OSHPD Technical Note for Producing Ischemic Stroke: Hospital Outcomes in California, 2012-2013

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The stroke mortality risk model used in this report was developed through a multi-step process that included conducting a literature review, convening an expert panel, selecting candidate outcome measures, defining the study cohort, selecting risk factors for the risk model, estimating and testing statistical models, and calculating outcome measures. The details of this process are described in the report "Ischemic Stroke Outcomes Validation Study in California, 2006-2009," which is available on the Office of Statewide Health Planning and Development (OSHPD) website: http://www.oshpd.ca.gov. In this technical note, we summarize the key information regarding data sources, selection of hospitals and patients, the mortality measure and risk factors, the readmission measure and risk factors, patient demographic characteristics, risk model performance, and limitations of the methods.

Data Sources

The primary data source for this report was the California Patient Discharge Data (PDD) collected by OSHPD. For this report, stroke patients were selected from 2012 and 2013 PDD files. To identify deaths that occurred after discharge, the PDD was matched to 2012 and 2013 California death certificate records (Death Statistical Master File) obtained from the California Department of Public Health, using patients' Social Security Numbers as the common identifier in both datasets.

Selection of Hospitals

A total of 322 acute care hospitals reporting patient discharge data to OSHPD were eligible for inclusion. In cases of hospital consolidation, name change, and change of address, the discharges were attributed to the name of hospital that was in effect at the time the services were provided. Some hospitals were excluded from performance reporting because they treated a small number of ischemic stroke cases. Table 1 shows 48 hospitals with fewer than 30 ischemic stroke admissions during 2012 - 2013. A total of 532 ischemic stroke patients were reported from these hospitals during the time period, with 69 deaths and 70 readmissions. The small number of cases resulted in risk-adjusted rates with extremely wide confidence intervals that could not be meaningfully interpreted; therefore, risk-adjusted outcome rates and performance ratings are not provided for these hospitals.

Table 1. Hospitals with Fewer than 30 Stroke Admissions during 2012-2013

County	Hospital	Number of Stroke Cases	Number of Deaths	Number of Readmissions
Butte	Biggs Gridley Memorial Hospital	14	6	4
Colusa	Colusa Regional Medical Center	14	1	0
Fresno	Coalinga Regional Medical Center	7	1	0
Fresno	Adventist Medical Center - Reedley	21	4	1
Fresno	Fresno Heart and Surgical Hospital	2	0	0

Table 1. Hospitals with Fewer than 30 Stroke Admissions during 2012-2013

County	Hospital	Number of Stroke Cases	Number of Deaths	Number of Readmissions
Glenn	Glenn Medical Center	3	0	1
Inyo	Northern Inyo Hospital	17	3	3
Inyo	Southern Inyo Hospital	1	0	0
Kern	Delano Regional Medical Center	23	7	3
Kern	Kern Valley Healthcare District	8	1	2
Kings	Corcoran District Hospital	1	0	0
Lake	Saint Helena Hospital – Clearlake	6	1	0
Lassen	Banner Lassen Medical Center	6	1	0
Los Angeles	Bellflower Medical Center	4	0	0
Los Angeles	Tri-City Regional Medical Center – Hawaiian Gardens	23	0	4
Los Angeles	East Los Angeles Doctors Hospital	22	1	1
Los Angeles	East Valley Hospital Medical Center	16	2	4
Los Angeles	Hollywood Community Hospital	19	1	4
Los Angeles	Motion Picture and Television Hospital	4	1	0
Los Angeles	Norwalk Community Hospital	27	0	3
Los Angeles	Silver Lake Medical Center – Downtown Campus	20	1	3
Los Angeles	Coast Plaza Hospital	24	2	5
Los Angeles	Los Angeles Metropolitan Medical Center	8	0	5
Mariposa	John C. Fremont Healthcare District	3	1	0

Table 1. Hospitals with Fewer than 30 Stroke Admissions during 2012-2013

County	Hospital	Number of Stroke Cases	Number of Deaths	Number of Readmissions
Merced	Memorial Hospital Los Banos	7	4	0
Modoc	Modoc Medical Center	8	0	0
Mono	Mammoth Hospital	2	0	0
Monterey	George L. Mee Memorial Hospital	6	2	1
Nevada	Tahoe Forest Hospital	12	0	1
Orange	Anaheim General Hospital	9	0	4
Orange	Chapman Medical Center	16	1	5
Orange	Western Medical Center – Anaheim	11	1	0
Orange	Coastal Communities Hospital	22	1	1
Orange	Mission Hospital Laguna Beach	13	3	3
Plumas	Eastern Plumas Hospital – Portola Campus	4	2	1
Plumas	Plumas District Hospital	3	1	0
Plumas	Seneca Healthcare District	6	3	1
Riverside	Palo Verde Hospital	8	1	0
Riverside	Temecula Valley Hospital	3	0	0
San Bernardino	Bear Valley Community Hospital	3	1	0
San Bernardino	Montclair Hospital Medical Center	29	2	3
San Bernardino	Colorado River Medical Center	2	0	0
San Diego	Fallbrook Hospital District	23	2	2
Santa Barbara	Goleta Valley Cottage Hospital	5	3	0
Santa Barbara	Santa Ynez Valley Cottage Hospital	6	4	0

Table 1. Hospitals with Fewer than 30 Stroke Admissions during 2012-2013

County	Hospital	Number of Stroke Cases	Number of Deaths	Number of Readmissions
Shasta	Mayers Memorial Hospital	8	0	0
Siskiyou	Mercy Medical Center Mt. Shasta	29	4	4
Trinity	Trinity Hospital	4	0	1

Selection of Patients

Patients were selected for this analysis if these inclusion and exclusion criteria were met:

Inclusion Criteria

- Admission date between January 1, 2012 and November 30, 2013
- Age at admission of 18 years and older
- Principal ICD-9-CM diagnosis code for ischemic stroke (Table 2)

Table 2. Ischemic Stroke Diagnoses Included in the Analysis

ICD-9-CM Code	ICD-9-CM Description
433.01	Occlusion and stenosis of basilar artery with cerebral infarction
433.11	Occlusion and stenosis of carotid artery with cerebral infarction
433.21	Occlusion and stenosis of vertebral artery with cerebral infarction
433.31	Occlusion and stenosis of multiple and bilateral precerebral arteries with cerebral infarction
433.81	Occlusion and stenosis of other specified precerebral artery with cerebral infarction
433.91	Occlusion and stenosis of unspecified precerebral artery with cerebral infarction
434.00	Cerebral thrombosis without mention of cerebral infarction
434.01	Cerebral thrombosis with cerebral infarction
434.11	Cerebral embolism with cerebral infarction
434.91	Cerebral artery occlusion unspecified with cerebral infarction
436	Acute, but ill-defined, cerebrovascular disease

Exclusion Criteria

- Principal ICD-9-CM diagnosis code for hemorrhagic stroke (ICD-9 codes 430, 431, and 432)
- Evidence of prior ischemic stroke or hemorrhagic stroke within 180 days of the stroke admission
- Transfer from within the hospital or from another acute care hospital (hospital-to-hospital transfer)
- Treatment at a hospital other than a general acute care hospital [i.e., hospitals without emergency rooms, children's hospitals, and long-term acute care facilities]

Outcome Measures

We measured the quality of hospital care provided by calculating hospital 30-day all-cause risk-adjusted mortality rates (RAMR) and 30-day all-cause risk-adjusted readmission rates (RARR) for patients with ischemic stroke.

The Hospital 30-day RAMR includes deaths from any cause within 30 days of the index stroke admission. It was chosen as the central outcome for this report because it is a reliable, well-defined, and easily validated performance measure. Use of 30-day mortality versus inpatient mortality is preferred for two reasons: 1) 30 days is a more consistent time frame because length of hospital stay varies across patients and types of hospitals, and 2) hospitals cannot "game" their outcomes by discharging patients who might die in the hospital prior to the 30-day mark. Deaths occurring beyond 30 days are not included because they are less likely to be related to the care received in the hospital. Dates of death were determined by linking the PDD to California death certificate records using Social Security Numbers.

The Hospital 30-day RARR includes readmissions for any cause to any acute care hospital within 30 days of being discharged alive after treatment for ischemic stroke. Patients who were transferred from one hospital to another during the acute stroke episode are not considered to have been readmitted. This outcome is considered both a measure of hospital quality and a marker of resource utilization. Within the 30-day time frame, readmissions are often due to the care received during the index hospitalization and the subsequent transition to the outpatient setting.

Readmissions are costly to the healthcare system and are burdensome to patients and their caregivers. Measuring and reporting readmission rates across hospitals can reveal opportunities for quality improvement and reducing costs in the healthcare system. Hospitals may be able to lower readmission rates by both improving patient care and better planning for patients' needs once they leave the hospital. Similar mortality and readmission measures have been used by the Centers for Medicare and Medicaid Services (CMS) to modify hospital payments based on performance.

How the Outcomes were Measured

OSHPD used a multivariable logistic regression model to determine the relationship between each of the risk factors and the probability of 30-day mortality or 30-day readmission while controlling for all other risk factors in the model.

Risk-adjustment: To make fair comparisons among different hospitals, the 30-day mortality and 30-day readmission rates were adjusted for risk factors including patient demographics, source of admission, stroke severity, and comorbidities that are known to influence the patient's risk of death or readmission. Hospitals with higher-risk patients are more likely to have higher death and readmission rates than hospitals with lower-risk patients, even when the medical care given is appropriate. Therefore, it is necessary to adjust for differences in the severity of patient illness across hospitals. Hospitals with more complex cases receive a larger risk-adjustment weight in the risk model than those hospitals with less complex cases. Thus, hospitals treating sicker patients are not at a disadvantage when their performance is compared with other hospitals.

Validation: Before developing the model, OSHPD contracted with the University of California, Los Angeles to conduct the validation study, "Ischemic Stroke Outcomes Validation Study in California, 2006-2009," (www.oshpd.ca.gov) to determine whether existing data elements in the PDD could be used to develop valid measures of ischemic stroke quality. The study found that a risk-adjusted mortality measure based on the existing data at OSHPD was a feasible, reliable and valid measure of hospital stroke quality. The investigators found that important clinical processes and independent measures of stroke care quality were statistically significantly related to this patient outcome. Establishing the process-outcome link is important towards validating the outcome measures as reflective of the care provided. This is especially important in the stroke domain, where some stroke injury and sequale may be reversed by utilizing standard processes of care immediately following a stroke.

Risk Factors for Ischemic Stroke Outcomes: Risk factors, including patient demographics, hospitalization characteristics, stroke severity and comorbidities, were selected for the

ischemic stroke model. Risk factors that appeared not to significantly lower the risk of death or readmission were eliminated from further analysis unless prior literature or clinical experience suggested a reason for this relationship.

Patient Demographic and Hospitalization Characteristics

During 2012 to 2013, slightly more women (51.17%) than men (48.83%) were admitted for ischemic strokes. Most patients were White non-Hispanic (56.47%) followed by Hispanic (19.46%), Asian/Pacific Islander (10.67%), and Black (9.89%). Ischemic strokes occur most often in adults 65 years of age and older, who accounted for 69.98% of ischemic stroke patients (Table 3).

Table 3. Demographic Characteristics of Ischemic Stroke Patients

	Number	Percent (%)
Statewide	70,447	
SEX		
Male	34,396	48.83
Female	36,051	51.17
AGE GROUP		
18-44	2,438	3.46
45-64	17,807	26.56
65+	49,302	69.98
RACE/ETHNICITY		
White	39,780	56.47
Black	6,970	9.89
Hispanic	13,711	19.46
Asian/Pacific Islander	7,515	10.67
Other	2,471	3.51
EXPECTED PAYER		
Medicare	47,462	67.37
Medi-Cal	6,410	9.10
Private	11,387	16.16
Self Pay	2,394	3.40
Other	2,794	3.97

Risk-Adjustment Models

Table 4 shows the parameter estimates, odds ratios (ORs), and confidence intervals (CIs) for the risk factors in the 2012-2013 ischemic stroke 30-day mortality model. The strongest predictors of death were: diagnosis of metastatic cancer (OR=6.847), cardiopulmonary arrest (OR=6.640), decreased consciousness/altered mental status/coma (OR=4.541), and bleeding disorders (OR=2.571). Several conditions (e.g., hypertension) that clinically would be expected to increase the risk of death, were associated with a lower risk of mortality. Many of the counterintuitive findings seen in this analysis are likely explained by prior studies that found coding bias primarily responsible – patients who are severely ill and in the process of dying will have more severe acute conditions or complications that take precedence in coding over chronic diseases[1].

[1] Iezzoni LI, Foley SM, Daley J, Hughes J, Fisher ES, Heeren T. Comorbidities, complications, and coding bias. Does the number of diagnosis codes matter in predicting in-hospital mortality? *JAMA* 1992; 267:2197-203.

