Data S1

Medical Chart Procurement, Abstraction, and Quality Measurement

To assess the assumptions underlying our IV estimator we selected a stratified random sample of patients with CKD from our study population based on (1) observed ACEI/ARB use after index stroke, (2) local area ACEI/ARB area treatment rates (ATRs) after stroke (high or low ACEI/ARB areas using patients from the highest and lowest quintiles, respectively), and (3) geographic region, using the four U.S. Census Geographical Regions: Northeast (NE), Midwest (MW), South (ST), and West (WT; US Census Bureau, 2014). To evaluate assumptions underlying the IV estimator, we grouped patients based on local area ACEI/ARB use rates and tested the mean differences in each abstracted measure between groups.

Medical Chart Procurement

Investigators randomly selected 1,424 patients based on the criteria described above. The sample was designed to obtain sufficient medical charts to ensure 840 completed abstractions. Our previous work indicated the need for at least 69% more abstraction requests to obtain the desired number of cases; therefore the initial sample included an oversample based on those response rates.¹

The investigators worked with the Chronic Condition Data Warehouse (CCW) and Information Collection Enterprises (ICE) to obtain the medical charts for these patients. ICE disseminated chart requests for the initial sample on October 2, 2015. The inpatient claims for the index stroke for the abstraction subsample were linked to the Provider of Services (POS) file, a public use file made available by the Centers for Medicare & Medicaid Services (CMS), to obtain hospital contact information for requesting the medical charts. A patient finder file was sent by study investigators to CCW to obtain patient names for inclusion with the chart requests. The finder file also contained an encrypted identification number for each patient. The CCW provided patient information to ICE directly along with the encrypted identification number.
ICE mailed a chart request packet to each facility with a patient in the study. The packet included a cover letter from the Principal Investigator, a 2-page abstract describing the study objectives, a copy of the Center for Medicare and Medicaid Services (CMS) Data Use Agreement (DUA) to document approval to request medical charts, the approval letter from University of South Carolina Institutional Review Board (USC IRB), and medical chart coversheet that contained patient-specific identifiers (name, Social Security Number [SSN], and Medicare Health Insurance Claim [HIC]), and the admission date of the hospitalization chart being requested. The packet also included detailed instructions to photocopy the chart and send all components by secure package to ICE. Hospitals were reimbursed a standard amount per chart for photocopying and United States mail costs. Often the acute portion of an index stroke hospitalization occurred at two facilities if a patient was transferred to another hospital. For the 2% of cases in which a transfer occurred, charts were requested from both hospitals. Failure to obtain charts from both hospitals rendered the case incomplete and was not abstracted.

If the requested medical charts were not received by ICE within 30 days of the original request, the medical charts department was contacted by telephone to re-request the chart. In some cases, a copy of the original packet was mailed again. After these efforts to obtain charts from the initial sample were exhausted, and after abstractors successfully reviewed charts for the original sampling wave, 15 chart requests from a second wave (oversample) were disseminated on May 13, 2016 to obtain the necessary number of medical charts for each category.

**Data Collection Tool**

We created a structured data abstraction tool to obtain information from the medical charts of the sampled patients for the index hospital stay, which could have included treatment at two facilities if the patient was transferred during the acute stay. The data collection tool was based loosely on an instrument used for our previous AMI study. We also leveraged key questions from other well-designed medical chart abstraction tools such as the Women’s Health Initiative and the Adult Comorbidity Evaluation (ACE-27). We examined clinical practice guidelines for management of acute stroke patients and secondary prevention of stroke and included variables to capture important clinical assessment and treatment information. For
example, variables regarding stroke severity and functional status were based on the Modified Rankin Scale (MRS), Barthel Index, Stroke Scales: An Update, and the Continuity and Assessment Record and Evaluation (CARE) item set. Variables were modified and customized in consultation with the study team cardiologist, nephrologist, neurologist, pharmacist, and nurses. The abstraction tool was originally created in Microsoft (MS) Word to allow for ease of viewing the dimensions of care, variables, operational definitions, and to facilitate training, review, and revisions of the tool. After the tool was completed, ICE programmed the data elements into an electronic tool with a user-friendly front-end interface using MS Access. Operational definitions were documented for each variable, including a list of valid sources within a medical chart (e.g., admission face sheet, surgical report, and medication administration record), inclusion/exclusion criteria, time frame parameters, and medical terms/synonyms. To facilitate the collection of medications, a list of commonly prescribed medications and their corresponding dosages was imported into the tool so that a drop-down list could be offered to facilitate efficiency; the field also allowed for the entry of free text so that medications which did not appear on the drop-down list could be captured.

Testing and Fielding the Data Collection Tool

The abstraction tool was finalized by the study team nurses and the ICE lead abstractor. The ICE lead abstractor trained five additional ICE abstractors in December 2015. Collectively, the abstractors had extensive medical chart abstraction experience averaging more than ten years each and all were well-versed in medical terminology, though none were nurses or clinicians. During the training, the study objectives were described, each subsection of the tool was explained, and instructions for each variable were highlighted. Each abstractor received his/her own copy of the abstraction instruction manual for reference while abstracting the cases. Abstractions were completed at a secure, onsite location exclusively.

Prior to beginning abstraction, all abstractors initially reviewed the same set of 8 cases. The cases were sent to the study clinical co-investigators and “gold” answers were established. Inter-rater reliability scores were calculated for each data element by comparing each abstractor’s results to the gold answers. Feedback was given on all discrepancies so that the
collected data would be consistent across the abstractors. Feedback from this training exercise was used to make minor clarifications to the abstraction tool and the manual. When an abstractor demonstrated 95% agreement with the gold standard abstractor for all data elements, the abstractor began abstracting from the pool of charts available.

To coordinate activities between all study team members and facilitate resolution of any barriers to abstraction, the entire research team attended biweekly meetings during which project updates were provided by ICE. These updates included reports detailing the number of charts and full sets/cases requested, received, and refused by primary sample unit (PSU). They also highlighted the number of abstracted cases that were complete to date for each PSU. If, at any time during the data collection process, an abstractor had a question or concern about how to abstract a data element, the on-site lead abstractor was consulted. Questions that required a decision from the clinical team were evaluated (by e-mail or on the bi-weekly call) and responded to within approximately 48 hours. During the abstraction process, our study team clinicians were consulted when a clinical judgment was necessary. To maintain quality throughout the entire project, our protocol involved extensive quality control for the abstracted charts.

**Abstraction and Quality Assurance**

To maintain quality throughout the project, our protocol involved extensive quality control for the abstracted charts. In addition to the inter-rater agreement process used for all abstractors prior to launching the abstraction data collection effort, ongoing internal quality control (IQC) processes were instituted. Three rounds of IQC were performed, one at the start of study and two additional rounds, both of which occurred after 1/3 of the cases (i.e., approximately 280 charts) were abstracted. All rounds of IQC included re-abstraction of a random sample of cases; 18 cases for round 1, and 12 cases for both rounds 2 and 3. This approach yielded interrater agreement scores for 5% of the charts abstracted (42 cases). Each of the abstractors completed three cases that were re-abstracted by another abstractor. An accuracy-by-variable report was prepared, and abstractors who did not meet the 95% agreement per variable standard were retrained and charts they abstracted were re-abstracted by the lead abstractor to ensure
accuracy. To verify that data were abstracted accurately and uniformly across all members of the abstraction team, results from all three IQC rounds were aggregated by conceptual domains and agreement was calculated. We calculated a kappa statistic for each categorical variable and each associated domain; for continuous variables (e.g., lab values) we calculated intra-class correlations (ICC) – then also summarized them into domain scores.

**Analyses**

Because of the voluntary nature of the response from the facilities, we analyzed the characteristics of patients for whom we received charts versus those for whom we did not by linking patient-level beneficiary and Medicare A and B claims from the index stroke stay to our requested and received medical charts. We also linked data from the CMS POS file to obtain geographic information and additional characteristics of the hospital facilities to allow for comparison of responding versus non-responding facilities.

**Results**

A total of 1,439 complete chart sets were requested and 956 were received for an overall response rate of 66.4%; of these, 840 were abstracted. Of the chart sets received, 17 of them were not abstracted due to missing information such as initial intake/history, medication administration list, or discharge instructions; and 84 were not abstracted because they came from a stratum for which the necessary number of charts had been received and abstracted (i.e., we obtained more charts than we needed for some of the strata). For five cases, a transfer occurred, and the other chart was not received, rendering the case unusable for abstraction. Figure S1 documents the medical chart sample requested, received, and abstracted.
Nonresponse analysis revealed that very few differences between patients whose charts were received versus not received (Table S1). Examination of claims-based measures at the patient-level indicated that patients for whom we received charts were more likely white (83.2% versus 77.4%, p=.005), less likely to be dually enrolled in Medicare and Medicaid (33.6% versus 38.5%, p <0.05), were less likely to have required an acute care transfer for the stroke hospitalization (0.9% versus 4.4%; p < 0.0001), and had shorter average acute care lengths of stay (LOS) (5.67 days versus 6.37 days; p < 0.001). Other demographics, as well as characteristics of the index stroke, prior comorbid conditions, and the complications of index stay were all comparable.

Examination of the hospital facility-level nonresponse (Table S2) revealed that we were more likely to receive charts from facilities in the West region of the U.S. (26.7% versus 20.5%; p < 0.01). We were also less likely to receive charts from larger facilities (300+ beds) (45.1% versus 60.4%; p < 0.001).
|                                | Full record received | Full record requested but not received | P-value |
|--------------------------------|----------------------|----------------------------------------|---------|
| **Number**                     | 956                  | 483                                    |         |
| **Demographics**               |                      |                                        |         |
| Percent female                 | 60.8%                | 62.5%                                  | 0.064   |
| Percent dual eligible for Medicaid | 33.6%               | 38.5%                                  | 0.013*  |
| **Race**                       |                      |                                        |         |
| White                          | 83.2%                | 77.4%                                  | 0.005*  |
| Black                          | 9.8%                 | 13.9%                                  | 0.006*  |
| American Native                | 0.6%                 | 0.4%                                   | 0.078   |
| Asian                          | 2.6%                 | 3.3%                                   | 0.066   |
| Other race                     | 1.8%                 | 1.2%                                   | 0.067   |
| Mean age (at time of admission)| 81.48                | 80.78                                  | 0.291   |
| **Baseline Comorbid conditions**|                     |                                        |         |
| CKD                            |                      |                                        |         |
| CKD_STG_1                      | 1.7%                 | 2.1%                                   | 0.076   |
| CKD_STG_2                      | 3.5%                 | 5.2%                                   | 0.025*  |
| CKD_STG_3                      | 26.8%                | 24.4%                                  | 0.060   |
| CKD_STG_4                      | 13.4%                | 9.9%                                   | 0.016*  |
| CKD_STG_5                      | 2.2%                 | 1.5%                                   | 0.056   |
| CKD_STG_NOS                    | 52.4%                | 56.1%                                  | 0.030*  |
| Cardiovascular disease         | 64.5%                | 60.5%                                  | 0.036*  |
| Heart Failure                  | 33.2%                | 32.7%                                  | 0.088   |
| Hypertension                   |                      |                                        |         |
| Without complications          | 65.1%                | 65.8%                                  | 0.079   |
| With complications             | 52.4%                | 50.5%                                  | 0.076   |
| Obesity                        | 5.8%                 | 7.7%                                   | 0.032*  |
| **Function-related indicators (FRI)**|                   |                                        |         |
| FRI0                           | 32.7%                | 32.5%                                  | 0.088   |
| FRI1                           | 25.7%                | 28.4%                                  | 0.046*  |
| FRI2                           | 16.3%                | 15.7%                                  | 0.086   |
| FRI3plus                       | 25.1%                | 22.6%                                  | 0.054   |
| **Characteristics of index institutional stay** | |                                        |         |
| Multiple acute care facility/transfer (transfer) | 0.9% | 4.4% | <.0001* |
| **Discharge disposition**      |                      |                                        |         |
| Discharged home                | 27.6%                | 25.9%                                  | 0.484   |
| Transferred to inpatient hospital | 0.3%               | 0.4%                                   | 0.760   |
| Discharged to LTC/IRF/IPF      | 26.5%                | 22.6%                                  | 0.108   |
| Discharged to SNF/NF           | 31%                  | 32.1%                                  | 0.663   |
Discharged to Home Health 14.6% 19.1% 0.032*
Stay had an ICU component 16.1% 14.7% 0.487
Mean Length of Hospital Stay (LOS) 5.67 6.37 <.0001*

