)	158 (46.2)	162 (51.2)
Median [Min, Max]	166 [73.0, 409]	167 [49.0, 1120]	150 [17.0, 582]	150 [41.0, 334]	156 [17.0, 1120]
Missing	397 (53.1%)	1855 (46.9%)	2679 (45.9%)	586 (47.0%)	5517 (46.8%)
<b>High-Density Lipoprotein (HDL) Cholesterol (mg/dL)</b>					
Mean (SD)	41.9 (13.6)	41.9 (14.4)	44.7 (14.6)	49.0 (14.8)	44.1 (14.6)
Median [Min, Max]	39.0 [12.0, 126]	39.0 [5.00, 144]	42.0 [5.00, 154]	47.0 [11.0, 126]	42.0 [5.00, 154]
Missing	396 (53.0%)	1857 (47.0%)	2678 (45.9%)	586 (47.0%)	5517 (46.8%)
<b>Low-Density Lipoprotein (LDL) Cholesterol (mg/dL)</b>					
Mean (SD)	102 (37.2)	101 (43.6)	88.0 (48.7)	87.8 (39.1)	93.0 (45.9)
Median [Min, Max]	100 [5.00, 274]	97.0 [5.00, 755]	81.0 [1.00, 1340]	82.0 [8.00, 251]	87.0 [1.00, 1340]
Missing	256 (34.3%)	972 (24.6%)	1379 (23.6%)	301 (24.1%)	2908 (24.7%)
<b>Hemoglobin A1C (%)</b>					
Mean (SD)	6.27 (2.08)	7.31 (15.6)	6.78 (12.2)	6.91 (22.9)	6.95 (14.5)
Median [Min, Max]	5.50 [1.90, 14.5]	5.90 [2.00, 536]	5.90 [3.20, 509]	5.80 [2.20, 606]	5.90 [1.90, 606]
Missing	372 (49.8%)	1614 (40.8%)	2380 (40.8%)	558 (44.7%)	4924 (41.8%)
<b>Fasting Blood Sugar (mg/dL)</b>					
Mean (SD)	141 (80.9)	156 (82.8)	145 (66.6)	135 (50.9)	147 (72.2)
Median [Min, Max]	114 [27.0, 756]	125 [39.0, 929]	124 [14.0, 873]	120 [40.0, 478]	123 [14.0, 929]
Missing	194 (26.0%)	923 (23.3%)	1257 (21.5%)	254 (20.4%)	2628 (22.3%)
<b>International Normalized Ratio (INR)</b>					
Mean (SD)	1.03 (0.184)	1.07 (0.414)	1.13 (0.702)	1.21 (1.01)	1.11 (0.640)
Median [Min, Max]	1.00 [0.800, 3.00]	1.00 [0.800, 13.0]	1.00 [0.800, 24.0]	1.06 [0.800, 22.4]	1.00 [0.800, 24.0]
Missing	338 (45.2%)	1680 (42.5%)	2575 (44.1%)	582 (46.6%)	5175 (43.9%)