Table 4. Parameters for 30-Day Mortality Model

Risk Variables	Coefficient	Standard Error	P Value	Odds Ratio	95% CI for Odds Ratio
Intercept	-7.557	0.125	<.0001		
Age (Years)	0.059	0.001	<.0001	1.060	1.057-1.063
Male	-0.038	0.030	0.204	0.963	0.909-1.021
Black	-0.489	0.061	<.0001	0.613	0.544-0.690
Hispanic	-0.176	0.040	<.0001	0.838	0.775-0.908
Asian	-0.331	0.050	<.0001	0.718	0.652-0.792
Other Race/Ethnicity	0.021	0.076	0.788	1.021	0.879-1.185
Emergency Department (ED) Transfer	0.284	0.065	<.0001	1.328	1.168-1.510
Hospital - Hospital (HH) Transfer	0.110	0.066	0.097	1.116	0.980-1.271
ED + HH Transfer	-0.405	0.275	0.140	0.667	0.389-1.143
Source of Admission - Skilled Nursing	0.583	0.046	<.0001	1.791	1.637-1.960
Source of Admission - Other	0.161	0.084	0.056	1.174	0.996-1.384
Aphasia	0.222	0.032	<.0001	1.248	1.173-1.329
Hemiplegia/Hemiparesis	0.234	0.040	<.0001	1.264	1.170-1.366
Other Paralysis	-0.290	0.143	0.042	0.748	0.565-0.990
Hemineglect	0.153	0.100	0.126	1.165	0.958-1.417
Vision Loss	-0.248	0.078	0.002	0.780	0.669-0.910
Apraxia	-0.705	0.233	0.002	0.494	0.313-0.780
Decreased Consciousness, Altered Mental Status, Coma	1.513	0.052	<.0001	4.541	4.099-5.032
Seizure or Seizure Disorder	0.432	0.055	<.0001	1.540	1.383-1.714

Table 4. Parameters for 30-Day Mortality Model

Risk Variables	Coefficient	Standard Error	P Value	Odds Ratio	95% CI for Odds Ratio
Conjugate Deviation of Eyes	0.587	0.350	0.094	1.798	0.905-3.570
Other Cerebral Ischemic Signs or Symptoms	-0.288	0.107	0.007	0.750	0.609-0.924
Perenteral Nutrition	0.225	0.183	0.218	1.253	0.875-1.793
Dysphagia	0.158	0.035	<.0001	1.171	1.093-1.255
Admission Elevated Glucose	-0.148	0.085	0.080	0.862	0.730-1.018
Acute Myocardial Infarction	0.677	0.076	<.0001	1.969	1.696-2.286
Left–sided Valvular Heart Disease	-0.018	0.114	0.873	0.982	0.785-1.228
Right–sided Valvular Heart Disease	-0.524	0.108	<.0001	0.592	0.479-0.732
Atrial Fibrillation	0.511	0.030	<.0001	1.667	1.573-1.768
Cardiopulmonary Arrest	1.893	0.057	<.0001	6.640	5.938-7.424
Systolic Heart Failure	-0.489	0.502	0.330	0.613	0.229-1.640
History of CHF (Left Heart Failure, Cardiomyopathy)	0.278	0.035	<.0001	1.320	1.233-1.414
Any Ischemic Heart Disease: CAD, Angina, AMI, prior MI	-0.034	0.033	0.311	0.967	0.906-1.032
Dementia or Alzheimer's Disease	0.194	0.048	<.0001	1.214	1.104-1.334
Low Platelet Count	0.147	0.184	0.424	1.159	0.808-1.661
Bleeding Disorders (no platelet disorders)	0.944	0.167	<.0001	2.571	1.854-3.564
Anticoagulation*					
Hypercoagulable State	0.137	0.158	0.386	1.147	0.841-1.564
Falls	-0.040	0.064	0.537	0.961	0.848-1.090

Table 4. Parameters for 30-Day Mortality Model

Risk Variables	Coefficient	Standard Error	P Value	Odds Ratio	95% CI for Odds Ratio
Current Smoker	-0.090	0.041	0.027	0.914	0.843-0.990
Recurrent Strokes	0.167	0.052	0.001	1.181	1.066-1.309
Former TIA	-0.189	0.086	0.028	0.828	0.699-0.980
TIA Resolved	0.114	0.046	0.014	1.120	1.023-1.227
Fever 48 h	0.661	0.120	<.0001	1.936	1.529-2.451
Pulmonary Circulation Disease	0.114	0.070	0.105	1.121	0.977-1.287
Peripheral Vascular Disease	0.014	0.041	0.739	1.014	0.935-1.099
Hypertension	-0.129	0.036	0.000	0.879	0.820-0.943
Paralysis	0.866	0.044	<.0001	2.378	2.181-2.592
Chronic Pulmonary Disease	0.096	0.039	0.013	1.101	1.020-1.187
Diabetes w/o Chronic Complications	0.026	0.035	0.454	1.027	0.958-1.100
Diabetes w/ Chronic Complications	-0.046	0.054	0.388	0.955	0.860-1.060
Renal Failure	0.161	0.036	<.0001	1.174	1.094-1.260
Liver Disease	0.186	0.114	0.102	1.205	0.964-1.506
Chronic Peptic Ulcer Disease	0.276	0.578	0.633	1.317	0.424-4.088
Acquired Immune Deficiency Syndrome	0.725	0.709	0.306	2.065	0.515-8.279
Lymphoma	0.751	0.179	<.0001	2.119	1.493-3.007
Metastatic Cancer	1.924	0.083	<.0001	6.847	5.825-8.048
Solid Tumor w/out Metastasis	0.717	0.087	<.0001	2.047	1.728-2.426

Table 4. Parameters for 30-Day Mortality Model

Risk Variables	Coefficient	Standard Error	P Value	Odds Ratio	95% CI for Odds Ratio
Rheumatoid Arthritis/Collagen Vas	0.140	0.084	0.095	1.150	0.976-1.355
Weight Loss	0.356	0.061	<.0001	1.427	1.266-1.608
Fluid and Electrolyte Disorders	0.337	0.034	<.0001	1.400	1.310-1.496
Chronic Blood Loss Anemia	-0.377	0.222	0.089	0.686	0.444-1.060
Deficiency Anemia	-0.123	0.038	0.001	0.885	0.821-0.953
Alcohol Abuse	0.059	0.082	0.467	1.061	0.904-1.245
Drug Abuse	0.332	0.107	0.002	1.394	1.131-1.717
Psychoses	-0.060	0.072	0.400	0.941	0.818-1.084

*Parameters could not be estimated accurately since all two patients with condition survived.

Table 5 shows the parameter estimates, ORs, and CIs for the risk factors in the 2012-2013 ischemic stroke 30-day readmissions model. The strongest predictors of 30-day readmissions were: diagnosis of metastatic cancer (OR=1.808), Hospital-Hospital (HH) transfer (OR=1.752), Chronic Blood Loss Anemia (OR=1.679), Perenteral Nutrition (OR=1.562) and Fever 48 hr (OR=1.522).

Table 5. Parameters for Readmission Model

Risk Variables	Coefficient	Standard Error	P Value	Odds Ratio	95% CI for Odds Ratio
Intercept	-2.600	0.070	<.0001		
Age (Years)	0.000	0.001	0.631	1.000	0.999-1.002
Black	0.182	0.039	<.0001	1.199	1.110-1.296
Hispanic	0.096	0.032	0.002	1.101	1.035-1.171
Asian	0.130	0.039	0.001	1.139	1.055-1.229
Hospital - Hospital Transfer	0.284	0.055	<.0001	1.328	1.193-1.478
ED + HH Transfer	0.561	0.179	0.002	1.752	1.234-2.489
Hemineglect	-0.308	0.122	0.011	0.735	0.579-0.933
Vision Loss	0.086	0.064	0.182	1.090	0.961-1.236
Seizure or Seizure Disorder	0.208	0.049	<.0001	1.231	1.118-1.356
Perenteral Nutrition	0.446	0.190	0.019	1.562	1.076-2.268
Dysphagia	0.219	0.033	<.0001	1.245	1.166-1.328
Acute Myocardial Infarction	0.207	0.078	0.008	1.230	1.056-1.434
Cardiopulmonary Arrest	0.354	0.078	<.0001	1.425	1.223-1.661
History of CHF (L Heart Failure, Cardiomyopathy)	0.170	0.033	<.0001	1.185	1.112-1.263
Any Ischemic Heart Disease: CAD, Angina, AMI, prior MI	0.131	0.029	<.0001	1.140	1.077-1.206
Bleeding Disorders (no platelet disorders)	0.122	0.194	0.530	1.129	0.773-1.650
Recurrent Strokes	0.200	0.043	<.0001	1.221	1.122-1.329
TIA Resolved	0.231	0.039	<.0001	1.260	1.167-1.361
Fever 48 hr	0.420	0.120	0.001	1.522	1.202-1.927

Table 5. Parameters for Readmission Model

Risk Variables	Coefficient	Standard Error	P Value	Odds Ratio	95% CI for Odds Ratio
Pulmonary Circulation Disease	0.222	0.066	0.001	1.249	1.097-1.421
Peripheral Vascular Disease	0.150	0.036	<.0001	1.162	1.084-1.247
Hypertension	0.093	0.031	0.003	1.097	1.032-1.166
Paralysis	0.273	0.033	<.0001	1.313	1.230-1.402
Chronic Pulmonary Disease	0.153	0.034	<.0001	1.165	1.091-1.244
Diabetes w/o Chronic Complications	0.151	0.028	<.0001	1.163	1.100-1.229
Diabetes w/ Chronic Complications	0.172	0.040	<.0001	1.188	1.097-1.285
Renal Failure	0.279	0.032	<.0001	1.322	1.243-1.407
Liver Disease	0.349	0.082	<.0001	1.417	1.208-1.663
Metastatic Cancer	0.593	0.090	<.0001	1.808	1.516-2.157
Solid Tumor w/o Metastasis	0.289	0.089	0.001	1.335	1.122-1.588
Weight Loss	0.205	0.061	0.001	1.228	1.091-1.383
Fluid and Electrolyte Disorders	0.158	0.031	<.0001	1.171	1.102-1.245
Chronic Blood Loss Anemia	0.518	0.164	0.002	1.679	1.217-2.315
Deficiency Anemia	0.307	0.032	<.0001	1.359	1.277-1.446
Psychoses	0.043	0.058	0.459	1.044	0.931-1.171

Risk Model Performance

For each logistic regression model, OSHPD computed summary statistics to assess model performance: model evaluation, goodness of fit, discrimination, and calibration.

Discrimination: 30-day mortality /30-day readmission

Risk models that distinguish well between patients who have an adverse event and those who do not are said to have good discrimination. A commonly used measure of discrimination is the C-statistic, also known as the area under the Receiver Operating Characteristic (ROC) curve. For all possible pairs of patients, where one has a 30-day death or a 30-day readmission and the other does not, the C-statistic describes the proportion of pairs where the patient with the event had a higher predicted risk of the event than the patient without the event. C-statistics range from 0.5 to 1, with higher values indicating better discrimination. For the 2012-2013 mortality risk model, the C-statistic was 0.84, which is generally considered excellent model discrimination. For the readmission risk model, the C-statistic was 0.63, indicating that the readmissions model was much less accurate than the mortality model in predicting which patients had the event. However, readmissions are more difficult to predict than outcomes like mortality or complications, and this C-statistic is typical of those found in the health services literature.

Calibration: 30-day mortality /30-day readmission

Calibration refers to the ability of a risk model to match predicted and observed outcomes (e.g., deaths and readmissions). A model in which the number of observed outcomes matches closely with the predicted number of outcomes across different strata of the data demonstrates good calibration. Good calibration is essential for accurate risk adjustment. A common measure of calibration is the Hosmer-Lemeshow χ^2 test, which compares observed and predicted outcomes over deciles of risk. The p-value of the Hosmer-Lemeshow test statistic for this 30-day readmission risk model is <0.001, indicating poor calibration. That is, predicted readmissions were not consistent with actual readmissions across the data. The finding of poor calibration for risk models based on administrative data is not uncommon, especially when analyses employ large numbers of cases and the test becomes sensitive to small differences between the number of predicted and expected events.

To better understand problems in calibration, the data were partitioned into 10 groups by patient risk, and observed outcomes were compared with predicted outcomes for each of the groups. Table 6 presents these results for the mortality outcome with the lowest risk patients in Risk Group 1 and the highest risk patients in Risk Group 10. All 10 risk groups have neither significantly fewer nor significantly more readmissions than were predicted by the model. Overall the risk model shows no systematic underestimation or overestimation of death cases at the extremes. Table 7 presents the results for the readmission outcome with the lowest risk patients in Risk Group 1 and the highest risk patients in Risk Group 10. All 10 risk groups have neither significantly fewer nor significantly more readmissions than were predicted by the model. Overall the risk model shows no systematic underestimation or overestimation of readmission cases at the extremes.