Chrischilles E, Schneider K, Wilwert J, et al. Beyond comorbidity: expanding the definition and measurement of complexity among older adults using administrative claims data. *Med Care.* 2014;52 Suppl 3:S75-84.
* p<.05

For internal quality control (IQC), we calculated a kappa statistic for each item and then summarized the kappa statistics for each conceptual area; for continuous variables (e.g., lab values) we calculated intra-class correlations (ICC) and summarized them for each conceptual area. Figure A2 illustrates the summary scores for each conceptual area, along with the error bars for the standard deviation. Since the kappa statistic corrects for agreement by chance, values 0.41-0.60 are often considered “moderate” agreement, 0.61 – 0.80 is “substantial agreement”, and scores higher than this are considered “very high” or near perfect agreement. ICC are interpreted similarly. All conceptual areas had moderate or better agreement between raters, with four conceptual areas having very high agreement (administrative variables, vitals during stay, lab test values during stay and administration of medications).

| Facility characteristics | Facility returned one or more records | Facility did not return any records | P-value |
|--------------------------|--------------------------------------|-----------------------------------|---------|
| Number (%)               | 967 (65.8%)                          | 503 (34.2%)                       |         |
| Hospital Type            |                                      |                                   |         |
| For profit               | 103 (10.5%)                          | 53 (10.7%)                        | 0.946   |
| NFP                      | 450 (89.5%)                          | 864 (89.4%)                       | 0.946   |
| Number of hospital beds  |                                      |                                   |         |
| Under 100                | 129 (13.3%)                          | 50 (9.9%)                         | 0.059   |
| 100-199                  | 183 (18.9%)                          | 77 (15.3%)                        | 0.085   |
| 200-299                  | 219 (22.7%)                          | 72 (14.3%)                        | 0.0001* |
| 300+                     | 436 (45.1%)                          | 304 (60.4%)                       | <.0001* |
| Region                   |                                      |                                   |         |
| Northeast                | 234 (24.2%)                          | 139 (27.6%)                       | 0.151   |
| Midwest                  | 247 (25.5%)                          | 125 (24.9%)                       | 0.772   |
| South                    | 228 (23.6%)                          | 136 (27.0%)                       | 0.145   |
| Metropolitan Status | West | 258 (26.7%) | 103 (20.5%) | 0.009* |
|---------------------|------|-------------|-------------|--------|
| Urban/Metro         | 825 (85.3%) | 452 (89.9%) | 0.014*    |
| Nonmetro            | 142 (14.7%) | 51 (10.1%)  | 0.014*    |

* p<.05

We originally asked abstractors to find and document use in the charts of standardized stroke severity scores that have been used in previous prospective clinical studies, such as the Modified Rankin Score or Barthel Index. Unfortunately, pilot testing revealed that these standardized scores were almost universally unreported. Therefore, instead, we identified the key concepts from these stroke assessment instruments, and directly measured each of the clinical domains with our abstraction tool to address items such as activities of daily living (ADLs) and functional deficits.

**Limitations**

Study abstractors found little consistent information in the charts with respect to measures of stroke severity. We originally asked abstractors to find and document use in the charts of standardized stroke severity scores that have been used in previous prospective clinical studies, such as the Modified Rankin Score or Barthel Index. Unfortunately, pilot testing revealed that these standardized scores were almost universally unreported. We attempted to isolate the conditions that underlie these measures in the charts. However, uncertainty remains as to whether individual conditions not reported in a chart did not actually exist for a patient or were simply not specifically recorded in the charts at individual institutions. For example, we feel confident that patients who were reported in the charts to have “problems with self-feeding” had this problem. We cannot be certain, though, because of reporting differences across institutions, whether patients who were not reported to have “problems with self-feeding” did not have these problems. As a result, our results are conditional on the assumption that chart reporting differences across institutions are not correlated with ACE/ARB treatment choices or local area ACE/ARB prescribing rates.
Future Research

Abstractors reported substantial variation in the quality and extent of information available in the charts across institutions. Future research requiring data abstracted from patient charts across institutions perhaps should also include measures of chart “completeness” to help ensure that conditions observed for a patient are recorded.

Figure S2. Average Kappa Statistics Indicating Consistency of Abstracting Across Conceptual Domains.
Data S2. Covariate Definitions for Medicare Claims Data Analysis of ACEI/ARB Effectiveness After Ischemic Stroke

Demographic characteristics (age at index stroke, sex, race) were obtained from the CCW Medicare Beneficiary File. Comorbidity concepts related to the use of ACEI/ARBs for secondary prevention of stroke were developed after a thorough review of available measures by the study clinical investigators. The Elixhauser Comorbidity Index (ECI) served as the basis for this effort because of its wide acceptance, common use, and broad spectrum of conditions. Some conditions were separated out of the Elixhauser categories for emphasis (e.g., hyperkalemia). Several conditions in the ECI not considered relevant to this study by our clinical experts were not specified. Other conditions considered important by study clinicians were added using commonly accepted claims-based algorithms (e.g., Chronic Condition Data Warehouse, Mini-Sentinel). Most comorbidities were identified using Medicare claims for the 12 months before the index inpatient stroke admission date through the index stroke institutional stay except for complications sepsis and pneumonia, which were assessed only during the index stroke institutional stay. The table below defines each covariate and measurement approach.