## Appendix B: Participating SEQIP Hospitals

List of hospitals whose data contributed to the 2023 SEQIP stroke registry

1	ARH OUR LADY OF THE WAY
2	BAPTIST HEALTH LAGRANGE
3	BAPTIST HEALTH CORBIN
4	BAPTIST HEALTH HARDIN
5	BAPTIST HEALTH LEXINGTON
6	BAPTIST HEALTH LOUISVILLE
7	BAPTIST HEALTH MADISONVILLE (REGIONAL MEDICAL CENTER)
8	BAPTIST HEALTH PADUCAH
9	BARBOURVILLE ARH HOSPITAL
10	CHI SAINT JOSEPH EAST
11	CHI ST. JOSEPH HEALTHCARE - KENTUCKY
12	DEACONESS HENDERSON HOSPITAL
13	EPHRAIM MCDOWELL REGIONAL MEDICAL CENTER
14	GEORGETOWN COMMUNITY HOSPITAL
15	GREENVIEW REGIONAL HOSPITAL (TRISTAR)
16	HARLAN ARH HOSPITAL
17	HAZARD ARH REGIONAL MEDICAL CENTER
18	HIGHLANDS REGIONAL MEDICAL CENTER
19	KING'S DAUGHTERS MEDICAL CENTER
20	LAKE CUMBERLAND REGIONAL HOSPITAL
21	MARY BRECKINRIDGE ARH HOSPITAL
22	MCDOWELL ARH HOSPITAL
23	MERCY HEALTH LOURDES HOSPITAL
24	MIDDLESBORO ARH HOSPITAL
25	MORGAN COUNTY ARH HOSPITAL
26	NORTON AUDUBON HOSPITAL
27	NORTON BROWNSBORO HOSPITAL
28	NORTON HOSPITAL
29	NORTON WOMEN'S AND CHILDREN'S HOSPITAL
30	OWENSBORO HEALTH
31	PAINTSVILLE ARH HOSPITAL
32	PIKEVILLE MEDICAL CENTER
33	ST. ELIZABETH EDGEWOOD
34	ST. ELIZABETH FLORENCE
35	ST. ELIZABETH FT. THOMAS
36	STS. MARY AND ELIZABETH HOSPITAL
37	SUMMERS COUNTY ARH HOSPITAL
38	T.J. SAMSON COMMUNITY HOSPITAL
39	THE MEDICAL CENTER AT BOWLING GREEN - KENTUCKY
40	THE MEDICAL CENTER AT CAVERNA
41	THE MEDICAL CENTER AT FRANKLIN
42	THE MEDICAL CENTER AT SCOTTSVILLE
43	TUG VALLEY ARH REGIONAL MEDICAL CENTER
44	UNIVERSITY OF KENTUCKY HOSPITAL
45	UNIVERSITY OF LOUISVILLE HOSPITAL
46	UOFL HEALTH - JEWISH HOSPITAL
47	UOFL HEALTH - SHELBYVILLE
48	WHITESBURG ARH HOSPITAL