Table 6. Calibration of Risk Model for 30-Day Mortality, 2012-2013

Risk Group	Ischemic Stroke Cases	Observed Deaths	Predicted Deaths	Difference	95% CI of Predicted Deaths
1	7,044	47	52.91	5.91	(43.94-66.05)
2	7,047	71	102.82	31.82	(86.43-122.97)
3	7,052	108	156.15	48.15	(132.01-185.57)
4	7,036	170	224.23	54.23	(189.29-267.38)
5	7,045	257	316.96	59.96	(268.66-375.82)
6	7,045	361	438.99	77.99	(372.37-519.99)
7	7,045	627	611.07	-15.93	(519.44-720.66)
8	7,045	955	879.54	-75.46	(746.58-1,037.05)
9	7,045	1,661	1,393.82	-267.18	(1,186.79-1,631.66)
10	7,043	3,083	3,163.52	80.52	(2,815.44-3,520.12)
	70,447	**7,340**	**7,340**	**0**	

Note: Risk Group 1 is at lowest risk for mortality and Risk Group 10 is at highest risk.

Table 7. Calibration of Risk Model for 30-Day Readmission, 2012-2013

Risk Group	Ischemic Stroke Cases	Observed Readmissions	Predicted Readmissions	Difference	95% CI of Predicted Readmissions
1	6,728	428	499.97	71.97	(469.27-532.98)
2	6,677	481	539.77	58.77	(503.13-579.22)
3	6,682	563	590.29	27.29	(548.34-635.42)
4	6,697	650	637.48	-12.52	(583.99-695.71)
5	6,695	749	689.24	-59.76	(628.52-755.58)
6	6,696	758	757.59	-0.41	(686.00-836.17)
7	6,696	904	841.51	-62.49	(753.62-938.95)
8	6,696	1,016	958.38	-57.62	(851.20-1077.74)
9	6,696	1,174	1,148.71	-25.29	(1008.44-1305.76)
10	6,698	1,582	1,642.09	60.09	(1418.92-1888.93)
	66,961	**8,305**	**8,305.04**	**0.04**	

Note: Risk Group 1 is at lowest risk for readmissions and Risk Group 10 is at highest risk.

Calculation of Hospital Outcome Measures

30-Day Mortality/Readmission Outcome
The risk-adjusted rate represents the best estimate of what a hospital mortality/readmission rate would have been if the hospital had a patient case mix identical to the statewide average. Thus, this rate is comparable among hospitals because it accounts for the differences in patient severity of illness.

The risk-adjusted rate is computed first by dividing the hospital's observed rate by the hospital's expected rate (obtained from the risk model calculation) to get the observed/expected (O/E) ratio. If the O/E ratio is greater than one, the hospital has a higher mortality rate than expected based on its patient mix. If the O/E ratio is less than one, the hospital has a lower mortality rate than expected. The O/E ratio is then multiplied by the overall state mortality to obtain the hospital's risk-adjusted mortality rate. This results in the 2012-2013 hospital 30-day mortality rate of 10.42% and the 30-day readmission rate of 12.40%. However, because a hospital's point estimate of the risk-adjusted rate can be attributed to chance, this report determines the performance rating not based on a point estimate of the risk-adjusted rate, but based on a comparison of the 98% confidence interval (CI) of each hospital's risk-adjusted rate to the California average rate[2]. As shown in Tables 8 and 9, if the upper 98% CI of a hospital's risk-adjusted rate is below the state average rate, indicating the hospital's risk-adjusted rate is significantly lower than the state average, then the hospital's performance rating is "Better." If the lower 98% CI of a hospital's risk-adjusted rate is above the state average rate, indicating the hospital's risk-adjusted rate is significantly higher than the state average, then the performance rating is "Worse." If the state average rate is within the 98% CI of a hospital's risk-adjusted rate, then the performance rating is "As Expected."

Limitations of the Data and Models

The preferred method to produce hospital outcome reports includes the collection of detailed clinical data to provide accurate risk adjustment. This approach requires medical chart abstraction, which is expensive and time-consuming; consequently, it has not been widely implemented by public reporting agencies. Using health insurance claims or administrative data for public outcomes reporting offers several advantages, including minimal data collection costs and the ability to produce reports for a large number of procedures and conditions. However, most approaches to risk adjustment that rely on administrative data have demonstrated deficiencies that threaten their usefulness as quality assessment tools.

> ***Types of Data Quality Errors:*** Quality of care is one reason a hospital's mortality/readmission rate may be unusually high or low. However, there are additional factors that may contribute to a hospital's 30-day mortality/readmission rate.
>
> ***Hospital data errors***: Hospitals that failed to report important risk factors or had other data quality problems could have received too little "credit" for their patient risk in the risk-adjustment process. Some facilities have applied for and have been granted "modifications"

[2] Luft HS, Brown BW Jr. Calculating the probability of rare events: Why settle for an approximation? *Health Services Research*. 1993; 28:419-439.

to standard inpatient data reporting requirements. Other facilities were unable to complete specific fields as required and were deemed "non-compliant" at the time of reporting. OSHPD provides a list of known data errors and their affected variables for facilities with approved modifications and non-compliant facilities (www.oshpd.ca.gov).

***Unmeasured risk**:* Administrative datasets provide limited data, based on ICD-9-CM codes, to characterize patients' risk of death/readmission. This includes data errors for both known risk factors and unknown risk factors. For known risk factors, unmeasured risk may be in the form of hospitals incorrectly reporting ICD-9-CM codes in the patient discharge data records.

In addition, unknown risk factors not reported in the patient discharge data records may also account for unmeasured patient risk differences not explained by the current model.

Limited outcome measure: This report focuses on two outcome measures: 30-day mortality and 30-day readmission. If a hospital's risk-adjusted 30-day mortality rate is a valid quality of care indicator, then hospitals with low rates are managing their patients in ways that maximize the likelihood of successful outcomes. These management practices are also known as processes of care, because they describe the process by which nurses, physicians, and other health professionals provide care at the bedside. Other processes of care include functional recovery, health-related quality of life and other clinical outcomes. These measures may be as or more meaningful than the outcomes chosen but would require additional resources to collect and develop.

Other Stroke Quality Measures

AHRQ Inpatient Stroke Mortality Measure

The Agency for Healthcare Research and Quality (AHRQ) has developed an Inpatient Quality Indicator -Acute Stroke Mortality Rate (IQI #17), and OSHPD has publicly reported this as a measure of hospital stroke care since 2006. However, there are several important differences between the AHRQ inpatient mortality measure (Version 4.5) and the OSHPD 30-day mortality measure.

- This outcomes report includes only ischemic stroke patients, while IQI #17 includes all acute stroke cases and breaks them further into three strata: subarachnoid stroke, hemorrhagic stroke and ischemic stroke.
- This report encompasses two years of data, while IQI #17 is reported annually.
- This report includes patients with a primary diagnosis of cerebral thrombosis without mention of cerebral infarction, while IQI #17 exludes those patients.
- This report excludes patients with prior ischemic or hemorrhagic stroke within 180 days of the stroke admission, while IQI #17 does not have the exclusion.
- This report includes deaths that occur up to 30 days after admission, while IQI #17 includes only inpatient deaths.
- This report uses a risk model based on both clinical logic and empirical considerations, while the IQI #17 risk model is empirically based.
- In this report, a 98% confidence interval is applied to identify hospitals whose performance differs significantly from the state average while the IQI #17 uses a 95% confidence interval to identify hospital outliers.

CMS Stroke Mortality and Readmission Measures

The Centers for Medicare and Medicaid Services (CMS) recently provided the details for two stroke measures: Hospital 30-Day Mortality Following Acute Ischemic Stroke and Hospital 30-Day Readmission Following Acute Ischemic Stroke. One major difference between our report and the CMS measures is the risk factors included in the model. In the OSHPD report, both 30-day mortality and readmission models adjusted for stroke severity while the CMS measures did not include stroke severity as a predictive variable. The OSHPD C-statistic for the mortality model is higher than the C-statistic published by CMS (0.84 vs 0.74), while the C-statistic for the OSHPD readmissions model is similar to the CMS model (0.63 vs 0.60).

Results: Risk-Adjusted Outcomes

Risk-adjusted 30-day mortality rates: Among the 70,447 ischemic stroke patients admitted to 322 California hospitals between January 1, 2012 and November 30, 2013, 7,340 patients died within 30 days of the index admission, reflecting an overall statewide 30-day mortality rate of 10.42% (Table 8). The observed 30-day mortality rates at California hospitals ranged from 0% to 23.53%. The expected 30-day mortality rate, calculated by the risk model to reflect patients' demographics and severity of illness, varied between 2.19% and 18.42%. The 30-day RAMRs, which evaluate hospital performance, ranged from 0% to 27.65%. Among the nine hospitals rated "Worse" than expected, the average RAMR was 17.83% (range: 13.92 – 27.65%), more than three times the average RAMR for the nine hospitals rated "Better" than expected (average 5.75%; range: 3.32 - 6.88%).

Risk-adjusted 30-day readmission rates: Among the 66,961 ischemic stroke patients discharged from 322 California hospitals between January 1, 2012 and November 30, 2013, 8,305 patients were readmitted for any reason within 30 days of discharge following an ischemic stroke hospitalization, reflecting an overall statewide 30-day readmission rate of 12.40% (Table 9). The observed 30-day readmission rates at California hospitals ranged from 1.89% to 26.19%. The expected 30-day readmission rate, calculated by the risk model to reflect patients' demographics and severity of illness, varied between 10.00% and 17.12%. The 30-day RARRs ranged from 2.20% to 26.00%. Among the seven hospitals rated "Worse" than expected, the average RARR was 19.01% (range: 15.85 – 26.00%), almost three times the average RARR for the 12 hospitals rated "Better" than expected (average 5.48%; range: 2.32 – 7.56%).

GUIDE TO INTERPRETING TABLES 8 & 9: HOSPITAL RISK-ADJUSTED OUTCOMES RESULTS, 2012-2013	
Ischemic Stroke Cases	The total number of acute ischemic stroke cases submitted to PDD for 2012-2013.
Ischemic Stroke Deaths	The number of deaths includes all deaths occurring within 30 days of the index stroke admission.
Ischemic Stroke Readmissions	The number of hospital readmissions within 30 days of being discharged from the hospital. Patients who were transferred from one hospital to another during the acute stroke episode are not considered to be a readmission.

GUIDE TO INTERPRETING TABLES 8 & 9: HOSPITAL RISK-ADJUSTED OUTCOMES RESULTS, 2011-2012	
Observed Mortality Rate	The ratio of the number of ischemic stroke deaths and the ischemic stroke cases multiplied by 100: Observed Mortality Rate = Number of Ischemic Stroke Deaths/ Ischemic Stroke Cases × 100.
Observed Readmission Rate	The ratio of the number of ischemic stroke readmissions and the ischemic stroke cases multiplied by 100: Observed Readmission Rate = Number of Ischemic Stroke Readmissions/ Ischemic Stroke Cases × 100.
Expected Mortality Rate	The ratio of the expected number of ischemic stroke deaths predicted for a provider (after risk-adjusting for their patient population) and the ischemic stroke cases multiplied by 100: Expected Mortality Rate = Number of Expected Deaths/ Ischemic Stroke Cases × 100.
Expected Readmission Rate	The ratio of the expected number of ischemic stroke readmissions predicted for a provider (after risk-adjusting for their patient population) and the ischemic stroke cases multiplied by 100: Expected Readmission Rate = Number of Expected Readmissions/ Ischemic Stroke Cases × 100.
Risk-Adjusted Mortality Rate (RAMR) and 98% Confidence Interval (CI)	The RAMR is obtained by multiplying the California observed mortality rate by a provider's O/E ratio. The 98% confidence interval represents the confidence in the estimate for the RAMR. The lower and upper confidence limits are calculated using Poisson exact confidence interval calculations.
Risk-Adjusted Readmission Rate (RARR) and 98% Confidence Interval (CI)	The RARR is obtained by multiplying the California observed readmission rate by a provider's O/E ratio. The 98% confidence interval represents the confidence in the estimate for the RARR. The lower and upper confidence limits are calculated using Poisson exact confidence interval calculations.
Performance Rating	The performance rating is based on a comparison of each provider's risk-adjusted rate to the California observed rate. A provider is classified as "Better" if the upper 98% confidence limit of its risk-adjusted rate falls below the California observed rate. A provider is classified as "Worse" if the lower 98% confidence limit of its risk-adjusted rate is higher than the California observed rate.