| Covariate       | Definition                                                                                                                                 |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Elix_Depress    | Elixhauser Depression: 1 if patient had (ICD-9 codes 309, 311, 296.2, 296.3, 296.5, 300.4) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| ELIX_FluElexDis | Elixhauser Fluid and Electrolyte Disorders: 1 if patient had (ICD-9 codes 253.6, 276.0, 276.1, 276.2, 276.3, 276.4, 276.5, 276.6, 276.8, 276.9) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| ELIX_Obesity    | Elixhauser Obesity: 1 if patient had (ICD-9 code 278.0)                                                                                        |
| ELIX_WL         | Elixhauser Weight Loss: 1 if patient had (ICD-9 codes 260, 261, 262, 263, 783.2, 799.4) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| Variable | Description |
|----------|-------------|
| ELIX_SubstanceAbuse | Elixhauser Drug Abuse combined with Alcohol Abuse: 1 if patient had (ICD-9 codes 980, 265.2, 291.1, 291.2, 291.3, 291.5, 291.8, 291.9, 303.0, 303.9, 305.0, 357.5, 425.5, 535.3, 571.0, 571.1, 571.2, 571.3, V113, 292, 304, 305.2, 305.3, 305.4, 305.5, 305.6, 305.7, 305.8, 305.9, V654) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| ELIX_Coagu | Elixhauser Coagulopathy: 1 if patient had (ICD-9 codes 286, 287.1, 287.3, 287.4, 287.5) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| ELIX_BLA | Elixhauser Blood Loss Anemia: 1 if patient had (ICD-9 code 280.0) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| ELIX_DA | Elixhauser Deficiency Anemia: 1 if patient had (ICD-9 codes 281, 280.1, 280.8, 280.9) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| CCW_EXTRAAnemia | CCW Anemia (2010) beyond Elixhauser Blood Loss Anemia and Deficiency Anemia: 1 if patient had (ICD-9 codes 282.0, 282.1, 282.2, 282.3, 282.5, 282.7, 282.8, 282.9, 283.0, 283.2, 283.9, 284.2, 284.9, 285.0, 285.1, 285.3, 285.8, 285.9, 282.40, 282.41, 282.42, 282.43, 282.44, 282.45, 282.46, 282.47, 282.49, 282.60, 282.61, 282.62, 282.63, 282.64, 282.68, 282.69, 283.10, 283.11, 283.19, 284.01, 284.09, 284.11, 284.12, 284.19, 284.81, 284.89, 285.21, 285.22, 285.29) on a Medicare Part A or B claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| Sepsis_Index | Sepsis: 1 if patient had (Mini-Sentinel 2011) (ICD-9 code 995.91) on Medicare Part A claim for the index stay, 0 otherwise. |
| ELIX_OthNeuro | Elixhauser Other Neurological Disorders: 1 if patient had (ICD-9 codes 334, 335, 340, 341, 345, 331.9, 332.0, 332.1, 333.4, 333.5, 336.2, 348.1, 348.3, 780.3, 784.3, 333.92) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| ELIX_Paralysis | Elixhauser Paralysis: 1 if patient had (ICD-9 codes 342, 343, 334.1, 344.0, 344.1, 344.2, 344.3, 344.4, 344.5, 344.6, 344.9) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| ELIX_METS | Elixhauser Metastatic Cancer: 1 if patient had (ICD-9 codes 196-199) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| ELIX_CA | Elixhauser Cancer, general: 1 if patient had (ICD-9 codes 140-165, 170-176, 179-195, 200-208, 273.0, 273.3) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| AF | Atrial Fibrillation: 1 if patient had (2010) (Primary or Secondary ICD-9 codes - 427.31, 427.32) on a Medicare Part A or B claim in |
| Variable                      | Definition                                                                 |
|-------------------------------|-----------------------------------------------------------------------------|
| Cardiac_Arrest               | Cardiac Arrest: 1 if patient had (Aujesky 2006) (ICD-9 code 427.5) on a Medicare Part A or B claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| ELIX_Cardiac_Arrhythm        | Elixhauser Cardiac Arrhythmia: 1 if patient had (ICD-9 codes 427.0, 427.1, 427.2, 427.3, 427.4, 427.6, 427.9, 785.0, V450, V533, 996.01, 996.04) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| ELIX_CHF                     | Elixhauser Congestive Heart Failure: 1 if patient had (ICD-9 codes 428, 425.4, 425.5, 425.7, 425.8, 425.9, 398.91, 402.01, 402.11, 402.91, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| CABG                         | Coronary Artery Bypass Graft: 1 if patient had (ICD-9 procedure codes 361, 362, 363; or HCPCS codes 35510, 35511, 35512, 35513, 35514, 35515, 35516, 35517, 35518, 35519, 35520, 35521, 35522, 35523, 35524, 35525, 35526, 35527, 35528, 35529, 35530, 35531, 35532, 35533, 35534, 35535, 35536) on a Medicare Part A or B claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| CCW_IHDnonAMI                | CCW Ischemic Heart Disease - non-AMI: 1 if patient had (2010) (ICD-9 codes 412, 411.0, 411.1, 413.0, 413.1, 413.9, 414.2, 414.3, 414.4, 414.8, 414.9, 410.00, 410.02, 410.10, 410.12, 410.20, 410.22, 410.30, 410.32, 410.40, 410.42, 410.50, 410.52, 410.60, 410.62, 410.70, 410.72, 410.80, 410.82, 410.90, 410.92, 411.81, 411.89, 414.00, 414.01, 414.02, 414.03, 414.04, 414.05, 414.06, 414.07, 414.12) on a Medicare Part A or B claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| CCW_AMI                      | CCW Acute Myocardial Infarction: 1 if patient had (Primary or Secondary ICD-9 codes 410.01, 410.11, 410.21, 410.31, 410.41, 410.51, 410.61, 410.71, 410.81, 410.91) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| ELIX_VD                      | Elixhauser Valvular Disease: 1 if patient had (ICD-9 codes 394, 395, 396, 397, 424, 093.2, 746.3, 746.4, 746.5, 746.6, V422, V433) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| ELIX_COPD                    | Elixhauser Chronic Pulmonary Disease: 1 if patient had (ICD-9 codes 490-496, 500-505, 416.8, 416.9, 506.4, 508.1, 508.8) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| Pneumonia_Index              | Pneumonia: 1 if patient had (ICD-9 codes 481-483) on Medicare Part A claim for the index stay, 0 otherwise. |
| ELIX_RHEUM_A                 | Elixhauser Rheumatologic Disease: 1 if patient had (ICD-9 codes 446, 720, 725, 701.0, 710.0, 710.1, 710.2, 710.3, 710.8, 710.9, 711.2, 719.3, 728.5, 729.30) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| Variable         | Description                                                                                           | Code(s)                                                                                     |
|------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| **CCW_RHEUM_O**  | CCW Rheumatoid and Osteoarthritis: 1 if patient had (ICD-9 codes 714.0, 714.1, 714.2, 720.0, 721.0, 721.1, 721.2, 721.3, 714.30, 714.31, 714.32, 714.33, 715.00, 715.04, 715.09, 715.10, 715.11, 715.12, 715.13, 715.14, 715.15, 715.16, 715.17, 715.18, 715.19, 715.20, 715.21, 715.22, 715.23, 715.24, 715.25, 715.26, 715.27, 715.28, 715.30, 715.31, 715.32, 715.33, 715.34, 715.35, 715.36, 715.37, 715.38, 715.80, 715.89, 715.90, 715.91, 715.92, 715.93, 715.94, 715.95, 715.96, 715.97, 715.98, 721.90, 721.91) on a Medicare Part A or B claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| **ELIX_DMUC**    | Elixhauser Diabetes, uncomplicated: 1 if patient had (ICD-9 codes 250.0, 250.1, 250.2, 250.3) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise.                                                                 |                                                                                             |
| **ELIX_DMC**     | Elixhauser Diabetes, complicated: 1 if patient had (ICD-9 codes 250.4, 250.5, 250.6, 250.7, 250.8, 250.9) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise.                                                                 |                                                                                             |
| **ELIX_HPTN_C**  | Elixhauser Hypertension, complicated: 1 if patient had (ICD-9 codes 402 through 405) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise.                                                                 |                                                                                             |
| **ELIX_HPTN_UC** | Elixhauser Hypertension, uncomplicated: 1 if patient had (ICD-9 codes 401) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise.                                                                 |                                                                                             |
| **CCW_HyperLipid** | CCW Hyperlipidemia: 1 if patient had (ICD-9 codes 272.0, 272.1, 272.2, 272.3, 272.4) on a Medicare Part A or B claim in the period 1-year prior to the index though the index stay, 0 otherwise.                                                                 |                                                                                             |
| **ELIX_HPOTHROID** | Elixhauser Hypothyroidism: 1 if patient had (ICD-9 codes 243, 244, 240.9, 246.1, 246.8) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise.                                                                 |                                                                                             |
| **ELIX_LiverDz** | Elixhauser Liver Disease: 1 if patient had (ICD-9 codes 570, 571, 070.6, 070.9, 456.0, 456.1, 456.2, 572.2, 572.3, 572.4, 572.8, 573.3, 573.4, 573.8, 573.9, V427, 070.22, 070.23, 070.32, 070.33, 070.44, 070.54) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise.                                                                 |                                                                                             |
| **ELIX_PUBNB**   | Elixhauser Peptic Ulcer Disease, Excluding Bleeding: 1 if patient had (ICD-9 codes 531.7, 531.9, 532.7, 532.9, 533.7, 533.9, 534.7, 534.9) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise.                                                                 |                                                                                             |
| **ELIX_PVD**     | Elixhauser Peripheral Vascular Disease/Disorders: 1 if patient had (ICD-9 codes 440, 441, 093.0, 437.3, 443.1, 443.2, 443.8, 443.9, 447.1, 557.1, 557.9, V434) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise.                                                                 |                                                                                             |
| Variable               | Definition                                                                 |
|------------------------|-----------------------------------------------------------------------------|
| ELIX_PCD               | Elixhauser Pulmonary Circulation Disorders: 1 if patient had (ICD-9 codes 416, 415.0, 415.1, 417.0, 417.8, 417.9) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| CHRS_CVD_nonstroke     | Charlson Cerebrovascular Disease: 1 if patient had (ICD-9 codes 432, 433, 437, 438, 435.2; ICD-9 Procedure codes 3812, 3842; HCPCS codes 35001, 35002, 35005, 35301, 35501, 35508, 35509, 35515, 35642, 35645, 35691, 35693) on a Medicare Part A or B claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| ELIX_Psycho            | Elixhauser Psychoses: 1 if patient had (ICD-9 codes 295, 297, 298, 293.8, 296.04, 296.14, 296.44, 296.54) on a Medicare Part A claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| TIA                    | Transient Ischemic Attack: 1 if patient had (ICD-9 code 435) during index stay, 0 otherwise. |
| Hemorrhagic            | Hemorrhagic stroke: 1 if patient had (ICD-9 codes 430, 431) during index stay, 0 otherwise. |
| CCW_AlgDementia        | CCW Alzheimer's Disease and Related Disorders or Senile Dementia: 1 if patient had (ICD-9 codes 797, 331.0, 331.2, 331.7, 290.0, 290.3, 294.0, 294.8, 331.11, 331.19, 290.10, 290.11, 290.12, 290.13, 290.20, 290.21, 290.40, 290.41, 290.42, 290.43, 294.10, 294.11, 294.20, 294.21) on a Medicare Part A or B claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| Angioedema             | Angioedema: 1 if patient had (ICD-9 code 995.1) on a Medicare Part A or B claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| Hyperkalemia           | Hyperkalemia: 1 if patient had (ICD-9 code 276.7) on a Medicare Part A or B claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| ARF                    | Acute renal failure: 1 if patient had (ICD-9 code 584) on a Medicare Part A or B claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| HPOTN                  | Hypotension: 1 if patient had (ICD-9 codes 458.0, 785.5, 988.0) on a Medicare Part A or B claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| Bradycardia            | Bradycardia: 1 if patient had (ICD-9 code 427.8) on a Medicare Part A or B claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| HrtBlock               | Heart Block: 1 if patient had (ICD-9 code 426) on a Medicare Part A or B claim in the period 1-year prior to the index though the index stay, 0 otherwise. |
| Myopathy               | Myopathy serious: 1 if patient had (Primary or Secondary ICD-9 codes 791.3, 729.1, 359.4, 359.8, 359.9, 710.4, 728.9, 729.8, 728.89, E942.2; HCPCS codes 82550, 82552, 82554, 80012, 80016, 80018, 80019) combined with Myopathy non-serious |
| Feature               | Description                                                                                                                                 |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| age66to70            | 1 if patient in age group 66 years to 70 years at index admission from CCW Medicare Beneficiary File, 0 otherwise.                           |
| age71to75            | 1 if patient in age group 71 years to 75 years at index admission from CCW Medicare Beneficiary File, 0 otherwise.                             |
| age76to80            | 1 if patient in age group 76 years to 80 years at index admission from CCW Medicare Beneficiary File, 0 otherwise.                           |
| age81to85            | 1 if patient in age group 81 years to 85 years at index admission from CCW Medicare Beneficiary File, 0 otherwise.                           |
| age85over            | 1 if patient in age group 85 years and over at index admission from CCW Medicare Beneficiary File, 0 otherwise.                              |
| male                 | 1 if patient Sex is male, 0 otherwise.                                                                                                                                                     |
| female               | 1 if patient Sex is female, 0 otherwise.                                                                                                                                                   |
| white                | 1 if patient Race is Non-Hispanic White, 0 otherwise.                                                                                                                                       |
| black                | 1 if patient Race is Black (or African-American), 0 otherwise.                                                                                                                             |
| race_other           | 1 if patient Race is Not otherwise specified, 0 otherwise.                                                                                                                                     |
| asian                | 1 if patient Race is Asian / Pacific Islander, 0 otherwise.                                                                                                                                    |
| hispanic             | 1 if patient Race is Hispanic, 0 otherwise.                                                                                                                                                 |
| american_native      | 1 if patient Race is American Indian / Alaska Native, 0 otherwise.                                                                                                                           |
| ruca_metro           | 1 if patient zip code in metropolitan area based on Rural-Urban Commuting Area (RUCA), 0 otherwise.                                                                                         |
| ruca_nonmetro        | 1 if patient zip code in non-metropolitan area based on Rural-Urban Commuting Area (RUCA), 0 otherwise.                                                                                     |
| ruca_unknown         | 1 if patient zip code rural-urban status unknown, 0 otherwise.                                                                                                                                |
| LIS_ind              | 1 if patient has low income subsidy from CCW Medicare Beneficiary File, 0 otherwise.                                                                                                       |
| dual_elig_strokemonth| 1 if patient had Medicaid dual eligibility in the index stroke month from CCW Medicare Beneficiary File, 0 otherwise.                                                                    |
| dual_elig_diff       | 1 if patient had different Medicaid eligibility status in the index stroke month and the month before, 0 otherwise.                                                                      |
| highIMMArea          | 1 if patient zip code has a higher percentage of immigrants than the median zip code according to the Census, 0 otherwise.                                                              |
| highnoENGArea        | 1 if patient zip code has a higher percentage of residence how do not speak English than the median zip code according to the Census, 0 otherwise.                                            |
| lowincomearea        | 1 if patient zip code has a lower per capita income than the median zip code according to the Census, 0 otherwise.                                                                            |
| noHSeqarea           | 1 if patient zip code has a higher percentage residence who did not complete high school than the median zip code according to the Census, 0 otherwise.                                         |
| pctpovertyhigh       | 1 if patient zip code has a higher poverty rate than the median zip code according to the Census, 0 otherwise.                                                                            |
| Variable                  | Description                                                                 |
|--------------------------|-----------------------------------------------------------------------------|
| le_first_quart           | 1 if patient county of residence in the lowest survival quartile, 0 otherwise. |
| le_second_quart          | 1 if patient county of residence in the second lowest survival quartile, 0 otherwise. |
| le_third_quart           | 1 if patient county of residence in the highest survival quartile, 0 otherwise. |
| le_fourth_quart          | 1 if patient county of residence in the highest survival quartile, 0 otherwise. |
| deductible_phase         | 1 if patient in Part D deductible phase at index date from CCW Medicare Beneficiary File, 0 otherwise. |
| pre_ICL_phase            | 1 if patient in Part D pre-Initial Coverage Limit (ICL) phase at index date from CCW Medicare Beneficiary File, 0 otherwise. |
| ICL_phase                | 1 if patient in Part D Initial Coverage Limit (ICL) phase (donut hole) at index date from CCW Medicare Beneficiary File, 0 otherwise. |
| catastrophic_phase       | 1 if patient in Part D catastrophic phase at index date from CCW Medicare Beneficiary File, 0 otherwise. |
| unknown_phase            | 1 if patient in Part D phase at index date unknown from CCW Medicare Beneficiary File, 0 otherwise. |
| PLAN_Premium_under25th   | 1 if patient Part D Plan Premium for 2010 under 25th percentile of study cohort from CCW Medicare Beneficiary File, 0 otherwise. |
| PLAN_Premium_25thto50th  | 1 if patient Part D Plan Premium for 2010 between 25th and 50th percentile of study cohort from CCW Medicare Beneficiary File, 0 otherwise. |
| PLAN_Premium_50thto75th  | 1 if patient Part D Plan Premium for 2010 between 50th and 75th percentile of study cohort from CCW Medicare Beneficiary File, 0 otherwise. |
| PLAN_Premium_over75th    | 1 if patient Part D Plan Premium for 2010 over 75th percentile of study cohort from CCW Medicare Beneficiary File, 0 otherwise. |
| cum_bene_rspns_amt_under25th | 1 if patient out-of-pocket drug costs in 2010 up to index date from Part D claims -- under 25th percentile of study cohort, 0 otherwise. |
| cum_bene_rspns_amt_25thto50th | 1 if patient out-of-pocket drug costs in 2010 up to index date from Part D claims -- between 25th and 50th percentile of study cohort, 0 otherwise. |
| cum_bene_rspns_amt_50thto75th | 1 if patient out-of-pocket drug costs in 2010 up to index date from Part D claims -- between 50th and 75th percentile of study cohort |
| cum_bene_rspns_amt_over75th | 1 if patient out-of-pocket drug costs in 2010 up to index date from Part D claims -- over 75th percentile of study cohort, 0 otherwise. |
| cum_total_cost_under25th | 1 if patient total drug costs in 2010 up to index date from Part D claims -- under 25th percentile of study cohort, 0 otherwise. |
| cum_total_cost_25thto50th | 1 if patient total drug costs in 2010 up to index date from Part D claims -- between 25th and 50th percentile of study cohort, 0 otherwise. |
| Variable                  | Definition                                                                 |
|--------------------------|-----------------------------------------------------------------------------|
| `cum_total_cost_50thto75th` | 1 if patient total drug costs in 2010 up to index date from Part D claims -- between 50th and 75th percentile of study cohort, 0 otherwise. |
| `cum_total_cost_over75th` | 1 if patient total drug costs in 2010 up to index date from Part D claims -- over 75th percentile of study cohort, 0 otherwise. |
| `FRI0`                   | 1 if the sum of 16 conditions related to patient frailty identified using Part A and Part B Medicare claims during the year prior to the index stroke period\(^{10}\) equaled 0, 0 otherwise. |
| `FRI1`                   | 1 if the sum of 16 conditions related to patient frailty identified using Part A and Part B Medicare claims during the year prior to the index stroke period\(^{10}\) equaled 1, otherwise. |
| `FRI2`                   | 1 if the sum of 16 conditions related to patient frailty identified using Part A and Part B Medicare claims during the year prior to the index stroke period\(^{10}\) equaled 2, 0 otherwise. |
| `FRI3plus`               | 1 if the sum of 16 conditions related to patient frailty identified using Part A and Part B Medicare claims during the year prior to the index stroke period\(^{10}\) equaled 3 or more, 0 otherwise. |
| `CKD_STG_1_NOS`          | 1 if CKD stage I (ICD-9 585.1) is the severest stage of CKD found from 1-year prior index through the index stay or if CKD NOS (ICD-9 585.9), 0 otherwise. |
| `CKD_STG_2`              | 1 if CKD stage II (ICD-9 585.2) is the severest stage of CKD found from 1-year prior index through the index stay, 0 otherwise. |
| `CKD_STG_3`              | 1 if CKD stage III (ICD-9 585.3) is the severest stage of CKD found from 1-year prior index through the index stay, 0 otherwise. |
| `CKD_STG_4`              | 1 if CKD stage IV (ICD-9 585.4) is the severest stage of CKD found from 1-year prior index through the index stay, 0 otherwise. |
| `CKD_STG_5`              | 1 if CKD stage V (ICD-9 585.5) is the severest stage of CKD found from 1-year prior index through the index stay, 0 otherwise. |
| `PRE180_ACEARB`          | 1 if patient had an ACEI/ARB prescription in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| `PRE180_ALDO_RECEPT_ANTAG` | 1 if patient had an Aldosterone receptor antagonist prescription in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| `PRE180_ALPHA_AGNOIST_CENTRAL` | 1 if patient had an Antiadrenergic agent (centrally acting) prescription in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| `PRE180_ALPHA_BLOCKER_PERIPHERAL` | 1 if patient had an Antiadrenergic agent (peripherally acting) prescription in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| `PRE180_ANTICOAG_OTH`     | 1 if patient had a non-warfarin and non-heparin anticoagulant prescription in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| `PRE180_ANTIHYPERTENSIVE_OTH` | 1 if patient had an antihypertensive prescription for a class not specifically designated in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| Variable                        | Definition                                                                 |
|--------------------------------|---------------------------------------------------------------------------|
| PRE180_ANTIPLATELET_OTH        | 1 if patient had an antiplatelet prescription for a class not specifically designated in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| PRE180_ASpirin                 | 1 if patient had an aspirin prescription in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| PRE180_BACTRIM                 | 1 if patient had a bactrim prescription in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| PRE180_BETA_BLOCKER            | 1 if patient had a beta blocker prescription in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| PRE180_BILE_ACID               | 1 if patient had a bile acid prescription in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| PRE180_CC_BLOCKER              | 1 if patient had a calcium channel blocker in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| PRE180_CLOPIDOGRREL            | 1 if patient had a clopidogrel prescription in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| PRE180_DIURETIC_OTH            | 1 if patient had a non k-sparing diuretic prescription in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| PRE180_EZETIMIBE               | 1 if patient had an ezetimibe prescription in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| PRE180_FIBRATE                 | 1 if patient had a fibrate prescription in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| PRE180_HEPARIN                 | 1 if patient had a heparin prescription in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| PRE180_K_SPARING               | 1 if patient had a K-sparing diuretic in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| PRE180_K_SUPP                  | 1 if patient had a potassium supplement in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| PRE180_LIPID_OTH               | 1 if patient had a lipid lowering product prescription not otherwise specified in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| PRE180_LITHIUM                 | 1 if patient had a lithium prescription in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| PRE180_NIACIN                  | 1 if patient had a niacin prescription in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| PRE180_NSAID                   | 1 if patient had a nsaid prescription in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| PRE180_PP_INHIBITOR            | 1 if patient had a proton pump inhibitor prescription in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| PRE180_RENIN_INHIB             | 1 if patient had a renin inhibitor prescription in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| PRE180_STATIN                  | 1 if patient had a statin prescription in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| PRE180_TICLOPIDINE             | 1 if patient had a ticlopidine prescription in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| PRE180_VASODILATOR             | 1 if patient had a vascodilator prescription in the 180 days prior to the index admission in Part D claims, 0 otherwise. |
| Variable                        | Description                                                                                                                                 |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| PRE180_WARFARIN                | 1 if patient had a warfarin prescription in the 180 days prior to the index admission in Part D claims, 0 otherwise.                           |
| POST30_ALDO_RECEPT_ANTAG       | 1 if patient had an Aldosterone receptor antagonist prescription in the 30 days after the index discharge in Part D claims, 0 otherwise.   |
| POST30_ALPHA_AGNOIST_CENTRAL   | 1 if patient had an Antiadrenergic agent (centrally acting) prescription in the 30 days after the index discharge in Part D claims, 0 otherwise. |
| POST30_ALPHA_BLOCKER_PERIPHERAL| 1 if patient had an Antiadrenergic agent (peripherally acting) prescription in the 30 days after the index discharge in Part D claims, 0 otherwise. |
| POST30_ANTICOAG_OTH            | 1 if patient had a non-warfarin and non-heparin anticoagulant prescription in the 30 days after the index discharge in Part D claims, 0 otherwise. |
| POST30_ANTIHYPERTENSIVE_OTH    | 1 if patient had an antihypertensive prescription for a class not specifically designated in the 30 days after the index discharge in Part D claims, 0 otherwise. |
| POST30_ANTIPATELET_OTH         | 1 if patient had an antiplatelet prescription for a class not specifically designated in the 30 days after the index discharge in Part D claims, 0 otherwise. |
| POST30_ASPIRIN                 | 1 if patient had an aspirin prescription in the 30 days after the index discharge in Part D claims, 0 otherwise.                           |
| POST30_BACTRIM                | 1 if patient had a bactrim prescription in the 30 days after the index discharge in Part D claims, 0 otherwise.                             |
| POST30_BETA_BLOCKER            | 1 if patient had a beta blocker prescription in the 30 days after the index discharge in Part D claims, 0 otherwise.                           |
| POST30_BILE_ACID               | 1 if patient had a bile acid prescription in the 30 days after the index discharge in Part D claims, 0 otherwise.                         |
| POST30_CC_BLOCKER              | 1 if patient had a calcium channel blocker in the 30 days after the index discharge in Part D claims, 0 otherwise.                      |
| POST30_CLOPIDOGREL             | 1 if patient had a clopidogrel prescription in the 30 days after the index discharge in Part D claims, 0 otherwise.                     |
| POST30_DIURETIC_OTH            | 1 if patient had a non k-sparing diuretic prescription in the 30 days after the index discharge in Part D claims, 0 otherwise.          |
| POST30_EZETIMIBE               | 1 if patient had an ezetimibe prescription in the 30 days after the index discharge in Part D claims, 0 otherwise.                     |
| POST30_FIBRATE                 | 1 if patient had a fibrate prescription in the 30 days after the index discharge in Part D claims, 0 otherwise.                         |
| POST30_HEPARIN                 | 1 if patient had a heparin prescription in the 30 days after the index discharge in Part D claims, 0 otherwise.                         |
| POST30_K_SPARING               | 1 if patient had a K-sparing diuretic in the 30 days after the index discharge in Part D claims, 0 otherwise.                           |
| POST30_K_SUPP                  | 1 if patient had a potassium supplement in the 30 days after the index discharge in Part D claims, 0 otherwise.                       |
| POST30_LIPID_OTH               | 1 if patient had a lipid lowering product prescription not otherwise specified in the 30 days after the index discharge in Part D claims, 0 otherwise. |
| Variable               | Description                                                                 |
|------------------------|-----------------------------------------------------------------------------|
| POST30_LITHIUM         | 1 if patient had a lithium prescription in the 30 days after the index discharge in Part D claims, 0 otherwise. |
| POST30_NIACIN          | 1 if patient had a niacin prescription in the 30 days after the index discharge in Part D claims, 0 otherwise. |
| POST30_NSAID           | 1 if patient had a nsaid prescription in the 30 days after the index discharge in Part D claims, 0 otherwise. |
| POST30_PP_INHIBITOR    | 1 if patient had a proton pump inhibitor prescription in the 30 days after the index discharge in Part D claims, 0 otherwise. |
| POST30_RENIN_INHIB     | 1 if patient had a renin inhibitor prescription in the 30 days after the index discharge in Part D claims, 0 otherwise. |
| POST30_STATIN          | 1 if patient had a statin prescription in the 30 days after the index discharge in Part D claims, 0 otherwise. |
| POST30_TICLOPIDINE     | 1 if patient had a ticlopidine prescription in the 30 days after the index discharge in Part D claims, 0 otherwise. |
| POST30_VASODILATOR     | 1 if patient had a vasodilator prescription in the 30 days after the index discharge in Part D claims, 0 otherwise. |
| POST30_WARFARIN        | 1 if patient had a warfarin prescription in the 30 days after the index discharge in Part D claims, 0 otherwise. |
| NDC_admission_0        | 1 if patient had 0 prescriptions with positive days supplied at index date based on days-supplied in Part D claims, 0 otherwise. |
| NDC_admission1to3      | 1 if patient had 1-3 prescriptions with distinct National Drug Codes (NDCs) with positive days supplied at index date based on days-supplied in Part D claims, 0 otherwise. |
| NDC_admission4plus     | 1 if patient had 4 or more prescriptions with distinct National Drug Codes (NDCs) with positive days supplied at index date based on days-supplied in Part D claims, 0 otherwise. |
| OT_acute               | 1 if patient had occupational therapy during acute stroke inpatient stay (revenue center code = 0430, 0431, 0432, 0433, 0434, 0439), 0 otherwise. |
| PT_acute               | 1 if patient had physical therapy during acute stroke inpatient stay (revenue center code = 0420, 0421, 0422, 0423, 0424, 0429), 0 otherwise. |
| ST_acute               | 1 if patient had speech therapy during acute stroke inpatient stay (revenue center code = 0440, 0441, 0442, 0443, 0444, 0449), 0 otherwise. |
| transfer               | 1 if patient was transferred to another acute facility during the acute stroke inpatient stay, 0 otherwise. |
| days_imc               | Days patient stayed in an Intermediate Care Unit (revenue center code = 0206) during index stroke institutional stay prior to discharge home. |
| days_icu               | Days patient stayed in an Intensive Care Unit (revenue center code = 0200, 0201, 0202, 0203, 0204, 0207, 0208, 0209) during index stroke institutional stay prior to discharge home. |
| **days_ccu** | Days patient stayed in a Critical Care Unit (revenue center code = 0210, 0211, 0212, 0213, 0214, 0215, 0216, 0217, 0218, 0219) during index stroke institutional stay prior to discharge home. |
| **days_SNF_sum** | Days patient stayed in a Skilled Nursing Facility during index stroke institutional stay prior to discharge home. |
| **days_reg_IP** | Days patient stayed in an acute inpatient facility but not in a IMC, ICU, or CCU during index stroke institutional stay prior to discharge home. |
| **days_IRF_sum** | Days patient stayed in an Inpatient Rehabilitation Facility during index stroke institutional stay prior to discharge home. |
Data S3. Instrument Strategy Background.