# Appendix C: SEQIP Infographic

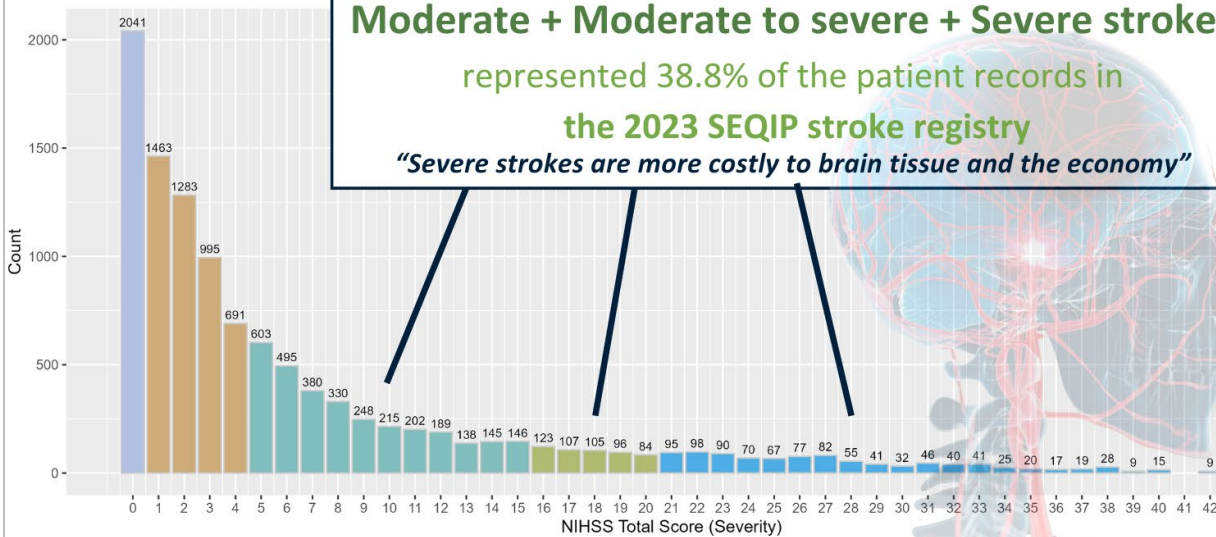
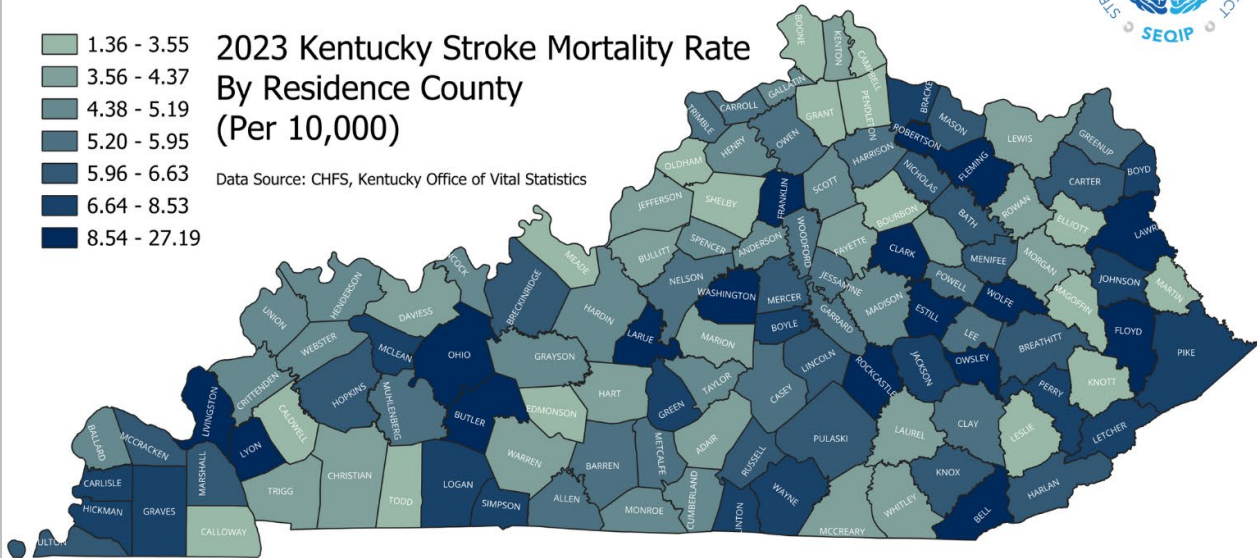
## KENTUCKY STROKE ENCOUNTER QUALITY IMPROVEMENT PROJECT (SEQIP)



**2023 Kentucky Stroke Mortality Rate By Residence County (Per 10,000)**

- 1.36 - 3.55
- 3.56 - 4.37
- 4.38 - 5.19
- 5.20 - 5.95
- 5.96 - 6.63
- 6.64 - 8.53
- 8.54 - 27.19

Data Source: CHFS, Kentucky Office of Vital Statistics



**Moderate + Moderate to severe + Severe strokes represented 38.8% of the patient records in the 2023 SEQIP stroke registry**  
*“Severe strokes are more costly to brain tissue and the economy”*

- No stroke symptoms (score: 0)
- Minor stroke (score: 1 to 4)
- Moderate stroke (score: 5 to 15)
- Moderate to severe stroke (score: 16 to 20)
- Severe stroke (score: 21 to 42)

SEQIP was created in 2009 as a voluntary statewide stroke quality improvement initiative of the Kentucky Heart Disease and Stroke Prevention Task Force, KHDSF, and AHA/ASA.



**Kentucky Public Health**  
Prevent. Promote. Protect.

In this year’s report data from 48 participating hospitals were included.