Table 8. Hospital Risk-Adjusted 30-Day Mortality Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	98% CI for RAMR	Performance Rating*
Statewide		70,447	7,340	10.42				
Alameda	Alameda County Medical Center – Highland Campus	188	9	4.79	3.85	12.94	5.41-24.61	
	Alameda Hospital	123	13	10.57	10.98	10.03	5.16-16.75	
	Alta Bates Summit Medical Center – Alta Bates Campus	300	15	5.00	8.26	6.30	3.26-10.68	
	Alta Bates Summit Medical Center – Summit Campus – Hawthorne	462	41	8.87	9.70	9.53	6.71-12.93	
	Eden Medical Center	399	49	12.28	11.78	10.86	8.03-14.16	
	Kaiser Foundation Hospital – Hayward	419	59	14.08	13.72	10.69	8.18-13.56	
	Kaiser Foundation Hospital – Oakland Campus	529	49	9.26	11.83	8.16	6.03-10.66	
	Saint Rose Hospital	113	13	11.50	8.56	14.00	7.44-23.10	
	San Leandro Hospital	68	9	13.24	10.87	12.69	5.51-22.93	
	Valleycare Medical Center	112	7	6.25	7.22	9.02	3.15-18.89	
	Washington Hospital – Fremont	347	35	10.09	12.02	8.74	6.02-12.04	

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County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	98% CI for RAMR	Performance Rating*
Statewide		70,447	7,340	10.42				
Amador	Sutter Amador Hospital	111	13	11.71	10.61	11.50	5.96-19.31	
Butte	Enloe Medical Center – Esplanade Campus	464	52	11.21	12.32	9.48	7.00-12.41	
	Feather River Hospital	136	10	7.35	10.04	7.63	3.54-13.91	
	Oroville Hospital	172	8	4.65	7.76	6.25	2.47-12.50	
Calaveras	Mark Twain Medical Center	46	7	15.22	10.50	15.10	5.54-29.47	
Contra Costa	Contra Costa Regional Medical Center	113	6	5.31	3.89	14.21	4.56-31.26	
	Doctors Medical Center – San Pablo	249	20	8.03	10.15	8.25	4.95-12.64	
	John Muir Medical Center – Concord Campus	307	30	9.77	11.53	8.83	5.88-12.50	
	John Muir Medical Center – Walnut Creek Campus	444	64	14.41	16.36	9.18	7.09-11.57	
	Kaiser Foundation Hospital – Antioch	270	27	10.00	13.67	7.62	5.06-10.82	
	Kaiser Foundation Hospital – Walnut Creek	346	46	13.29	14.75	9.39	6.82-12.42	
	San Ramon Regional Medical Center	144	17	11.81	12.78	9.62	5.43-15.11	

Table 8. Hospital Risk-Adjusted 30-Day Mortality Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	98% CI for RAMR	Performance Rating*
Statewide		70,447	7,340	10.42				
Contra Costa (continued)	Sutter Delta Medical Center	167	10	5.99	9.63	6.48	2.91-11.77	
Del Norte	Sutter Coast Hospital	111	11	9.91	10.81	9.55	4.44-16.91	
El Dorado	Barton Memorial Hospital	31	2	6.45	8.01	8.39	0.65-28.65	
	Marshall Medical Center	177	26	14.69	15.55	9.84	6.55-13.85	
Fresno	Clovis Community Medical Center	218	23	10.55	9.02	12.19	7.63-17.98	
	Community Regional Medical Center – Fresno	728	70	9.62	7.20	13.92	10.77-17.53	Worse
	Kaiser Foundation Hospital – Fresno	316	38	12.03	10.76	11.64	8.22-15.78	
	Saint Agnes Medical Center	714	89	12.47	10.78	12.05	9.66-14.76	
Humboldt	Mad River Community Hospital	48	10	20.83	11.90	18.24	8.44-31.21	
	Redwood Memorial Hospital	34	8	23.53	13.90	17.64	7.32-31.25	
	Saint Joseph Hospital – Eureka	185	17	9.19	11.00	8.70	4.84-13.97	
Imperial	El Centro Regional Medical Center	218	14	6.42	8.33	8.04	4.16-13.60	

Table 8. Hospital Risk-Adjusted 30-Day Mortality Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	98% CI for RAMR	Performance Rating*
Statewide		70,447	7,340	10.42				
Imperial (continued)	Pioneers Memorial Healthcare District	133	8	6.02	7.59	8.26	3.27-16.34	
Kern	Bakersfield Heart Hospital	80	3	3.75	9.44	4.14	0.63-12.31	
	Bakersfield Memorial Hospital	326	36	11.04	8.14	14.13	9.76-19.46	
	Kern Medical Center	40	0	0.00	2.19	0.00	0.00-48.76	
	Mercy Hospital – Bakersfield	208	26	12.50	10.65	12.23	7.92-17.53	
	Ridgecrest Regional Hospital	30	5	16.67	11.57	15.01	4.34-31.93	
	San Joaquin Community Hospital	694	70	10.09	8.22	12.78	9.86-16.15	
Kings	Adventist Medical Center	211	23	10.90	9.15	12.42	7.78-18.33	
Lake	Sutter Lakeside Hospital	56	9	16.07	14.00	11.96	5.06-21.82	
Los Angeles	Alhambra Hospital	101	8	7.92	10.96	7.53	3.02-14.61	
	Antelope Valley Hospital	460	47	10.22	8.44	12.61	9.21-16.68	
	Beverly Hospital	161	19	11.80	10.67	11.52	6.88-17.61	

Table 8. Hospital Risk-Adjusted 30-Day Mortality Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	98% CI for RAMR	Performance Rating*
Statewide		70,447	7,340	10.42				
Los Angeles (continued)	California Hospital Medical Center – Los Angeles	252	13	5.16	5.61	9.58	4.75-16.57	
	Cedars Sinai Medical Center	759	56	7.38	11.81	6.51	4.84-8.48	Better
	Centinela Hospital Medical Center	414	15	3.62	5.68	6.65	3.42-11.36	
	Citrus Valley Medical Center – Inter-Community Campus	158	7	4.43	8.56	5.40	1.96-11.40	
	Citrus Valley Medical Center – Queen of the Valley Campus	305	25	8.20	9.03	9.46	6.07-13.77	
	Community and Mission Hospital of Huntington Park – Slauson	38	1	2.63	5.13	5.34	0.05-30.89	
	Community Hospital of Long Beach	50	4	8.00	11.56	7.21	1.83-17.04	
	Downey Regional Medical Center	252	25	9.92	9.87	10.47	6.60-15.36	
	Encino Hospital Medical Center	43	3	6.98	18.42	3.95	0.67-10.98	
	Foothill Presbyterian Hospital – Johnston Memorial	110	9	8.18	9.31	9.16	3.90-17.24	
	Garfield Medical Center	330	21	6.36	11.51	5.76	3.53-8.70	Better

Table 8. Hospital Risk-Adjusted 30-Day Mortality Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	98% CI for RAMR	Performance Rating*
Statewide		70,447	7,340	10.42				
Los Angeles (continued)	Glendale Adventist Medical Center – Wilson Terrace	383	38	9.92	11.76	8.79	6.13-12.04	
	Glendale Memorial Hospital and Medical Center	155	11	7.10	8.67	8.53	4.01-15.25	
	Good Samaritan Hospital – Los Angeles	188	11	5.85	10.34	5.89	2.75-10.54	
	Greater El Monte Community Hospital	42	2	4.76	8.31	5.97	0.49-20.97	
	Henry Mayo Newhall Memorial Hospital	274	23	8.39	11.94	7.33	4.63-10.81	
	Hollywood Presbyterian Medical Center	272	30	11.03	11.95	9.62	6.45-13.50	
	Huntington Memorial Hospital	513	53	10.33	10.98	9.80	7.28-12.77	
	Kaiser Foundation Hospital – Baldwin Park	403	41	10.17	7.43	14.27	9.99-19.46	
	Kaiser Foundation Hospital – Downey	342	24	7.02	7.01	10.43	6.58-15.47	
	Kaiser Foundation Hospital – Panorama City	250	34	13.60	7.75	18.28	12.45-25.29	Worse
	Kaiser Foundation Hospital – South Bay	267	30	11.24	9.53	12.29	8.21-17.36	
	Kaiser Foundation Hospital – Sunset	419	29	6.92	6.85	10.53	6.80-15.27	

Table 8. Hospital Risk-Adjusted 30-Day Mortality Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	98% CI for RAMR	Performance Rating*
Statewide		70,447	7,340	10.42				
Los Angeles (continued)	Kaiser Foundation Hospital – West Los Angeles	313	17	5.43	5.81	9.74	5.30-15.99	
	Kaiser Foundation Hospital – Woodland Hills	274	38	13.87	13.66	10.58	7.44-14.33	
	Keck Hospital of University of Southern California	69	6	8.70	8.85	10.24	3.56-22.00	
	Lakewood Regional Medical Center	400	38	9.50	7.66	12.92	8.98-17.74	
	Long Beach Memorial Medical Center	669	62	9.27	8.06	11.99	9.10-15.37	
	Los Angeles Community Hospital	38	1	2.63	7.73	3.55	0.04-20.53	
	Los Angeles County/Harbor – UCLA Medical Center	292	12	4.11	3.68	11.64	5.78-20.38	
	Los Angeles County/Olive View – UCLA Medical Center	160	3	1.88	2.39	8.19	1.21-26.00	
	Los Angeles County/University of Southern California Medical Center	242	28	11.57	4.36	27.65	18.30-39.42	Worse
	Marina Del Rey Hospital	83	6	7.23	9.23	8.16	2.60-17.87	
	Memorial Hospital of Gardena	90	3	3.33	6.06	5.73	0.90-16.78	

Table 8. Hospital Risk-Adjusted 30-Day Mortality Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	98% CI for RAMR	Performance Rating*
Statewide		70,447	7,340	10.42				
Los Angeles (continued)	Methodist Hospital of Southern California	567	78	13.76	12.22	11.73	9.27-14.51	
	Mission Community Hospital – Panorama Campus	44	1	2.27	9.46	2.50	0.03-13.71	
	Monterey Park Hospital	49	5	10.20	12.60	8.44	2.48-18.24	
	Northridge Hospital Medical Center	315	34	10.79	11.82	9.52	6.52-13.19	
	Olympia Medical Center	80	5	6.25	11.57	5.63	1.54-12.86	
	Pacific Alliance Medical Center, Inc.	97	3	3.09	6.84	4.71	0.71-14.29	
	Pacific Hospital of Long Beach	35	2	5.71	11.27	5.28	0.43-17.60	
	Pacifica Hospital of the Valley	30	1	3.33	7.87	4.42	0.04-22.64	
	Palmdale Regional Medical Center	166	14	8.43	7.57	11.61	6.23-19.24	
	Pomona Valley Hospital Medical Center	578	61	10.55	9.88	11.13	8.48-14.24	
	Presbyterian Intercommunity Hospital	560	62	11.07	11.37	10.15	7.68-13.00	
	Providence Holy Cross Medical Center	387	32	8.27	10.62	8.12	5.44-11.45	

Table 8. Hospital Risk-Adjusted 30-Day Mortality Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	98% CI for RAMR	Performance Rating*
Statewide		70,447	7,340	10.42				
Los Angeles (continued)	Providence Little Company of Mary Medical Center – San Pedro	154	13	8.44	12.14	7.24	3.65-12.23	
	Providence Little Company of Mary Medical Center – Torrance	550	55	10.00	8.87	11.75	8.76-15.27	
	Providence Saint Joseph Medical Center	538	71	13.20	12.75	10.79	8.46-13.44	
	Providence Tarzana Medical Center	260	23	8.85	12.60	7.31	4.48-10.99	
	Ronald Reagan UCLA Medical Center	457	59	12.91	15.90	8.46	6.52-10.68	
	Saint Francis Medical Center	208	8	3.85	7.44	5.39	2.04-10.92	
	Saint John's Health Center	159	14	8.81	11.72	7.83	4.14-13.05	
	Saint Mary Medical Center	185	14	7.57	8.92	8.84	4.58-14.82	
	Saint Vincent Medical Center	146	6	4.11	7.68	5.58	1.74-12.58	
	San Dimas Community Hospital	68	8	11.76	8.88	13.81	5.92-26.37	
	San Gabriel Valley Medical Center	142	11	7.75	11.54	7.00	3.37-12.33	
	Santa Monica – UCLA Medical Center and Orthopedic Hospital	195	17	8.72	12.44	7.30	4.27-11.39	

Table 8. Hospital Risk-Adjusted 30-Day Mortality Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	98% CI for RAMR	Performance Rating*
Statewide		70,447	7,340	10.42				
Los Angeles (continued)	Sherman Oaks Hospital	57	5	8.77	15.65	5.84	1.60-13.37	
	Southern California Hospital At Culver City	108	4	3.70	7.39	5.22	1.12-13.89	
	Temple Community Hospital	58	3	5.17	10.01	5.39	0.83-15.78	
	Torrance Memorial Medical Center	568	68	11.97	11.57	10.79	8.35-13.57	
	University of Southern California Verdugo Hills Hospital	115	14	12.17	10.46	12.13	6.20-20.31	
	Valley Presbyterian Hospital	224	24	10.71	11.14	10.02	6.33-14.72	
	West Hills Hospital and Medical Center	233	33	14.16	12.16	12.14	8.25-16.80	
	White Memorial Medical Center	398	21	5.28	9.92	5.54	3.29-8.56	Better
	Whittier Hospital Medical Center	101	3	2.97	9.32	3.32	0.51-9.67	Better
Madera	Madera Community Hospital	63	7	11.11	5.34	21.69	7.68-44.19	
Marin	Kaiser Foundation Hospital – San Rafael	209	17	8.13	13.98	6.06	3.41-9.64	Better
	Marin General Hospital	239	31	12.97	13.45	10.05	6.78-14.08	