“Instruments” in instrumental variable estimation are measured factors having a strong relationship with treatment choice and are assumed to have no direct relationship to study outcomes or other unmeasured factors related to study outcomes. With these characteristics, instruments provide a natural experiment of treatment choice across patients. Measures of local area practice styles have been shown to be a practical and rich source for instrument development. The approach used here to measure local area practice styles has explained larger portions of treatment variation than other approaches and effectively balanced measured confounding variables. We produced ZIP code-specific practice style measures reflecting the ACEI/ARB treatment choices for Medicare stroke patients living within a driving distance of each patient’s ZIP code. Driving times were expanded around each ZIP code adding patients from additional ZIP codes until a defined threshold number of patients were found. For the patients around each ZIP code, an area treatment ratio (ATR) was estimated as the ratio of the number of these patients that used ACEI/ARBs after stroke over the sum of the predicted probabilities of these same patients receiving ACEI/ARBs after stroke. Predicted treatment probabilities were estimated for each patient based on a logistic model of treatment choice over all the stroke patients in our study using baseline covariates in Supplement A as dependent variables. A ZIP code with an ATR greater than 1 suggests greater provider preference in the local area for prescribing an ACEI/ARB after stroke than the average ZIP code area, and an ATR less than 1 suggests lower preference than average.
Data S4.