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County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	98% CI for RAMR	Performance Rating*
Statewide		70,447	7,340	10.42				
Marin (continued)	Novato Community Hospital	51	9	17.65	12.63	14.56	6.65-25.63	
Mendocino	Frank R. Howard Memorial Hospital	40	4	10.00	13.89	7.50	1.73-18.01	
	Mendocino Coast District Hospital	31	5	16.13	15.44	10.89	3.18-23.13	
	Ukiah Valley Medical Center	113	20	17.70	12.33	14.96	9.15-22.17	
Merced	Mercy Medical Center – Merced	275	32	11.64	14.75	8.22	5.60-11.41	
Monterey	Community Hospital Monterey Peninsula	335	35	10.45	9.61	11.33	7.72-15.75	
	Natividad Medical Center	57	0	0.00	2.86	0.00	0.00-26.80	
	Salinas Valley Memorial Hospital	324	20	6.17	9.96	6.46	3.78-10.02	Better
Napa	Queen of the Valley Hospital – Napa	175	34	19.43	12.14	16.67	11.46-22.82	Worse
	Saint Helena Hospital	63	9	14.29	12.91	11.53	4.95-20.90	
Nevada	Sierra Nevada Memorial Hospital	166	25	15.06	14.00	11.21	7.26-16.16	
Orange	AHMC Anaheim Regional Medical Center	227	17	7.49	7.04	11.09	6.13-17.93	

Table 8. Hospital Risk-Adjusted 30-Day Mortality Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	98% CI for RAMR	Performance Rating*
Statewide		70,447	7,340	10.42				
Orange (continued)	Fountain Valley Regional Hospital and Medical Center – Euclid	480	35	7.29	11.05	6.88	4.79-9.44	Better
	Garden Grove Hospital and Medical Center	81	4	4.94	8.17	6.30	1.38-15.94	
	Hoag Memorial Hospital Presbyterian	846	76	8.98	10.74	8.72	6.79-10.94	
	Huntington Beach Hospital	55	4	7.27	11.10	6.83	1.53-17.03	
	Kaiser Foundation Hospital – Anaheim	259	23	8.88	9.28	9.97	6.20-14.87	
	Kaiser Foundation Hospital – Lakeview	204	14	6.86	7.64	9.35	4.73-15.96	
	La Palma Intercommunity Hospital	78	4	5.13	7.68	6.96	1.52-18.16	
	Los Alamitos Medical Center	397	49	12.34	12.18	10.56	7.76-13.85	
	Mission Hospital Regional Medical Center	470	57	12.13	12.93	9.77	7.34-12.59	
	Orange Coast Memorial Medical Center	208	16	7.69	10.55	7.60	4.27-12.17	
	Placentia Linda Hospital	78	11	14.10	10.36	14.18	7.19-24.31	
	Saddleback Memorial Medical Center	432	72	16.67	14.32	12.12	9.50-15.08	

Table 8. Hospital Risk-Adjusted 30-Day Mortality Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	98% CI for RAMR	Performance Rating*
Statewide		70,447	7,340	10.42				
Orange (continued)	Saint Joseph Hospital – Orange	447	53	11.86	10.60	11.65	8.68-15.13	
	Saint Jude Medical Center	560	70	12.50	14.28	9.12	7.12-11.39	
	UC Irvine Medical Center	369	47	12.74	11.33	11.71	8.62-15.31	
	West Anaheim Medical Center	123	14	11.38	11.86	10.00	5.19-16.48	
	Western Medical Center – Santa Ana	190	24	12.63	10.99	11.98	7.63-17.42	
Placer	Kaiser Foundation Hospital – Roseville	500	66	13.20	13.31	10.33	7.98-13.03	
	Sutter Auburn Faith Hospital	177	20	11.30	12.04	9.78	5.81-14.97	
	Sutter Roseville Medical Center	501	73	14.57	11.72	12.96	10.14-16.16	
Riverside	Corona Regional Medical Center – Main	147	19	12.93	11.00	12.24	7.32-18.54	
	Desert Regional Medical Center	556	60	10.79	10.08	11.16	8.48-14.27	
	Eisenhower Medical Center	831	95	11.43	10.13	11.75	9.41-14.41	
	Hemet Valley Medical Center	374	61	16.31	14.16	12.00	9.26-15.16	
	John F. Kennedy Memorial Hospital	90	8	8.89	9.23	10.04	4.38-19.02	

Table 8. Hospital Risk-Adjusted 30-Day Mortality Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	98% CI for RAMR	Performance Rating*
Statewide		70,447	7,340	10.42				
Riverside (continued)	Kaiser Foundation Hospital – Moreno Valley	104	13	12.50	8.19	15.90	7.99-26.74	
	Kaiser Foundation Hospital – Riverside	237	23	9.70	7.63	13.25	8.20-19.75	
	Loma Linda University Medical Center – Murrieta	63	2	3.17	6.66	4.97	0.37-19.11	
	Menifee Valley Medical Center	85	12	14.12	12.86	11.44	5.69-19.41	
	Parkview Community Hospital Medical Center	186	18	9.68	8.30	12.16	6.97-19.06	
	Riverside Community Hospital	487	50	10.27	8.92	12.00	8.80-15.79	
	Riverside County Regional Medical Center	286	16	5.59	6.39	9.13	5.20-14.60	
	San Gorgonio Memorial Hospital	93	10	10.75	10.60	10.57	4.81-18.96	
	Southwest Healthcare System – Murrieta	409	40	9.78	8.69	11.72	8.20-16.02	
Sacramento	Kaiser Foundation Hospital – Sacramento	447	65	14.54	12.94	11.71	9.10-14.67	

Table 8. Hospital Risk-Adjusted 30-Day Mortality Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	98% CI for RAMR	Performance Rating*
Statewide		70,447	7,340	10.42				
Sacramento (continued)	Kaiser Foundation Hospital – South Sacramento	463	46	9.94	10.91	9.49	6.95-12.48	
	Mercy General Hospital	345	35	10.14	11.23	9.41	6.57-12.85	
	Mercy Hospital – Folsom	126	7	5.56	8.48	6.82	2.43-14.15	
	Mercy San Juan Hospital	690	109	15.80	14.16	11.63	9.60-13.85	
	Methodist Hospital of Sacramento	350	38	10.86	9.93	11.39	8.05-15.40	
	Sutter General Hospital	437	42	9.61	8.41	11.91	8.46-16.04	
	Sutter Memorial Hospital	162	14	8.64	9.40	9.58	4.99-15.99	
	UC Davis Medical Center	439	37	8.43	7.55	11.64	8.08-15.98	
San Benito	Hazel Hawkins Memorial Hospital	41	7	17.07	12.19	14.60	5.48-27.65	
San Bernardino	Arrowhead Regional Medical Center	452	21	4.65	4.16	11.63	6.78-18.19	
	Barstow Community Hospital	87	7	8.05	6.68	12.56	4.48-25.90	
	Chino Valley Medical Center	88	2	2.27	6.65	3.56	0.27-13.56	
	Community Hospital of San Bernardino	39	1	2.56	6.47	4.13	0.04-21.96	

Table 8. Hospital Risk-Adjusted 30-Day Mortality Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	98% CI for RAMR	Performance Rating*
Statewide		70,447	7,340	10.42				
San Bernardino (continued)	Desert Valley Hospital	245	9	3.67	8.66	4.42	1.77-8.79	Better
	Hi-Desert Medical Center	82	9	10.98	8.25	13.86	5.83-25.90	
	Kaiser Foundation Hospital – Fontana	491	45	9.17	9.01	10.59	7.64-14.12	
	Loma Linda University Medical Center	601	72	11.98	10.19	12.26	9.57-15.32	
	Redlands Community Hospital	305	36	11.80	11.34	10.85	7.56-14.83	
	Saint Bernadine Medical Center	232	17	7.33	7.89	9.68	5.48-15.37	
	Saint Mary Regional Medical Center	388	25	6.44	7.04	9.54	5.90-14.31	
	San Antonio Community Hospital	474	46	9.70	8.89	11.37	8.20-15.16	
	Victor Valley Global Medical Center	102	4	3.92	7.35	5.56	1.27-14.13	
San Diego	Alvarado Hospital	149	19	12.75	13.61	9.76	5.88-14.67	
	Grossmont Hospital	887	102	11.50	11.16	10.74	8.73-12.98	
	Kaiser Foundation Hospital – San Diego	508	36	7.09	8.67	8.51	5.78-11.89	
	Palomar Health Downtown Campus	657	83	12.63	11.44	11.51	9.15-14.18	

Table 8. Hospital Risk-Adjusted 30-Day Mortality Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	98% CI for RAMR	Performance Rating*
Statewide		70,447	7,340	10.42				
San Diego (continued)	Paradise Valley Hospital	127	9	7.09	7.24	10.19	4.16-19.65	
	Pomerado Hospital	216	30	13.89	12.86	11.26	7.57-15.73	
	Scripps Green Hospital	185	20	10.81	11.20	10.06	6.05-15.36	
	Scripps Memorial Hospital – Encinitas	311	39	12.54	14.32	9.12	6.50-12.28	
	Scripps Memorial Hospital – La Jolla	395	50	12.66	14.31	9.22	6.80-12.04	
	Scripps Mercy Hospital	779	82	10.53	9.61	11.42	9.04-14.13	
	Sharp Chula Vista Medical Center	419	35	8.35	9.19	9.47	6.44-13.23	
	Sharp Coronado Hospital and Healthcare Center	35	6	17.14	12.08	14.79	5.21-29.02	
	Sharp Memorial Hospital	602	69	11.46	10.50	11.38	8.82-14.30	
	Tri-City Medical Center – Oceanside	557	74	13.29	11.75	11.78	9.26-14.64	
	UC San Diego Medical Center	376	30	7.98	9.04	9.19	6.11-13.04	
San Francisco	California Pacific Medical Center – Davies Campus	298	28	9.40	14.48	6.76	4.45-9.63	Better

Table 8. Hospital Risk-Adjusted 30-Day Mortality Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	98% CI for RAMR	Performance Rating*
Statewide		70,447	7,340	10.42				
San Francisco (continued)	California Pacific Medical Center – Pacific Campus	296	31	10.47	12.43	8.78	5.85-12.40	
	California Pacific Medical Center – St. Luke's Campus	40	7	17.50	10.06	18.12	7.18-33.77	
	Chinese Hospital	97	4	4.12	10.14	4.24	1.01-10.85	
	Kaiser Foundation Hospital – San Francisco	292	27	9.25	10.81	8.91	5.83-12.81	
	Saint Francis Memorial Hospital	165	15	9.09	10.42	9.09	4.89-14.88	
	Saint Mary's Medical Center – San Francisco	156	15	9.62	12.51	8.01	4.19-13.33	
	San Francisco General Hospital	338	38	11.24	6.25	18.74	13.10-25.55	Worse
	UC San Francisco Medical Center	337	32	9.50	9.70	10.20	6.81-14.38	
San Joaquin	Dameron Hospital	148	12	8.11	6.67	12.67	6.25-22.09	
	Doctors Hospital of Manteca	86	11	12.79	11.23	11.87	5.69-20.50	
	Kaiser Foundation Hospital – Manteca	147	20	13.61	11.76	12.06	7.42-17.82	
	Lodi Memorial Hospital	132	24	18.18	13.09	14.47	9.20-20.91	

Table 8. Hospital Risk-Adjusted 30-Day Mortality Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	98% CI for RAMR	Performance Rating*
Statewide		70,447	7,340	10.42				
San Joaquin (continued)	Saint Joseph's Medical Center of Stockton	423	50	11.82	10.14	12.14	8.94-15.90	
	San Joaquin General Hospital	155	17	10.97	5.92	19.31	11.16-30.05	Worse
	Sutter Tracy Community Hospital	88	12	13.64	10.57	13.45	6.87-22.37	
San Luis Obispo	French Hospital Medical Center	94	10	10.64	9.03	12.28	5.38-22.49	
	Marian Regional Medical Center – Arroyo Grande	104	9	8.65	10.15	8.88	4.07-16.40	
	Sierra Vista Regional Medical Center	143	21	14.69	10.37	14.76	8.98-22.15	
	Twin Cities Community Hospital	171	22	12.87	8.99	14.92	8.95-22.62	
San Mateo	Kaiser Foundation Hospital – Redwood City	315	43	13.65	11.99	11.87	8.57-15.76	
	Kaiser Foundation Hospital – South San Francisco	228	19	8.33	10.00	8.69	5.05-13.51	
	Mills-Peninsula Medical Center	398	51	12.81	14.11	9.46	7.05-12.27	
	San Mateo Medical Center	33	1	3.03	5.03	6.28	0.06-33.60	
	Sequoia Hospital	139	15	10.79	12.64	8.90	4.73-14.63	