2-Stage Least Squares (2SLS) Instrumental Variable Estimator Background

2SLS estimation involved estimation of first-stage treatment choice equation of the form:

\[ A_i = \beta_0 + \beta_1 \cdot X_i + \beta_2 \cdot R_i , \]

where \( A_i \) equals 1 if patient “i” used an ACEI/ARB in the 30 days after index stroke discharge, 0 otherwise; \( X_i \) is vector containing all measured covariates; and \( R_i \) represents a set of variables describing the ACEI/ARB area treatment ratio (ATR) in ZIP code of the residence of patient “i”.

As robustness checks we used several approaches to specify \( R_i \). We used standard F-test to assess the statistical significance of variables used to specify the instruments in equation (1). \(^{35}\)

The second stage outcome models were specified as follows:

\[ Y_i = \alpha_0 + \alpha_1 \cdot \hat{A}_i + \alpha_2 \cdot X_i , \]

where \( Y_i \) equals 1 of the outcome occurs for patient “i”, 0 otherwise; and \( X_i \) is defined as above. \( \hat{A}_i \) equals the predicted probability that patient “i” received an ACEI/ARB from equation (1). The parameter \( \alpha_1 \) equals the absolute effect of ACEI/ARB use on the probability of outcome \( Y_i \) occurring, and is an estimate of the local average treatment effect (LATE) of ACEI/ARB use for those patients whose choice of ACEI/ARB was sensitive to local area practice styles. \(^{36-39}\)

We estimated \( \alpha_1 \) for the full sample and on the subsets based on CKD status. As each dependent variable in this study is a binary variable, these linear specifications yield direct estimates of absolute LATEs. \(^{40}\)

Because of our large sample size, our parameter estimates will be distributed normally via the central limit theorem regardless of the distribution of the underlying error term. \(^{41-43}\) Each 2SLS model was estimated with robust standard error methods using STATA software. We tested for differences in ACEI/ARB LATE estimates between the CKD and non-
CKD patients\textsuperscript{44} and used bootstrapping to contrast the empirical distributions of treatment effects between CKD and non-CKD patients.\textsuperscript{45} Over-identification tests were performed to assess whether our assumed exclusion of the instruments ($R_i$) from equation (2) was appropriate.\textsuperscript{46}
Table S3. Means of Outcomes, Treatments, and Covariates for Medicare Patients in 2010 with an Index Ischemic Stroke and Chronic Kidney Disease by ACE/ARB Treatment Choice and Instrument Values

| Variables (See Supplement B for Definitions) | Total Population | ACE/ARB use | Quantiles of Local Areas Based Area Treatment Ratios (ATRs) Based on Actual and Predicted ACE/ARB Usea |
|----------------------------------------------|------------------|-------------|---------------------------------------------------------------------------------|
|                                              |                  | No | Yes | F-statisticc | p² | 1st | 2nd | 3rd | 4th | 5th | p² |
| N                                            | 9,092            | 4,918 | 4,174 | NA | NA | NA | 1,817 | 1,865 | 1,816 | 1,821 | 1,773 | NA |
| Treatment                                    |                  |    |    |    |    |    | 0.400 | 0.408 | 0.448 | 0.508 | 0.535 | <0.0001* |
| Angioedema_2yr                               | 0.005            | 0.005 | 0.005 | 0.930 | NA | NA | 0.007 | 0.006 | 0.006 | 0.002 | 0.003 | 0.025* |
| Hyperkalemia_2yr                             | 0.107            | 0.101 | 0.113 | 0.060 | NA | NA | 0.104 | 0.108 | 0.110 | 0.105 | 0.106 | 0.961 |
| HPOTN_2yr                                    | 0.053            | 0.055 | 0.050 | 0.325 | NA | NA | 0.053 | 0.057 | 0.051 | 0.053 | 0.049 | 0.482 |
| renalevnt_2yr                                | 0.177            | 0.171 | 0.184 | 0.095 | NA | NA | 0.186 | 0.177 | 0.177 | 0.172 | 0.172 | 0.260 |
| recurstroke_2yr                              | 0.065            | 0.067 | 0.062 | 0.417 | NA | NA | 0.067 | 0.064 | 0.067 | 0.063 | 0.062 | 0.515 |
| surv_out2yr                                  | 0.678            | 0.662 | 0.697 | 0.001* | NA | NA | 0.668 | 0.694 | 0.673 | 0.668 | 0.686 | 0.793 |
| Baseline Covariates                          |                  |    |    |    |    |    | 0.151 | 0.159 | 0.163 | 0.143 | 0.156 | 0.779 |
| Elix_Depress                                 | 0.154            | 0.158 | 0.151 | 0.348 | 0.357 | 0.367 | 0.345 | 0.029* | 0.353 | 0.351 | 0.349 | 0.367 | 0.366 | 0.237 |
| ELIX_FluElexDis                              | 0.069            | 0.063 | 0.076 | 0.020* | 0.077 | 0.085 | 0.067 | 0.0020* | 0.066 | 0.069 | 0.074 | 0.061 | 0.073 | 0.745 |
| ELIX_Obesity                                 | 0.007            | 0.008 | 0.005 | 0.150 | 0.048 | 0.052 | 0.043 | 0.037* | 0.076 | 0.071 | 0.084 | 0.076 | 0.076 | 0.820 |
| ELIX_SubstanceAbuse                          | 0.018            | 0.020 | 0.016 | 0.104 | 0.065 | 0.068 | 0.062 | 0.276 | 0.008 | 0.006 | 0.006 | 0.006 | 0.008 | 0.991 |
| ELIX_BLA                                     | 0.048            | 0.052 | 0.043 | 0.104 | 0.065 | 0.068 | 0.062 | 0.276 | 0.012 | 0.015 | 0.008 | 0.007 | 0.013 | 0.656 |
| ELIX_DA                                      | 0.048            | 0.052 | 0.043 | 0.104 | 0.065 | 0.068 | 0.062 | 0.276 | 0.012 | 0.015 | 0.008 | 0.007 | 0.013 | 0.656 |
| CCW_ExtraAnemia                              | 0.405            | 0.417 | 0.390 | 0.008* | 0.405 | 0.417 | 0.390 | 0.008* | 0.394 | 0.392 | 0.415 | 0.409 | 0.415 | 0.113 |
| Sepsis_Index                                 | 0.041            | 0.047 | 0.034 | 0.001* | 0.041 | 0.047 | 0.034 | 0.001* | 0.036 | 0.040 | 0.042 | 0.043 | 0.045 | 0.185 |
| ELIX_OthNuro                                  | 0.271            | 0.271 | 0.271 | 0.993 | 0.282 | 0.283 | 0.282 | 0.945 | 0.277 | 0.270 | 0.282 | 0.285 | 0.300 | 0.073 |
| ELIX_Paralysis                               | 0.282            | 0.283 | 0.282 | 0.945 | 0.012 | 0.015 | 0.008 | 0.003* | 0.013 | 0.011 | 0.013 | 0.008 | 0.013 | 0.656 |

Comorbidities: 2.33

*aBased on Actual and Predicted ACE/ARB Use
bF-statistic

cp²
| Condition                                      | Value 1 | Value 2 | Value 3 | Value 4 | Value 5 | Value 6 | Value 7 | Value 8 |
|------------------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| ELIX_CA                                        | 0.163   | 0.176   | 0.148   | 0.0003* |         |         |         |         |
| AF                                             | 0.286   | 0.308   | 0.260   | <0.0001*|         |         |         |         |
| Cardiac_Arrest                                 | 0.008   | 0.009   | 0.007   | 0.151   |         |         |         |         |
| ELIX_Cardi_Arrhythm                            | 0.379   | 0.400   | 0.355   | <0.0001*|         |         |         |         |
| ELIX_CHF                                       | 0.344   | 0.343   | 0.346   | 0.823   |         |         |         |         |
| CABG                                           | 0.045   | 0.043   | 0.047   | 0.467   |         |         |         |         |
| CCW_IHDnonAMI                                  | 0.525   | 0.522   | 0.527   | 0.638   |         |         |         |         |
| CCW_AMI                                        | 0.042   | 0.042   | 0.042   | 0.864   |         |         |         |         |
| ELIX_VD                                        | 0.122   | 0.123   | 0.121   | 0.814   |         |         |         |         |
| ELIX_COPD                                      | 0.264   | 0.278   | 0.247   | <0.001* |         |         |         |         |
| Pneumonia_Index                                | 0.022   | 0.022   | 0.022   | 0.794   |         |         |         |         |
| ELIX_RHEUM_A                                   | 0.016   | 0.016   | 0.015   | 0.588   |         |         |         |         |
| CCW_RHEUM_O                                    | 0.377   | 0.373   | 0.383   | 0.321   |         |         |         |         |
| ELIX_DMUC                                      | 0.404   | 0.366   | 0.450   | <0.0001*|         |         |         |         |
| ELIX_DMC                                       | 0.137   | 0.127   | 0.150   | 0.001*  |         |         |         |         |
| ELIX_HPTN_C                                    | 0.523   | 0.530   | 0.514   | 0.118   |         |         |         |         |
| ELIX_HPTN_UC                                   | 0.663   | 0.627   | 0.707   | <0.001* |         |         |         |         |
| CCW_HyperLipid                                 | 0.723   | 0.700   | 0.749   | <0.001* |         |         |         |         |
| ELIX_HPOTHROID                                 | 0.181   | 0.178   | 0.185   | 0.354   |         |         |         |         |
| ELIX_LiverDz                                   | 0.017   | 0.019   | 0.014   | 0.103   |         |         |         |         |
| ELIX_PUBNB                                     | 0.019   | 0.019   | 0.019   | 0.959   |         |         |         |         |
| ELIX_PVD                                       | 0.152   | 0.150   | 0.155   | 0.531   |         |         |         |         |
| ELIX_PCD                                       | 0.067   | 0.070   | 0.064   | 0.209   |         |         |         |         |
| CHRS_CVD_nonstroke                             | 0.639   | 0.628   | 0.652   | 0.017*  |         |         |         |         |
| ELIX_Psycho                                    | 0.031   | 0.030   | 0.033   | 0.387   |         |         |         |         |
| TIA                                            | 0.394   | 0.389   | 0.400   | 0.253   |         |         |         |         |
| Hemorrhagic                                    | 0.043   | 0.046   | 0.040   | 0.179   |         |         |         |         |
| CCW_AzhDemetia                                 | 0.243   | 0.252   | 0.232   | <0.025* |         |         |         |         |
| Angioedema                                      | 0.003   | 0.005   | 0.002   | <0.0130*|         |         |         |         |
| Hyperkalemia                                    | 0.122   | 0.134   | 0.109   | <0.0001*|         |         |         |         |
| ARCARB Side                                    | <0.0001*|         |         |         |         |         |         |         |
| Hyperkalemia                                    | 0.002   | 0.002   | 0.003   | 0.006   | 0.045*  |         |         |         |
| Angioedema                                      | 0.124   | 0.130   | 0.113   | 0.114   | 0.416   |         |         |         |
| Variable                  | Arf   | 0.512 | 0.460 | <0.0001* |
|---------------------------|-------|-------|-------|----------|
| ARF                       | 0.488 | 0.512 | 0.460 | <0.0001* |
| HPOTN                     | 0.060 | 0.071 | 0.047 | <0.0001* |
| Bradycardia               | 0.278 | 0.282 | 0.274 | 0.412    |
| HrtBlock                  | 0.157 | 0.160 | 0.154 | 0.451    |
| Myopathy                  | 0.346 | 0.343 | 0.349 | 0.607    |
| age66to70                 | 0.108 | 0.097 | 0.121 | 0.0002*  |
| age71to75                 | 0.153 | 0.146 | 0.160 | 0.067    |
| age76to80                 | 0.187 | 0.182 | 0.192 | 0.226    |
| age81to85                 | 0.230 | 0.232 | 0.228 | 0.674    |
| male                      | 0.379 | 0.398 | 0.356 | <0.0001* |
| female                    | 0.621 | 0.602 | 0.644 | <0.0001* |
| black                     | 0.144 | 0.133 | 0.158 | 0.0005*  |
| race_other                | 0.012 | 0.012 | 0.013 | 0.687    |
| asian                     | 0.024 | 0.020 | 0.029 | 0.0050*  |
| hispanic                  | 0.023 | 0.021 | 0.025 | 0.229    |
| American Native           | 0.006 | 0.007 | 0.005 | 0.125    |
| RUCa Metro                | 0.763 | 0.772 | 0.752 | 0.026*   |
| RUCa Nonmetro             | 0.237 | 0.228 | 0.248 | 0.026*   |
| RUCa Unknown              | 0.000 | 0.000 | 0.000 | 0.908    |
| Lis_ind                   | 0.053 | 0.050 | 0.055 | 0.276    |
| dual_elig_strokemonth     | 0.368 | 0.339 | 0.402 | <0.0001* |
| dual_elig_diff            | 0.049 | 0.044 | 0.054 | 0.030*   |
| highmMarea                | 0.503 | 0.493 | 0.516 | 0.029*   |
| highmENArea               | 0.480 | 0.485 | 0.475 | 0.336    |
| LowIncomeArea             | 0.506 | 0.486 | 0.530 | <0.0001* |
| noHsSedarea               | 0.504 | 0.488 | 0.523 | 0.001*   |
| pctPovertyHigh            | 0.507 | 0.488 | 0.529 | 0.0001*  |
| le_first_quart            | 0.250 | 0.244 | 0.258 | 0.143    |