Table 8. Hospital Risk-Adjusted 30-Day Mortality Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	98% CI for RAMR	Performance Rating*
Statewide		70,447	7,340	10.42				
San Mateo (continued)	Seton Medical Center	291	33	11.34	11.82	10.00	6.81-13.86	
Santa Barbara	Lompoc Valley Medical Center	71	10	14.08	10.51	13.96	6.39-24.65	
	Marian Region Medical Center	256	34	13.28	9.84	14.06	9.57-19.51	
	Santa Barbara Cottage Hospital	558	81	14.52	13.09	11.55	9.22-14.17	
Santa Clara	El Camino Hospital	369	36	9.76	12.57	8.09	5.58-11.16	
	Good Samaritan Hospital – San Jose	474	52	10.97	10.64	10.74	7.96-14.02	
	Kaiser Foundation Hospital – San Jose	342	41	11.99	11.08	11.27	8.09-15.04	
	Kaiser Foundation Hospital – Santa Clara	452	35	7.74	10.04	8.04	5.49-11.18	
	O'Connor Hospital – San Jose	245	33	13.47	11.76	11.93	8.21-16.43	
	Regional Medical of San Jose	444	41	9.23	9.54	10.09	7.08-13.73	
	Saint Louise Regional Hospital	98	9	9.18	11.73	8.16	3.47-15.22	
	Santa Clara Valley Medical Center	360	13	3.61	4.10	9.19	4.46-16.25	

Table 8. Hospital Risk-Adjusted 30-Day Mortality Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	98% CI for RAMR	Performance Rating*
Statewide		70,447	7,340	10.42				
Santa Clara (continued)	Stanford Hospital	392	38	9.69	11.16	9.05	6.27-12.41	
Santa Cruz	Dominican Hospital – Santa Cruz/Soquel	284	29	10.21	11.45	9.29	6.11-13.27	
	Watsonville Community Hospital	111	15	13.51	10.04	14.02	7.71-22.46	
Shasta	Mercy Medical Center – Redding	382	63	16.49	11.98	14.35	11.07-18.08	Worse
	Shasta Regional Medical Center	233	24	10.30	8.74	12.28	7.55-18.41	
Siskiyou	Fairchild Medical Center	49	2	4.08	10.83	3.93	0.30-14.05	
Solano	Kaiser Foundation Hospital – Rehabilitation Center Vallejo	313	27	8.63	12.27	7.32	4.87-10.44	
	Kaiser Foundation Hospital – Vacaville	200	16	8.00	10.78	7.73	4.46-12.15	
	North Bay Medical Center	230	14	6.09	9.51	6.67	3.63-10.98	
	Sutter Solano Medical Center	148	11	7.43	9.41	8.23	4.01-14.32	
Sonoma	Healdsburg District Hospital	47	5	10.64	9.91	11.18	3.09-25.28	
	Kaiser Foundation Hospital – Santa Rosa	257	46	17.90	15.65	11.92	8.86-15.43	

Table 8. Hospital Risk-Adjusted 30-Day Mortality Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	98% CI for RAMR	Performance Rating*
Statewide		70,447	7,340	10.42				
Sonoma (continued)	Palm Drive Hospital	48	6	12.50	14.69	8.87	2.89-18.33	
	Petaluma Valley Hospital	69	7	10.14	12.91	8.19	2.98-16.45	
	Santa Rosa Memorial Hospital – Montgomery	285	44	15.44	12.30	13.08	9.43-17.36	
	Sonoma Valley Hospital	54	10	18.52	15.48	12.46	5.73-21.70	
	Sutter Medical Center of Santa Rosa	98	10	10.20	9.72	10.94	4.94-19.60	
Stanislaus	Doctors Medical Center	471	53	11.25	8.65	13.55	10.04-17.67	
	Emanuel Medical Center, Inc.	133	16	12.03	8.25	15.20	8.40-24.29	
	Memorial Hospital Medical Center – Modesto	441	57	12.93	10.64	12.66	9.53-16.28	
	Oak Valley District Hospital	37	3	8.11	7.33	11.52	1.76-33.04	
Tehama	Saint Elizabeth Community Hospital	72	10	13.89	12.67	11.42	5.31-20.00	
Tulare	Kaweah Delta Medical Center	475	58	12.21	9.14	13.93	10.54-17.87	Worse
	Sierra View District Hospital	193	26	13.47	10.19	13.78	9.00-19.77	

Table 8. Hospital Risk-Adjusted 30-Day Mortality Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	98% CI for RAMR	Performance Rating*
Statewide		70,447	7,340	10.42				
Tulare (continued)	Tulare Regional Medical Center	74	12	16.22	9.41	17.96	8.84-30.26	
Tuolumne	Sonora Regional Medical Center – Greenley	149	24	16.11	12.90	13.01	8.26-18.87	
Ventura	Community Memorial Hospital – San Buenaventura	327	33	10.09	11.47	9.17	6.18-12.89	
	Los Robles Hospital and Medical Center	285	39	13.68	11.60	12.29	8.72-16.56	
	Ojai Valley Community Hospital	32	5	15.63	15.28	10.66	3.55-22.33	
	Saint John's Pleasant Valley Hospital	137	22	16.06	13.36	12.52	7.80-18.43	
	Saint John's Regional Medical Center	264	27	10.23	9.63	11.07	7.16-15.98	
	Simi Valley Hospital and Healthcare Services – Sycamore	131	18	13.74	10.04	14.26	8.65-21.60	
	Ventura County Medical Center	134	17	12.69	8.88	14.89	8.76-22.84	
Yolo	Sutter Davis Hospital	72	9	12.50	12.73	10.23	4.49-18.50	
	Woodland Memorial Hospital	107	20	18.69	11.05	17.63	10.78-26.14	Worse

Table 8. Hospital Risk-Adjusted 30-Day Mortality Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	98% CI for RAMR	Performance Rating*
Statewide		70,447	7,340	10.42				
Yuba	Rideout Memorial Hospital	348	39	11.21	9.57	12.20	8.60-16.51	

* A Hospital is classified as "Better" if the upper 98% Confidence Interval (CI) of the risk-adjusted rate falls below the California observed rate 10.42% for RAMR. A hospital is classified as "Worse" if the lower 98% CI of the risk-adjusted rate is higher than the California observed rate. A hospital's performance is classified as "As Expected" (rating is blank) if the California observed rate falls within the 98% CI of the hospital risk-adjusted rate.

Table 9. Hospital Risk-Adjusted 30-Day Readmission Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	98% CI for RARR	Performance Rating*
Statewide		66961	8305	12.40				
Alameda	Alameda County Medical Center – Highland Campus	183	14	7.65	11.55	8.21	4.06-14.39	
	Alameda Hospital	117	22	18.80	12.98	17.96	10.74-27.18	
	Alta Bates Summit Medical Center – Alta Bates Campus	296	26	8.78	12.08	9.02	5.53-13.65	
	Alta Bates Summit Medical Center – Summit Campus – Hawthorne	441	59	13.38	14.15	11.73	8.66-15.36	
	Eden Medical Center	374	45	12.03	12.80	11.66	8.18-15.92	
	Kaiser Foundation Hospital – Hayward	397	43	10.83	14.28	9.40	6.52-12.96	
	Kaiser Foundation Hospital – Oakland Campus	504	64	12.70	14.61	10.78	8.06-13.98	
	Saint Rose Hospital	107	22	20.56	12.09	21.10	12.63-31.82	Worse
	San Leandro Hospital	65	4	6.15	14.25	5.36	1.13-14.50	
	Valleycare Medical Center	111	10	9.01	10.57	10.57	4.48-20.23	
	Washington Hospital – Fremont	330	44	13.33	12.72	13.00	9.09-17.75	

Table 9. Hospital Risk-Adjusted 30-Day Readmission Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	98% CI for RARR	Performance Rating*
Statewide		66961	8305	12.40				
Amador	Sutter Amador Hospital	107	8	7.48	11.85	7.83	2.92-16.14	
Butte	Enloe Medical Center – Esplanade Campus	438	43	9.82	10.87	11.20	7.75-15.49	
	Feather River Hospital	135	15	11.11	11.41	12.08	6.19-20.51	
	Oroville Hospital	166	26	15.66	11.51	16.88	10.50-25.02	
Calaveras	Mark Twain Medical Center	41	9	21.95	11.03	24.68	10.27-45.23	
Contra Costa	Contra Costa Regional Medical Center	109	17	15.60	11.13	17.38	9.46-28.12	
	Doctors Medical Center – San Pablo	238	33	13.87	13.88	12.39	8.16-17.67	
	John Muir Medical Center – Concord Campus	293	42	14.33	13.53	13.14	9.14-18.00	
	John Muir Medical Center – Walnut Creek Campus	408	42	10.29	12.14	10.51	7.25-14.56	
	Kaiser Foundation Hospital – Antioch	257	35	13.62	14.45	11.69	7.81-16.51	

Table 9. Hospital Risk-Adjusted 30-Day Readmission Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	98% CI for RARR	Performance Rating*
Statewide		66961	8305	12.40				
Contra Costa (continued)	Kaiser Foundation Hospital – Walnut Creek	326	42	12.88	14.05	11.38	7.89-15.65	
	San Ramon Regional Medical Center	132	16	12.12	12.12	12.40	6.55-20.60	
	Sutter Delta Medical Center	163	25	15.34	13.59	13.99	8.61-20.89	
Del Norte	Sutter Coast Hospital	104	12	11.54	10.61	13.49	6.30-24.22	
El Dorado	Marshall Medical Center	163	16	9.82	12.09	10.07	5.29-16.87	
Fresno	Clovis Community Medical Center	213	22	10.33	11.72	10.93	6.40-17.05	
	Community Regional Medical Center – Fresno	690	94	13.62	12.53	13.48	10.64-16.72	
	Kaiser Foundation Hospital – Fresno	301	34	11.30	13.54	10.34	6.83-14.79	
	Saint Agnes Medical Center	682	86	12.61	12.53	12.48	9.73-15.65	
Humboldt	Mad River Community Hospital	46	4	8.70	10.19	10.58	2.24-28.08	
	Redwood Memorial Hospital	31	5	16.13	10.79	18.53	4.99-42.28	
	Saint Joseph Hospital – Eureka	174	16	9.20	12.51	9.12	4.78-15.34	

Table 9. Hospital Risk-Adjusted 30-Day Readmission Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	98% CI for RARR	Performance Rating*
Statewide		66961	8305	12.40				
Imperial	El Centro Regional Medical Center	207	33	15.94	13.40	14.75	9.75-20.95	
	Pioneers Memorial Hospital	126	14	11.11	11.41	12.08	6.03-20.85	
Kern	Bakersfield Heart Hospital	79	5	6.33	11.62	6.76	1.77-16.71	
	Bakersfield Memorial Hospital	310	43	13.87	12.64	13.61	9.49-18.61	
	Kern Medical Center	40	3	7.50	10.61	8.76	1.30-26.78	
	Mercy Hospital – Bakersfield	195	28	14.36	11.51	15.48	9.79-22.73	
	San Joaquin Community Hospital	669	89	13.30	11.79	14.00	10.97-17.48	
Kings	Adventist Medical Center	199	22	11.06	12.23	11.21	6.58-17.42	
Lake	Sutter Lakeside Hospital	55	4	7.27	12.14	7.43	1.57-19.91	
Los Angeles	Alhambra Hospital	97	9	9.28	13.98	8.23	3.30-16.19	
	Antelope Valley Hospital	434	57	13.13	12.25	13.30	9.75-17.51	
	Beverly Hospital	148	27	18.24	14.51	15.60	9.88-22.73	
	California Hospital Medical Center – Los Angeles	243	35	14.40	12.88	13.87	9.27-19.57	

Table 9. Hospital Risk-Adjusted 30-Day Readmission Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	98% CI for RARR	Performance Rating*
Statewide		66961	8305	12.40				
Los Angeles (continued)	Cedars Sinai Medical Center	727	122	16.78	12.78	16.28	13.31-19.59	Worse
	Centinela Hospital Medical Center	406	85	20.94	15.59	16.65	13.12-20.61	Worse
	Citrus Valley Medical Center – Inter-Community Campus	157	23	14.65	12.46	14.59	8.75-22.20	
	Citrus Valley Medical Center – Queen of the Valley Campus	296	43	14.53	11.98	15.04	10.49-20.55	
	Community and Mission Hospital of Huntington Park – Slauson	38	6	15.79	12.87	15.22	4.78-32.60	
	Community Hospital of Long Beach	49	3	6.12	13.39	5.67	0.85-17.33	
	Downey Regional Medical Center	241	35	14.52	13.23	13.62	9.11-19.20	
	Encino Hospital Medical Center	41	8	19.51	16.34	14.81	5.72-28.42	
	Foothill Presbyterian Hospital – Johnston Memorial	106	14	13.21	10.99	14.91	7.48-25.51	
	Garfield Medical Center	319	51	15.99	13.91	14.25	10.30-18.94	
	Glendale Adventist Medical Center – Wilson Terrace	367	53	14.44	13.24	13.53	9.82-17.94	

Table 9. Hospital Risk-Adjusted 30-Day Readmission Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	98% CI for RARR	Performance Rating*
Statewide		66961	8305	12.40				
Los Angeles (continued)	Glendale Memorial Hospital and Medical Center	149	23	15.44	12.10	15.83	9.51-24.03	
	Good Samaritan Hospital – Los Angeles	182	28	15.38	13.39	14.25	9.04-20.85	
	Greater El Monte Community Hospital	42	11	26.19	13.69	23.72	11.17-40.30	
	Henry Mayo Newhall Memorial Hospital	260	40	15.38	12.53	15.23	10.50-20.99	
	Hollywood Presbyterian Medical Center	253	56	22.13	13.64	20.13	14.96-26.06	Worse
	Huntington Memorial Hospital	499	59	11.82	12.42	11.81	8.69-15.53	
	Kaiser Foundation Hospital – Baldwin Park	393	49	12.47	13.27	11.66	8.32-15.69	
	Kaiser Foundation Hospital – Downey	329	45	13.68	13.45	12.61	8.88-17.14	
	Kaiser Foundation Hospital – Panorama City	238	34	14.29	12.08	14.67	9.73-20.82	

Table 9. Hospital Risk-Adjusted 30-Day Readmission Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	98% CI for RARR	Performance Rating*
Statewide		66961	8305	12.40				
Los Angeles (continued)	Kaiser Foundation Hospital – South Bay	250	42	16.80	14.91	13.98	9.77-19.02	
	Kaiser Foundation Hospital – Sunset	400	54	13.50	12.63	13.26	9.64-17.57	
	Kaiser Foundation Hospital – West Los Angeles	310	47	15.16	13.57	13.86	9.85-18.67	
	Kaiser Foundation Hospital – Woodland Hills	257	29	11.28	13.88	10.08	6.40-14.83	
	Keck Hospital of University of Southern California	64	4	6.25	11.57	6.70	1.41-18.14	
	Lakewood Regional Medical Center	374	66	17.65	12.82	17.07	12.91-21.88	Worse
	Long Beach Memorial Medical Center	632	84	13.29	11.93	13.81	10.74-17.36	
	Los Angeles Community Hospital	37	7	18.92	15.18	15.46	5.47-30.90	
	Los Angeles County/Harbor – UCLA Medical Center	282	35	12.41	11.52	13.37	8.90-18.97	
	Los Angeles County/Olive View – UCLA Medical Center	157	15	9.55	10.60	11.17	5.71-19.11	

Table 9. Hospital Risk-Adjusted 30-Day Readmission Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	98% CI for RARR	Performance Rating*
Statewide		66961	8305	12.40				
Los Angeles (continued)	Los Angeles County/University of Southern California Medical Center	217	26	11.98	11.05	13.45	8.29-20.20	
	Marina Del Rey Hospital	82	9	10.98	12.03	11.31	4.56-22.09	
	Memorial Hospital of Gardena	87	14	16.09	13.06	15.28	7.73-25.79	
	Methodist Hospital of Southern California	545	78	14.31	13.10	13.55	10.46-17.13	
	Mission Community Hospital – Panorama Campus	43	6	13.95	15.51	11.16	3.48-24.20	
	Monterey Park Hospital	44	5	11.36	13.29	10.61	2.82-25.06	
	Northridge Hospital Medical Center	306	33	10.78	12.35	10.83	7.09-15.59	
	Olympia Medical Center	78	14	17.95	15.10	14.74	7.53-24.58	
	Pacific Alliance Medical Center, Inc.	97	9	9.28	14.21	8.10	3.25-15.91	
	Pacific Hospital of Long Beach	35	6	17.14	17.12	12.42	3.96-26.12	
	Pacifica Hospital of the Valley	160	19	11.88	12.10	12.17	6.83-19.46	
	Palmdale Regional Medical Center	552	61	11.05	11.79	11.63	8.60-15.23	

Table 9. Hospital Risk-Adjusted 30-Day Readmission Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	98% CI for RARR	Performance Rating*
Statewide		66961	8305	12.40				
Los Angeles (continued)	Pomona Valley Hospital Medical Center	542	56	10.33	12.84	9.98	7.26-13.25	
	Presbyterian Intercommunity Hospital	376	52	13.83	13.48	12.73	9.21-16.93	
	Providence Holy Cross Medical Center	147	20	13.61	12.23	13.80	7.91-21.68	
	Providence Little Company of Mary Medical Center – San Pedro	43	6	13.95	15.51	11.16	3.48-24.20	
	Providence Little Company of Mary Medical Center – Torrance	512	69	13.48	12.33	13.55	10.25-17.41	
	Providence Saint Joseph Medical Center	507	69	13.61	12.33	13.68	10.36-17.56	
	Providence Tarzana Medical Center	248	35	14.11	12.76	13.71	9.16-19.38	
	Ronald Reagan UCLA Medical Center	417	63	15.11	12.60	14.87	11.12-19.25	
	Saint Francis Medical Center	200	31	15.50	14.18	13.56	8.84-19.44	
	Saint John's Health Center	154	15	9.74	12.28	9.84	5.04-16.75	
	Saint Mary Medical Center	177	24	13.56	14.58	11.54	6.99-17.46	

Table 9. Hospital Risk-Adjusted 30-Day Readmission Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	98% CI for RARR	Performance Rating*
Statewide		66961	8305	12.40				
Los Angeles (continued)	Saint Vincent Medical Center	142	19	13.38	12.58	13.19	7.43-20.97	
	San Dimas Community Hospital	67	12	17.91	11.85	18.75	8.99-32.49	
	San Gabriel Valley Medical Center	139	15	10.79	13.14	10.19	5.23-17.28	
	Santa Monica – UCLA Medical Center and Orthopedic Hospital	188	30	15.96	11.61	17.05	11.02-24.61	
	Sherman Oaks Hospital	54	8	14.81	14.35	12.81	4.88-25.26	
	Southern California Hospital at Culver City	103	21	20.39	13.58	18.62	11.03-28.26	
	Temple Community Hospital	56	12	21.43	14.26	18.64	8.97-31.82	
	Torrance Memorial Medical Center	543	81	14.92	12.22	15.14	11.75-19.05	
	University of Southern California Verdugo Hills Hospital	113	16	14.16	10.73	16.36	8.67-27.01	
	Valley Presbyterian Hospital	208	24	11.54	13.78	10.38	6.27-15.81	
	West Hills Hospital and Medical Center	209	28	13.40	11.16	14.89	9.39-21.93	
	White Memorial Medical Center	385	69	17.92	15.13	14.69	11.20-18.69	

Table 9. Hospital Risk-Adjusted 30-Day Readmission Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	98% CI for RARR	Performance Rating*
Statewide		66961	8305	12.40				
Los Angeles (continued)	Whittier Hospital Medical Center	99	13	13.13	13.68	11.91	5.82-20.66	
Madera	Madera Community Hospital	58	6	10.34	11.37	11.28	3.47-25.29	
Marin	Kaiser Foundation Hospital – San Rafael	201	20	9.95	12.39	9.96	5.66-15.85	
	Marin General Hospital	226	23	10.18	11.72	10.77	6.39-16.65	
	Novato Community Hospital	48	5	10.42	12.88	10.03	2.68-23.73	
Mendocino	Frank R. Howard Memorial Hospital	40	1	2.50	10.85	2.86	0.03-17.56	
	Mendocino Coast District Hospital	30	3	10.00	10.13	12.25	1.83-36.29	
	Ukiah Valley Medical Center	104	17	16.35	11.61	17.46	9.52-28.16	
Merced	Mercy Medical Center – Merced	258	29	11.24	13.53	10.30	6.54-15.16	
Monterey	Community Hospital Monterey Peninsula	315	43	13.65	11.16	15.18	10.56-20.81	
	Natividad Medical Center	57	5	8.77	10.48	10.38	2.73-25.22	
	Salinas Valley Memorial Hospital	312	36	11.54	12.33	11.61	7.76-16.44	

Table 9. Hospital Risk-Adjusted 30-Day Readmission Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	98% CI for RARR	Performance Rating*
Statewide		66961	8305	12.40				
Napa	Queen of the Valley Hospital – Napa	157	18	11.47	12.91	11.01	6.07-17.84	
	Saint Helena Hospital	57	6	10.53	12.61	10.36	3.20-23.00	
Nevada	Sierra Nevada Memorial Hospital	156	23	14.74	11.10	16.48	9.86-25.13	
Orange	AHMC Anaheim Regional Medical Center	221	32	14.48	11.81	15.21	9.96-21.79	
	Fountain Valley Regional Hospital and Medical Center – Euclid	456	56	12.28	13.68	11.13	8.15-14.69	
	Garden Grove Hospital and Medical Center	79	7	8.86	12.46	8.82	3.02-18.89	
	Hoag Memorial Hospital Presbyterian	813	101	12.42	11.34	13.59	10.81-16.77	
	Huntington Beach Hospital	54	10	18.52	13.57	16.93	7.40-30.70	
	Kaiser Foundation Hospital – Anaheim	250	32	12.80	11.71	13.56	8.84-19.52	
	Kaiser Foundation Hospital – Lakeview	200	19	9.50	12.69	9.28	5.18-14.95	
	La Palma Intercommunity Hospital	76	4	5.26	12.79	5.10	1.07-13.94	

Table 9. Hospital Risk-Adjusted 30-Day Readmission Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	98% CI for RARR	Performance Rating*
Statewide		66961	8305	12.40				
Orange (continued)	Los Alamitos Medical Center	381	44	11.55	11.46	12.50	8.72-17.15	
	Mission Hospital Regional Medical Center	438	55	12.56	11.56	13.48	9.81-17.87	
	Orange Coast Memorial Medical Center	204	29	14.22	12.23	14.41	9.21-21.01	
	Placentia Linda Hospital	77	12	15.58	10.98	17.60	8.33-30.91	
	Saddleback Memorial Medical Center	405	54	13.33	11.55	14.31	10.39-19.00	
	Saint Joseph Hospital – Orange	426	56	13.15	11.39	14.31	10.46-18.91	
	Saint Jude Medical Center	533	62	11.63	12.64	11.42	8.47-14.92	
	UC Irvine Medical Center	338	41	12.13	12.48	12.05	8.29-16.69	
	West Anaheim Medical Center	118	16	13.56	13.94	12.06	6.40-19.90	
	Western Medical Center – Santa Ana	173	16	9.25	11.56	9.92	5.20-16.70	
Placer	Kaiser Foundation Hospital – Roseville	479	49	10.23	13.12	9.67	6.87-13.08	

Table 9. Hospital Risk-Adjusted 30-Day Readmission Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	98% CI for RARR	Performance Rating*
Statewide		66961	8305	12.40				
Placer (continued)	Sutter Auburn Faith Hospital	174	11	6.32	11.93	6.57	2.90-12.40	Better
	Sutter Roseville Medical Center	469	47	10.02	12.37	10.04	7.08-13.68	
Riverside	Corona Regional Medical Center – Main	140	14	10.00	12.25	10.13	5.05-17.54	
	Desert Regional Medical Center	536	61	11.38	11.36	12.43	9.19-16.29	
	Eisenhower Medical Center	807	82	10.16	11.28	11.17	8.62-14.15	
	Hemet Valley Medical Center	351	49	13.96	12.59	13.76	9.84-18.45	
	John F. Kennedy Memorial Hospital	87	17	19.54	12.09	20.04	11.03-31.87	
	Kaiser Foundation Hospital – Moreno Valley	100	14	14.00	13.75	12.63	6.38-21.45	
	Kaiser Foundation Hospital – Riverside	227	21	9.25	12.87	8.92	5.14-14.08	
	Loma Linda University Medical Center – Murrieta	63	14	22.22	10.60	25.99	13.37-42.72	Worse
	Menifee Valley Medical Center	82	16	19.51	12.10	20.01	10.79-32.24	

Table 9. Hospital Risk-Adjusted 30-Day Readmission Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	98% CI for RARR	Performance Rating*
Statewide		66961	8305	12.40				
Riverside (continued)	Parkview Community Hospital Medical Center	176	32	18.18	12.08	18.67	12.30-26.50	
	Riverside Community Hospital	470	72	15.32	12.70	14.96	11.42-19.06	
	Riverside County Regional Medical Center	276	32	11.59	11.81	12.17	7.92-17.59	
	San Gorgonio Memorial Hospital	89	10	11.24	11.88	11.73	5.01-22.14	
	Southwest Healthcare System – Murrieta	399	51	12.78	11.05	14.35	10.31-19.21	
Sacramento	Kaiser Foundation Hospital – Sacramento	408	44	10.78	13.51	9.90	6.90-13.59	
	Kaiser Foundation Hospital – South Sacramento	445	54	12.13	14.61	10.30	7.48-13.68	
	Mercy General Hospital	325	36	11.08	13.58	10.11	6.77-14.30	
	Mercy Hospital – Folsom	123	18	14.63	10.69	16.98	9.40-27.26	
	Mercy San Juan Hospital	633	70	11.06	12.61	10.87	8.22-14.00	
	Methodist Hospital of Sacramento	331	49	14.80	13.44	13.66	9.79-18.29	