**Effects:**

| Variable                  | Arf   | 0.509 | 0.464 | 0.515 | 0.473 | 0.863 |
|---------------------------|-------|-------|-------|-------|-------|-------|
| HPOTN                     | 0.062 | 0.064 | 0.060 | 0.057 | 0.057 | 0.314 |
| Bradycardia               | 0.269 | 0.270 | 0.287 | 0.280 | 0.285 | 0.208 |
| HrtBlock                  | 0.152 | 0.170 | 0.163 | 0.146 | 0.155 | 0.496 |
| Myopathy                  | 0.345 | 0.334 | 0.350 | 0.344 | 0.357 | 0.343 |
| age66to70                 | 0.111 | 0.097 | 0.113 | 0.111 | 0.109 | 0.644 |
| age71to75                 | 0.145 | 0.149 | 0.161 | 0.153 | 0.156 | 0.329 |
| age76to80                 | 0.179 | 0.205 | 0.189 | 0.186 | 0.173 | 0.273 |
| age81to85                 | 0.233 | 0.233 | 0.225 | 0.224 | 0.235 | 0.879 |
| male                      | 0.375 | 0.374 | 0.382 | 0.373 | 0.390 | 0.425 |
| white                     | 0.625 | 0.626 | 0.618 | 0.627 | 0.610 | 0.425 |
| black                     | 0.143 | 0.121 | 0.153 | 0.167 | 0.139 | 0.138 |
| race_other                | 0.007 | 0.009 | 0.013 | 0.020 | 0.014 | 0.002* |
| asian                     | 0.021 | 0.026 | 0.020 | 0.030 | 0.023 | 0.521 |
| hispanic                  | 0.015 | 0.010 | 0.024 | 0.029 | 0.038 | <0.0001* |
| American Native           | 0.007 | 0.003 | 0.006 | 0.005 | 0.010 | 0.133 |
| ruca Metro                | 0.756 | 0.745 | 0.756 | 0.774 | 0.785 | 0.006* |
| ruca Nonmetro             | 0.243 | 0.255 | 0.245 | 0.225 | 0.215 | <0.0001* |
| ruca Unknown              | 0.001 | 0.000 | 0.000 | 0.001 | 0.000 | 0.626 |
| Lis_ind                   | 0.054 | 0.049 | 0.053 | 0.058 | 0.049 | 0.945 |
| dual_elig_strokemonth     | 0.359 | 0.331 | 0.378 | 0.408 | 0.365 | 0.013* |
| dual_elig_diff            | 0.053 | 0.050 | 0.046 | 0.047 | 0.048 | 0.396 |
| highmMarea                | 0.411 | 0.452 | 0.492 | 0.512 | 0.538 | <0.0001* |
| highmENArea               | 0.492 | 0.505 | 0.510 | 0.515 | 0.510 | 0.207 |
| lowIncomeArea             | 0.452 | 0.490 | 0.528 | 0.545 | 0.508 | <0.0001* |
| noHsSedarea               | 0.477 | 0.481 | 0.516 | 0.559 | 0.503 | <0.0005* |
| pctPovertyHigh            | 0.235 | 0.230 | 0.275 | 0.278 | 0.234 | 0.139 |
| le_second_quart | 0.245 | 0.240 | 0.251 | 0.193 | 0.238 | 0.276 | 0.225 | 0.216 | 0.270 | 0.968 |
|----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| le_third_quart | 0.244 | 0.253 | 0.234 | **0.042*** | 0.306 | 0.248 | 0.212 | 0.232 | 0.224 | 0.0001* |
| le_fourth_quart| 0.260 | 0.264 | 0.257 | 0.469 | 0.221 | 0.247 | 0.288 | 0.274 | 0.273 | 0.0001* |
| deductible_phase| 0.132 | 0.138 | 0.125 | 0.072 | 0.141 | 0.127 | 0.126 | 0.143 | 0.124 | 0.487 |
| pre_ICL_phase  | 0.647 | 0.654 | 0.639 | 0.135 | 0.647 | 0.651 | 0.648 | 0.652 | 0.636 | 0.558 |
| ICL_phase      | 0.136 | 0.123 | 0.152 | <0.0001* | 0.133 | 0.137 | 0.138 | 0.129 | 0.144 | 0.573 |
| catastrophic_phase | 0.030 | 0.026 | 0.035 | **0.018*** | 0.025 | 0.028 | 0.031 | **0.002** | 0.012* |
| unknown_phase  | 0.055 | 0.060 | 0.049 | **0.029*** | 0.055 | 0.057 | 0.057 | 0.051 | 0.054 | 0.629 |
| PLAN_PREMIUM_under25th | 0.244 | 0.231 | 0.259 | **0.002*** | 0.271 | 0.232 | 0.232 | 0.261 | 0.223 | **0.040** |
| PLAN_PREMIUM_25thto50th | 0.226 | 0.229 | 0.222 | 0.449 | 0.225 | 0.203 | 0.247 | 0.229 | 0.226 | 0.356 |
| PLAN_PREMIUM_50thto75th | 0.257 | 0.265 | 0.249 | 0.090 | 0.242 | 0.270 | 0.256 | 0.242 | 0.278 | 0.179 |
| PLAN_PREMIUM_over75th | 0.273 | 0.275 | 0.270 | 0.571 | 0.263 | 0.295 | 0.265 | 0.268 | 0.273 | 0.841 |
| cum_bene_rspns_amt_under25th | 0.204 | 0.221 | 0.184 | <0.0001* | 0.214 | 0.186 | 0.204 | 0.227 | 0.188 | 0.795 |
| cum_bene_rspns_amt_25thto50th | 0.258 | 0.244 | 0.274 | **0.001*** | 0.250 | 0.246 | 0.256 | 0.280 | 0.258 | 0.130 |
| cum_bene_rspns_amt_50thto75th | 0.256 | 0.254 | 0.258 | 0.694 | 0.255 | 0.258 | 0.258 | 0.237 | 0.271 | 0.801 |
| cum_bene_rspns_amt_over75th | 0.282 | 0.280 | 0.285 | 0.638 | 0.281 | 0.309 | 0.283 | 0.256 | 0.283 | 0.138 |
| cum_total_cost_under25th | 0.210 | 0.231 | 0.185 | <0.0001* | 0.215 | 0.213 | 0.209 | 0.221 | 0.190 | 0.157 |
| cum_total_cost_25thto50th | 0.251 | 0.254 | 0.248 | 0.497 | 0.246 | 0.238 | 0.259 | 0.257 | 0.258 | 0.191 |
| cum_total_cost_50thto75th | 0.268 | 0.263 | 0.274 | 0.213 | 0.280 | 0.280 | 0.258 | 0.265 | 0.257 | 0.063 |
| cum_total_cost_over75th | 0.271 | 0.252 | 0.293 | <0.0001* | 0.259 | 0.269 | 0.274 | 0.258 | 0.296 | 0.061 |
| FRI0           | 0.332 | 0.318 | 0.349 | **0.002*** | 0.341 | 0.337 | 0.337 | 0.331 | 0.316 | 0.117 |
| FRI1           | 0.250 | 0.248 | 0.251 | 0.778 | 0.264 | 0.238 | 0.254 | 0.244 | 0.248 | 0.408 |
| FRI2           | 0.170 | 0.173 | 0.166 | 0.406 | 0.156 | 0.187 | 0.164 | 0.168 | 0.174 | 0.573 |
| FRI3plus       | 0.248 | 0.261 | 0.234 | **0.003*** | 0.239 | 0.239 | 0.245 | 0.258 | 0.262 | 0.183 |
| CKD_STG_1_NOS  | 0.566 | 0.545 | 0.591 | <0.0001* | 0.560 | 0.579 | 0.567 | 0.559 | 0.566 | 0.3590 |
| CKD_STG_2      | 0.037 | 0.036 | 0.038 | 0.4881 | 0.032 | 0.031 | 0.042 | 0.042 | 0.038 | 0.5769 |
| CKD_STG_3      | 0.267 | 0.268 | 0.266 | 0.8588 | 0.286 | 0.253 | 0.257 | 0.272 | 0.267 | 0.5838 |
| CKD_STG_4      | 0.113 | 0.130 | 0.093 | <0.0001* | 0.104 | 0.122 | 0.120 | 0.108 | 0.112 | 0.4799 |
| CKD_STG_5      | 0.017 | 0.021 | 0.012 | **0.0010*** | 0.019 | 0.016 | 0.015 | 0.019 | 0.018 | 0.4695 |
| PRE180_ACEARB  | 0.582 | 0.379 | 0.822 | <0.0001* | 0.566 | 0.581 | 0.581 | 0.589 | 0.595 | 0.080 |

**Notes:**
- Significant p-values marked with asterisks (*)
- Insur:ance: 0.709
- FRI: 1.68
- CKD Stage: 4.91

**Significance Levels:**
- **<0.0001**
- **0.0010**
- **0.0020**
- **0.0050**
- **0.0100**
- **0.0500**
- **0.1000**
- **0.2000**

**Other Notations:**
- FRI: 1.68
- CKD Stage: 4.91
| Drug Category | Value 1 | Value 2 | Value 3 | Value 4 | Value 5 | Value 6 |
|---------------|---------|---------|---------|---------|---------|---------|
| PRE180_ALDO_RECEPT_ANTAG | 0.052 | 0.059 | 0.045 | **0.00**<sup>4</sup> | | |
| PRE180_ALPHA_AGNOIST_CENTRAL | 0.078 | 0.069 | 0.089 | **0.00**0<sup>3</sup> | | |
| PRE180_ALPHA_BLOCKER_PERIPHERAL | 0.107 | 0.112 | 0.101 | 0.090 | | |
| PRE180_ANTICOAG_OTH | 0.013 | 0.014 | 0.012 | 0.360 | | |
| PRE180_ANTIPLATELET_OTH | 0.015 | 0.012 | 0.018 | **0.019**<sup>*</sup> | | |
| PRE180_ASPIRIN | 0.023 | 0.022 | 0.024 | 0.396 | | |
| PRE180_BACTRIM | 0.080 | 0.078 | 0.082 | 0.473 | | |
| PRE180_BETA_BLOCKER | 0.593 | 0.573 | 0.617 | **<0.0001**<sup>*</sup> | | |
| PRE180_BILE_ACID | 0.011 | 0.010 | 0.012 | 0.605 | | |
| PRE180_CC_BLOCKER | 0.390 | 0.364 | 0.421 | **<0.0001**<sup>*</sup> | | |
| PRE180_CLOPIDOGREL | 0.169 | 0.155 | 0.185 | **0.0001**<sup>*</sup> | | |
| PRE180_DIURETIC_OTH | 0.544 | 0.512 | 0.582 | **<0.0001**<sup>*</sup> | | |
| PRE180_EZETIMIBE | 0.038 | 0.036 | 0.040 | 0.292 | | |
| PRE180_FIBRATE | 0.056 | 0.050 | 0.062 | **0.01**<sup>*</sup> | | |
| PRE180_HEPARIN | 0.002 | 0.002 | 0.002 | 0.411 | | |
| PRE180_K_SPARING | 0.045 | 0.047 | 0.042 | 0.250 | | |
| PRE180_K_SUPP | 0.206 | 0.206 | 0.207 | 0.864 | | |
| PRE180_LIPID_OTH | 0.001 | 0.000 | 0.001 | 0.527 | | |
| PRE180_LITHIUM | 0.002 | 0.001 | 0.002 | 0.399 | | |
| PRE180_NIACIN | 0.012 | 0.010 | 0.014 | 0.124 | | |
| PRE180_NSAID | 0.125 | 0.116 | 0.136 | **0.003**<sup>*</sup> | | |
| PRE180_PP_INHIBITOR | 0.307 | 0.293 | 0.324 | **0.002**<sup>*</sup> | | |
| PRE180_RENIN_INHIB | 0.011 | 0.010 | 0.012 | 0.352 | | |
| PRE180_STATIN | 0.482 | 0.448 | 0.523 | **<0.0001**<sup>*</sup> | | |
| PRE180_TICLOPIDINE | 0.001 | 0.001 | 0.001 | 0.561 | | |
| PRE180_VASODILATOR | 0.113 | 0.107 | 0.120 | 0.062 | | |
| PRE180_WARFARIN | 0.139 | 0.144 | 0.134 | 0.198 | | |
| POST30_ALDO_RECEPT_ANTAG | 0.029 | 0.029 | 0.029 | 0.882 | | |
| POST30_ALPHA_AGNOIST_CENTRAL | 0.064 | 0.054 | 0.076 | **<0.0001**<sup>*</sup> | | |
| POST30_ALPHA_BLOCKER_PERIPHERAL | 0.082 | 0.081 | 0.082 | 0.796 | | |
| POST30_ANTICOAG_OTH | 0.024 | 0.024 | 0.025 | 0.681 |
|---------------------|-------|-------|-------|-------|
| POST30_ANTIPATELET_OTH | 0.010 | 0.008 | 0.014 | 0.003* |
| POST30_ASPRIN | 0.083 | 0.078 | 0.088 | 0.070 |
| POST30_BACTRIM | 0.027 | 0.028 | 0.025 | 0.505 |
| POST30_BETA_BLOCKER | 0.475 | 0.426 | 0.532 | <0.0001* |
| POST30_BILE_ACID | 0.005 | 0.005 | 0.006 | 0.250 |
| POST30_CC_BLOCKER | 0.339 | 0.299 | 0.387 | <0.0001* |
| POST30_CLOPIDOGREL | 0.294 | 0.265 | 0.328 | <0.0001* |
| POST30_DIURETIC_OTH | 0.335 | 0.267 | 0.414 | <0.0001* |
| POST30_EZETIMIBE | 0.024 | 0.019 | 0.030 | 0.0005* |
| POST30_FIBRATE | 0.035 | 0.028 | 0.043 | <0.0001* |
| POST30_HEPARIN | 0.003 | 0.003 | 0.003 | 0.980 |
| POST30_K_SPARING | 0.017 | 0.016 | 0.018 | 0.532 |
| POST30_K_SUPP | 0.142 | 0.135 | 0.151 | 0.0409* |
| POST30_LIPID_OTH | 0.000 | 0.000 | 0.000 | 0.662 |
| POST30_LITHIUM | 0.001 | 0.001 | 0.001 | 0.346 |
| POST30_NIACIN | 0.009 | 0.007 | 0.012 | 0.012* |
| POST30_NSAID | 0.037 | 0.030 | 0.044 | 0.0003* |
| POST30_PP_INHIBITOR | 0.259 | 0.240 | 0.282 | <0.0001* |
| POST30_RENIN_INHIB | 0.008 | 0.004 | 0.012 | <0.0001* |
| POST30_STATIN | 0.529 | 0.460 | 0.610 | <0.0001* |
| POST30_TICLOPIDINE | 0.001 | 0.001 | 0.001 | 0.930 |
| POST30_VASODILATOR | 0.089 | 0.086 | 0.094 | 0.190 |
| POST30WARFARIN | 0.207 | 0.204 | 0.211 | 0.362 |
| NDC_admission_0 | 0.344 | 0.366 | 0.319 | <0.0001* |
| NDC_admission1to3 | 0.416 | 0.422 | 0.409 | 0.196 |
| NDC_admission4plus | 0.240 | 0.212 | 0.272 | <0.0001* |
| OT_acute | 0.671 | 0.674 | 0.668 | 0.564 |
| PT_acute | 0.891 | 0.887 | 0.897 | 0.111 |
| ST_acute | 0.619 | 0.622 | 0.615 | 0.504 |
| NDC drugs at admission : 4.27 | 0.014* |
| Therapy days during | 0.329 |
| 0.014* | 0.339 | 0.341 | 0.357 | 0.357 | 0.328 | 0.328 | 0.906 |
| 0.029* | 0.401 | 0.413 | 0.409 | 0.419 | 0.438 | 0.929 |
| 0.017* | 0.261 | 0.246 | 0.234 | 0.224 | 0.224 | 0.916 |
| 0.020* | 0.685 | 0.689 | 0.664 | 0.657 | 0.661 | 0.661 | 0.118 |
| 0.118 | 0.902 | 0.892 | 0.892 | 0.882 | 0.889 | 0.889 | 0.127 |
|               | acute stay: 1.14 |                  |                  |                  |                  | admission stay divisions: 2.96 |                  |
|---------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------------------|-----------------|
| ier           | 0.871           | 0.872           | 0.869           | 0.635           |                  | 0.927                       | 0.869           |
| transfer      | 0.023           | 0.022           | 0.024           | 0.675           |                  | 0.026                       | 0.023           |
| days_imc      | 1.062           | 1.045           | 1.083           | 0.499           |                  | 1.068                       | 1.068           |
| days_icu      | 0.603           | 0.578           | 0.632           | 0.311           |                  | 0.579                       | 0.537           |
| days_ccu      | 0.666           | 0.703           | 0.622           | 0.082           |                  | 0.643                       | 0.584           |
| days_reg_IP   | 3.714           | 3.752           | 3.668           | 0.476           |                  | 3.909                       | 3.618           |
| days_SNF_sum  | 17.664          | 17.701          | 17.622          | 0.909           |                  | 18.478                      | 17.246          |
| days_IRF_sum  | 4.051           | 4.046           | 4.057           | 0.945           |                  | 4.220                       | 4.126           |

a. Based on Area Treatment Ratio (ATR) of actual ACE/ARB treatment rate over predicted ACE/ARB treatment rate for the 50 AMI patients living closest to each patient’s residence ZIP code.
b. P value of T-test of characteristic difference between treated and non-treated patients.
c. Chow F-statistic used to test the exclusion restrictions of the specified set of covariates in the ARC/ARB choice equations. Chow GC. Tests of equality between sets of coefficients in two linear regressions. Econometrica: Journal of the Econometric Society. 1960:591-605.
d. P value for Chow F-tests.
e. Cochran-Armitage two-sided test of trend in characteristic value across patients grouped into quintiles based on local area ACE/ARB Area Treatment Ratios (ATRs). For example, the p value for age66to70 tests whether a linear trend in the percentage of patients in this age group exists across quintiles of the ACE/ARB choice ATR-based patient groups.

*p<0.05* signifies positive relationship with ACE/ARB choice or positive association with local area ACE/ARB Area Treatment rates. **signifies negative relationship with ACE/ARB choice or positive association with local area ACE/ARB Area Treatment rates.
Table S4. Means of Outcomes, Treatments, and Covariates for Medicare Patients in 2010 with an Index Ischemic Stroke and No Prior Chronic Kidney Disease by ACEI/ARB Treatment Choice and Instrument Values

| Variables (See Supplement B for Definitions) | Total population | ACE/ARB use | Quantiles of Local Areas Based Area Treatment Ratios (ATRs) Based on Actual and Predicted ACE/ARB Use* |
|---------------------------------------------|-----------------|-------------|-------------------------------------------------------------------------------------------------|
|                                             | No | Yes | p^b | F-statistic^c | p^d | 1st | 2nd | 3rd | 4th | 5th | p^e |
| N                                           | 26,677 | 14,609 | 12,068 | NA | NA | NA | 5,335 | 5,290 | 5,337 | 5,333 | 5,382 | NA |

| Treatments | post_acearb | 0.452 | 0.000 | 1.000 | NA | NA | 0.385 | 0.423 | 0.452 | 0.484 | 0.517 | <0.0001* |

| Outcomes | Angioedema_2yr | 0.004 | 0.003 | 0.006 | 0.001* | NA | NA | 0.004 | 0.005 | 0.004 | 0.005 | 0.005 | 0.874 |
|          | Hyperkalemia_2yr | 0.044 | 0.038 | 0.051 | <0.0001* | NA | NA | 0.044 | 0.042 | 0.051 | 0.042 | 0.040 | 0.375 |
|          | HPOTN_2yr | 0.048 | 0.047 | 0.049 | 0.293 | NA | NA | 0.046 | 0.047 | 0.050 | 0.049 | 0.047 | 0.635 |
|          | renalevnt_2yr | 0.063 | 0.054 | 0.075 | <0.0001* | NA | NA | 0.065 | 0.061 | 0.062 | 0.064 | 0.065 | 0.785 |
|          | recurstroke_2yr | 0.068 | 0.065 | 0.072 | 0.020* | NA | NA | 0.070 | 0.071 | 0.063 | 0.071 | 0.066 | 0.457 |
|          | surv_out2yr | 0.795 | 0.778 | 0.814 | <0.0001* | NA | NA | 0.788 | 0.793 | 0.800 | 0.798 | 0.794 | 0.324 |