Table 9. Hospital Risk-Adjusted 30-Day Readmission Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	98% CI for RARR	Performance Rating*
Statewide		66961	8305	12.40				
Sacramento (continued)	Sutter General Hospital	419	46	10.98	12.19	11.17	7.85-15.24	
	Sutter Memorial Hospital	154	16	10.39	12.54	10.28	5.40-17.22	
	UC Davis Medical Center	413	51	12.35	11.76	13.02	9.35-17.45	
San Benito	Hazel Hawkins Memorial Hospital	38	4	10.53	10.87	12.01	2.56-31.26	
San Bernardino	Arrowhead Regional Medical Center	443	50	11.29	10.83	12.92	9.22-17.42	
	Barstow Community Hospital	87	15	17.24	12.97	16.49	8.62-27.20	
	Chino Valley Medical Center	86	12	13.95	13.40	12.91	6.08-22.86	
	Community Hospital of San Bernardino	38	5	13.16	12.44	13.12	3.53-30.50	
	Desert Valley Hospital	241	38	15.77	14.80	13.22	9.02-18.33	
	Hi-Desert Medical Center	76	13	17.11	11.58	18.32	9.05-31.25	
	Kaiser Foundation Hospital – Fontana	468	64	13.68	13.06	12.98	9.72-16.82	
	Loma Linda University Medical Center	563	60	10.66	12.25	10.79	7.95-14.18	
	Redlands Community Hospital	288	34	11.81	12.12	12.08	7.98-17.27	

Table 9. Hospital Risk-Adjusted 30-Day Readmission Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	98% CI for RARR	Performance Rating*
Statewide		66961	8305	12.40				
San Bernardino (continued)	Saint Bernadine Medical Center	225	30	13.33	12.72	13.01	8.37-18.89	
	Saint Mary Regional Medical Center	376	53	14.10	12.25	14.27	10.35-18.95	
	San Antonio Community Hospital	449	46	10.25	11.48	11.07	7.78-15.12	
	Victor Valley Global Medical Center	99	15	15.15	11.89	15.80	8.19-26.36	
San Diego	Alvarado Hospital	137	14	10.22	13.24	9.57	4.78-16.54	
	Grossmont Hospital	821	130	15.83	12.39	15.85	13.03-19.00	Worse
	Kaiser Foundation Hospital – San Diego	494	53	10.73	11.76	11.32	8.16-15.15	
	Palomar Medical Center	613	70	11.42	11.02	12.85	9.71-16.55	
	Paradise Valley Hospital	125	25	20.00	14.09	17.60	10.96-25.87	
	Pomerado Hospital	198	17	8.59	10.79	9.87	5.27-16.42	
	Scripps Green Hospital	174	23	13.22	11.78	13.91	8.31-21.30	
	Scripps Memorial Hospital – Encinitas	298	21	7.05	10.85	8.05	4.61-12.85	
	Scripps Memorial Hospital – La Jolla	362	46	12.71	11.76	13.40	9.44-18.22	

Table 9. Hospital Risk-Adjusted 30-Day Readmission Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	98% CI for RARR	Performance Rating*
Statewide		66961	8305	12.40				
San Diego (continued)	Scripps Mercy Hospital	734	103	14.03	12.08	14.40	11.50-17.69	
	Sharp Chula Vista Medical Center	398	49	12.31	12.50	12.22	8.71-16.46	
	Sharp Coronado Hospital and Healthcare Center	34	6	17.65	11.21	19.52	6.18-41.24	
	Sharp Memorial Hospital	559	64	11.45	11.70	12.14	9.05-15.82	
	Tri-City Medical Center – Oceanside	520	43	8.27	11.14	9.21	6.35-12.77	
	UC San Diego Medical Center	355	52	14.65	11.93	15.23	11.02-20.23	
San Francisco	California Pacific Medical Center – Davies Campus	277	31	11.19	13.01	10.67	6.89-15.51	
	California Pacific Medical Center – Pacific Campus	281	30	10.68	12.63	10.49	6.71-15.35	
	California Pacific Medical Center – St. Luke's Campus	38	4	10.53	14.58	8.96	1.92-23.13	
	Chinese Hospital	94	9	9.57	13.32	8.92	3.58-17.50	
	Kaiser Foundation Hospital – San Francisco	278	27	9.71	13.26	9.09	5.64-13.62	
	Saint Francis Memorial Hospital	157	25	15.92	12.77	15.46	9.52-23.08	

Table 9. Hospital Risk-Adjusted 30-Day Readmission Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	98% CI for RARR	Performance Rating*
Statewide		66961	8305	12.40				
San Francisco (continued)	Saint Mary's Medical Center – San Francisco	151	17	11.26	12.62	11.07	5.96-18.20	
	San Francisco General Hospital	306	36	11.76	11.63	12.55	8.39-17.78	
	UC San Francisco Medical Center	323	41	12.69	11.87	13.26	9.13-18.34	
San Joaquin	Dameron Hospital	143	19	13.29	12.67	13.01	7.32-20.70	
	Doctors Hospital of Manteca	79	12	15.19	13.23	14.24	6.74-25.01	
	Kaiser Foundation Hospital – Manteca	140	13	9.29	15.12	7.62	3.68-13.45	
	Lodi Memorial Hospital	127	18	14.17	11.61	15.15	8.38-24.33	
	Saint Joseph's Medical Center of Stockton	392	43	10.97	12.38	10.99	7.62-15.14	
	San Joaquin General Hospital	147	21	14.29	11.70	15.14	8.82-23.51	
	Sutter Tracy Community Hospital	82	14	17.07	12.55	16.87	8.58-28.31	

Table 9. Hospital Risk-Adjusted 30-Day Readmission Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	98% CI for RARR	Performance Rating*
Statewide		66961	8305	12.40				
San Luis Obispo	French Hospital Medical Center	92	5	5.43	10.85	6.21	1.62-15.51	
	Marian Regional Medical Center – Arroyo Grande	100	2	2.00	10.71	2.32	0.17-9.37	Better
	Sierra Vista Regional Medical Center	137	13	9.49	10.30	11.43	5.50-20.28	
	Twin Cities Community Hospital	165	19	11.52	10.32	13.84	7.74-22.20	
San Mateo	Kaiser Foundation Hospital – Redwood City	290	29	10.00	12.71	9.76	6.18-14.41	
	Kaiser Foundation Hospital – South San Francisco	216	27	12.50	13.68	11.34	7.07-16.84	
	Mills-Peninsula Medical Center	371	42	11.32	12.49	11.24	7.77-15.53	
	San Mateo Medical Center	33	1	3.03	11.22	3.35	0.03-20.20	
	Sequoia Hospital	131	13	9.92	11.75	10.47	5.06-18.49	
	Seton Medical Center	273	22	8.06	13.23	7.56	4.40-11.86	Better
Santa Barbara	Lompoc Valley Medical Center	65	2	3.08	11.63	3.28	0.25-13.05	
	Marian Region Medical Center	240	24	10.00	11.97	10.36	6.22-15.89	

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Statewide		66961	8305	12.40				
Santa Barbara (continued)	Santa Barbara Cottage Hospital	517	45	8.70	10.78	10.02	6.98-13.79	
Santa Clara	El Camino Hospital	350	35	10.00	11.60	10.69	7.07-15.28	
	Good Samaritan Hospital – San Jose	440	49	11.14	10.95	12.61	8.97-17.05	
	Kaiser Foundation Hospital – San Jose	326	42	12.88	13.23	12.08	8.37-16.63	
	Kaiser Foundation Hospital – Santa Clara	436	53	12.16	12.77	11.80	8.53-15.74	
	O'Connor Hospital – San Jose	232	26	11.21	11.84	11.74	7.22-17.67	
	Regional Medical of San Jose	424	58	13.68	13.43	12.63	9.30-16.59	
	Saint Louise Regional Hospital	95	7	7.37	13.93	6.56	2.24-14.15	
	Santa Clara Valley Medical Center	355	48	13.52	11.31	14.82	10.54-20.01	
	Stanford Hospital	374	36	9.63	11.24	10.62	7.07-15.12	
Santa Cruz	Dominican Hospital – Santa Cruz/Soquel	269	20	7.43	10.59	8.71	4.91-14.02	

Table 9. Hospital Risk-Adjusted 30-Day Readmission Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	98% CI for RARR	Performance Rating*
Statewide		66961	8305	12.40				
Santa Cruz (continued)	Watsonville Community Hospital	107	11	10.28	11.77	10.84	4.84-20.02	
Shasta	Mercy Medical Center – Redding	348	33	9.48	11.43	10.29	6.71-14.88	
	Shasta Regional Medical Center	221	27	12.22	10.57	14.34	8.93-21.37	
Siskiyou	Fairchild Medical Center	48	4	8.33	10.00	10.34	2.19-27.51	
Solano	Kaiser Foundation Hospital – Rehabilitation Center Vallejo	304	32	10.53	14.76	8.85	5.75-12.80	
	Kaiser Foundation Hospital – Vacaville	191	15	7.85	12.89	7.56	3.85-12.99	
	North Bay Medical Center	221	34	15.38	13.23	14.42	9.61-20.37	
	Sutter Solano Medical Center	144	13	9.03	13.48	8.30	4.00-14.72	
Sonoma	Healdsburg District Hospital	47	4	8.51	10.02	10.54	2.23-28.02	
	Kaiser Foundation Hospital – Santa Rosa	238	23	9.66	13.77	8.71	5.17-13.46	
	Palm Drive Hospital	47	4	8.51	12.73	8.29	1.76-21.95	
	Petaluma Valley Hospital	64	6	9.38	11.18	10.40	3.19-23.46	

Table 9. Hospital Risk-Adjusted 30-Day Readmission Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	98% CI for RARR	Performance Rating*
Statewide		66961	8305	12.40				
Sonoma (continued)	Santa Rosa Memorial Hospital – Montgomery	262	22	8.40	11.69	8.91	5.19-13.99	
	Sonoma Valley Hospital	53	1	1.89	10.63	2.20	0.02-13.79	
	Sutter Medical Center of Santa Rosa	96	5	5.21	10.52	6.14	1.60-15.37	
Stanislaus	Doctors Medical Center	451	41	9.09	12.02	9.38	6.42-13.09	
	Emanuel Medical Center, Inc.	129	10	7.75	10.69	8.99	3.80-17.34	
	Memorial Hospital Medical Center – Modesto	422	57	13.51	11.97	13.99	10.27-18.41	
	Oak Valley District Hospital	36	4	11.11	10.14	13.60	2.90-35.19	
Tehama	Saint Elizabeth Community Hospital	68	5	7.35	11.50	7.93	2.08-19.42	
Tulare	Kaweah Delta Medical Center	446	50	11.21	11.86	11.72	8.37-15.79	
	Sierra View District Hospital	179	22	12.29	12.65	12.05	7.10-18.65	
	Tulare Regional Medical Center	71	12	16.90	11.86	17.67	8.38-30.89	
Tuolumne	Sonora Regional Medical Center – Greenley	137	13	9.49	12.05	9.76	4.71-17.28	

Table 9. Hospital Risk-Adjusted 30-Day Readmission Results by County, 2012-2013

County	Hospital	Ischemic Stroke Cases	Ischemic Stroke Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	98% CI for RARR	Performance Rating*
Statewide		66961	8305	12.40				
Ventura	Community Memorial Hospital – San Buenaventura	316	38	12.03	11.42	13.06	8.84-18.33	
	Los Robles Hospital and Medical Center	267	29	10.86	10.98	12.27	7.78-18.08	
	Ojai Valley Community Hospital	31	2	6.45	12.71	6.29	0.47-23.72	
	Saint John's Pleasant Valley Hospital	129	12	9.30	11.82	9.76	4.54-17.66	
	Saint John's Regional Medical Center	251	28	11.16	13.12	10.55	6.63-15.63	
	Simi Valley Hospital and Healthcare Services – Sycamore	118	23	19.49	11.93	20.27	12.30-30.35	
	Ventura County Medical Center	125	12	9.60	12.36	9.63	4.49-17.40	
Yolo	Sutter Davis Hospital	69	4	5.80	12.42	5.79	1.22-15.72	
	Woodland Memorial Hospital	98	7	7.14	10.69	8.29	2.82-18.02	
Yuba	Rideout Memorial Hospital	331	37	11.18	12.28	11.29	7.59-15.92	

*A Hospital is classified as "Better" if the upper 98% Confidence Interval (CI) of the risk-adjusted rate falls below the California observed rate (12.40% for RARR). A hospital is classified as "Worse" if the lower 98% CI of the risk-adjusted rate is higher than the California observed rate. A hospital's performance is classified as "As Expected" (rating is blank) if the California observed rate falls within the 98% CI of the hospital risk-adjusted rate.