| Baseline Covariates | ELIX_Depress | 0.140 | 0.141 | 0.139 | 0.522 | 0.140 | 0.141 | 0.136 | 0.136 | 0.146 | 0.146 | 0.620 |
|                     | ELIX_FluElexDis | 0.208 | 0.202 | 0.215 | 0.008* | 0.214 | 0.210 | 0.209 | 0.202 | 0.202 | 0.202 | 0.069 |
|                     | ELIX_Obesity | 0.054 | 0.045 | 0.065 | <0.0001* | 0.051 | 0.048 | 0.060 | 0.055 | 0.055 | 0.118 |
|                     | ELIX_WL | 0.038 | 0.042 | 0.032 | <0.0001* | 0.038 | 0.040 | 0.035 | 0.038 | 0.037 | 0.697 |
|                     | ELIX_SubstanceAbuse | 0.006 | 0.006 | 0.005 | 0.424 | 0.007 | 0.005 | 0.005 | 0.006 | 0.006 | 0.572 |
|                     | ELIX_Coagu | 0.027 | 0.029 | 0.025 | 0.023* | 0.031 | 0.027 | 0.025 | 0.028 | 0.025 | 0.131 |
|                     | ELIX_BLA | 0.007 | 0.007 | 0.008 | 0.631 | 0.008 | 0.006 | 0.009 | 0.006 | 0.009 | 0.578 |
|                     | ELIX_DA | 0.033 | 0.033 | 0.033 | 0.886 | 0.032 | 0.030 | 0.037 | 0.032 | 0.033 | 0.653 |
|                     | CCW_ExtraAnemia | 0.185 | 0.190 | 0.180 | 0.032* | 0.186 | 0.167 | 0.177 | 0.196 | 0.200 | <0.0001* |
|                     | Sepsis_Index | 0.012 | 0.013 | 0.011 | 0.056 | 0.012 | 0.014 | 0.013 | 0.013 | 0.010 | 0.227 |
|                     | ELIX_OthNuro | 0.244 | 0.250 | 0.236 | 0.010* | 0.245 | 0.242 | 0.236 | 0.242 | 0.255 | 0.283 |
|                     | ELIX_Paralysis | 0.277 | 0.269 | 0.286 | 0.002* | 0.268 | 0.269 | 0.280 | 0.289 | 0.277 | 0.044* |
|                     | ELIX_METS | 0.009 | 0.011 | 0.007 | 0.0010* | 0.012 | 0.008 | 0.008 | 0.007 | 0.011 | 0.643 |
|                     | ELIX_CA | 0.142 | 0.153 | 0.128 | <0.0001* | 0.143 | 0.127 | 0.145 | 0.143 | 0.150 | 0.048* |
|                     | AF | 0.241 | 0.257 | 0.222 | <0.0001* | 0.253 | 0.244 | 0.236 | 0.247 | 0.227 | 0.008* |
| Condition                  | Value1 | Value2 | Value3 | Value4 | Value5 |
|----------------------------|--------|--------|--------|--------|--------|
| Cardiac Arrest             | 0.003  | 0.002  | 0.004  | 0.047* |        |
| ELIX_Cardiac_Arrhythm      | 0.322  | 0.340  | 0.299  | <0.0001* |        |
| ELIX_CHF                   | 0.164  | 0.154  | 0.177  | <0.0001* |        |
| CABG                       | 0.038  | 0.038  | 0.039  | 0.639  |        |
| CCW_IHDnonAMI              | 0.375  | 0.362  | 0.390  | <0.0001* |        |
| CCW_AMI                    | 0.020  | 0.017  | 0.023  | 0.002*  |        |
| ELIX_VD                    | 0.111  | 0.114  | 0.108  | 0.104  |        |
| ELIX_COPD                  | 0.199  | 0.204  | 0.193  | 0.028*  |        |
| Pneumonia_Index            | 0.009  | 0.010  | 0.008  | 0.031*  |        |
| ELIX_RHEUM_A               | 0.015  | 0.015  | 0.014  | 0.804  |        |
| CCW_RHEUM_O                | 0.354  | 0.354  | 0.355  | 0.764  |        |
| ELIX_DMUC                  | 0.286  | 0.240  | 0.342  | <0.0001* |        |
| ELIX_DMC                   | 0.050  | 0.040  | 0.063  | <0.0001* |        |
| ELIX_HPTN_C                | 0.041  | 0.033  | 0.050  | <0.0001* |        |
| ELIX_HPTN_UC               | 0.832  | 0.772  | 0.904  | <0.0001* |        |
| CCW_HyperLipid             | 0.686  | 0.663  | 0.713  | <0.0001* |        |
| ELIX_HPOTHROID             | 0.177  | 0.184  | 0.169  | 0.002*  |        |
| ELIX_LiverDz               | 0.009  | 0.010  | 0.007  | 0.008*  |        |
| ELIX_PUBNB                 | 0.011  | 0.011  | 0.010  | 0.149  |        |
| ELIX_PVD                   | 0.092  | 0.092  | 0.092  | 0.791  |        |
| ELIX_PCD                   | 0.040  | 0.041  | 0.039  | 0.431  |        |
| CHRS_CVD_nonstroke         | 0.565  | 0.549  | 0.585  | <0.0001* |        |
| ELIX_Psycho                | 0.027  | 0.027  | 0.026  | 0.629  |        |
| TIA                        | 0.403  | 0.407  | 0.399  | 0.164  |        |
| Hemorrhagic                | 0.039  | 0.040  | 0.038  | 0.506  |        |
| CCW_AlzhDemetia            | 0.196  | 0.200  | 0.191  | 0.063  |        |
| Angioedema                 | 0.003  | 0.003  | 0.003  | 0.284  |        |
| Hyperkalemia               | 0.025  | 0.025  | 0.026  | 0.539  |        |
| ARF                        | 0.003  | 0.003  | 0.004  | 0.122  |        |
| HPOTN                      | 0.031  | 0.037  | 0.024  | <0.0001* |        |

*<0.0001*
| Bradycardia          | 0.209 0.205 0.213 0.087 | Other Med Side Effects: 2.45 | 0.061 | 0.202 0.209 0.215 0.210 0.209 0.410 |
|---------------------|------------------------|-------------------------------|-------|------------------------|
| HrtBlock            | 0.117 0.116 0.118 0.642 |                               | 0.043*| 0.115 0.121 0.111 0.113 0.123 0.475 |
| Myopathy            | 0.295 0.290 0.299 0.111 |                               |       | 0.289 0.299 0.303 0.290 0.292 0.945 |
| age66to70           | 0.128 0.122 0.135 0.002*|                               |       | 0.122 0.127 0.129 0.134 0.127 0.247 |
| age71to75           | 0.183 0.174 0.194 <0.0001*|                               |       | 0.178 0.174 0.191 0.187 0.175 0.481 |
| age76to80           | 0.198 0.196 0.199 0.580 |                               |       | 0.199 0.196 0.201 0.199 0.193 0.565 |
| age81to85           | 0.213 0.214 0.212 0.811 |                               |       | 0.214 0.217 0.208 0.208 0.217 0.815 |
| age85over           | 0.279 0.294 0.261 <0.0001*|                               |       | 0.277 0.286 0.271 0.273 0.288 0.638 |
| male                | 0.337 0.353 0.317 <0.0001*|                               | 0.002*| 0.335 0.326 0.345 0.334 0.344 0.207 |
| female              | 0.663 0.647 0.683 <0.0001*|                               |       | 0.665 0.674 0.655 0.666 0.656 0.207 |
| white               | 0.849 0.868 0.826 <0.0001*|                               |       | 0.866 0.866 0.835 0.836 0.843 <0.0001* |
| black               | 0.088 0.075 0.104 <0.0001*|                               |       | 0.084 0.082 0.100 0.094 0.081 0.594 |
| race_other          | 0.011 0.011 0.011 0.724 |                               |       | 0.008 0.011 0.013 0.010 0.013 0.079 |
| asian               | 0.022 0.020 0.025 0.004* |                               | 0.826 | 0.021 0.017 0.023 0.027 0.022 0.077 |
| hispanic            | 0.025 0.021 0.030 <0.0001*|                               |       | 0.018 0.021 0.023 0.029 0.036 <0.0001* |
| american_native     | 0.005 0.005 0.005 0.986 |                               |       | 0.003 0.004 0.007 0.005 0.005 0.062 |
| ruca_metro          | 0.736 0.745 0.725 0.0002*|                               | 0.015*| 0.752 0.702 0.721 0.740 0.765 0.001* |
| ruca_nonmetro       | 0.263 0.254 0.274 0.0002*|                               |       | 0.248 0.298 0.278 0.259 0.235 0.001* |
| ruca_unknown        | 0.001 0.000 0.001 0.238 |                               |       | 0.000 0.000 0.001 0.001 0.000 0.705 |
| LIS_ind             | 0.052 0.047 0.059 <0.0001*|                               |       | 0.047 0.057 0.056 0.050 0.052 0.700 |
| dual_elig_strokemonth | 0.304 0.274 0.340 <0.0001*|                               |       | 0.292 0.286 0.306 0.312 0.323 <0.0001* |
| dual_elig_diff      | 0.040 0.039 0.041 0.418 |                               |       | 0.042 0.041 0.037 0.041 0.037 0.293 |
| highIMMarea         | 0.501 0.499 0.504 0.471 |                               |       | 0.497 0.478 0.489 0.527 0.515 0.0001* |
| highnoENGarea       | 0.478 0.474 0.482 0.193 |                               |       | 0.428 0.439 0.491 0.483 0.549 <0.0001* |
| lowincomearea       | 0.495 0.476 0.518 <0.0001*|                               |       | 0.464 0.490 0.493 0.510 0.517 <0.0001* |
| noHSedarea          | 0.480 0.456 0.510 <0.0001*|                               |       | 0.442 0.455 0.493 0.510 0.501 <0.0001* |
| pctpovertyhigh      | 0.488 0.465 0.516 <0.0001*|                               |       | 0.453 0.462 0.495 0.521 0.509 <0.0001* |
| le_first_quart      | 0.245 0.234 0.259 <0.0001*|                               |       | 0.247 0.244 0.263 0.263 0.210 0.004* |
| le_second_quart     | 0.247 0.244 0.250 0.249 |                               |       | 0.229 0.274 0.246 0.221 0.264 0.360 |
| le_third_quart      | 0.243 0.247 0.238 0.067 |                               |       | 0.293 0.235 0.204 0.240 0.244 <0.0001* |
| Parameter                  | Value 1 | Value 2 | Value 3 | Value 4 | Value 5 | Value 6 | Value 7 | Value 8 |
|---------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| deductible_phase          | 0.163   | 0.172   | 0.153   | <0.0001* |         |         |         |         |
| pre_ICL_phase             | 0.661   | 0.657   | 0.667   | 0.114   |         |         |         |         |
| ICL_phase                 | 0.094   | 0.088   | 0.101   | 0.0002* |         |         |         |         |
| catastrophic_phase        | 0.021   | 0.017   | 0.025   | <0.0001* |         |         |         |         |
| unknown_phase             | 0.061   | 0.066   | 0.055   | <0.0001* |         |         |         |         |
| PLAN_PREMIUM_under25th    | 0.231   | 0.218   | 0.246   | <0.0001* |         |         |         |         |
| PLAN_PREMIUM_25thto50th   | 0.220   | 0.220   | 0.221   | 0.850   |         |         |         |         |
| PLAN_PREMIUM_50thto75th   | 0.277   | 0.289   | 0.263   | <0.0001* |         |         |         |         |
| PLAN_PREMIUM_over75th     | 0.272   | 0.274   | 0.270   | 0.444   |         |         |         |         |
| cum_bene_rspns_amt_under25th | 0.233 | 0.245   | 0.218   | <0.0001* |         |         |         |         |
| cum_bene_rspns_amt_25thto50th | 0.261 | 0.251   | 0.273   | 0.0001* |         |         |         |         |
| cum_bene_rspns_amt_50thto75th | 0.262 | 0.265   | 0.258   | 0.240   |         |         |         |         |
| cum_bene_rspns_amt_over75th | 0.245 | 0.239   | 0.251   | 0.029*  |         |         |         |         |
| cum_total_cost_under25th  | 0.296   | 0.320   | 0.267   | <0.0001* |         |         |         |         |
| cum_total_cost_25thto50th  | 0.268   | 0.270   | 0.265   | 0.282   |         |         |         |         |
| cum_total_cost_50thto75th  | 0.244   | 0.231   | 0.259   | <0.0001* |         |         |         |         |
| cum_total_cost_over75th   | 0.193   | 0.179   | 0.210   | <0.0001* |         |         |         |         |
| Pre 180 days drugs:       |         |         |         |         |         |         |         |         |
| FRI0                      | 0.448   | 0.432   | 0.466   | <0.0001* |         |         |         |         |
| FRI1                      | 0.266   | 0.270   | 0.261   | 0.088   |         |         |         |         |
| FRI2                      | 0.143   | 0.144   | 0.142   | 0.587   |         |         |         |         |
| FRI3plus                  | 0.143   | 0.153   | 0.131   | <0.0001* |         |         |         |         |
| PRE180_ACEARB             | 0.476   | 0.265   | 0.732   | <0.0001* |         |         |         |         |
| PRE180_ALDO_RECEPT_ANTAG   | 0.025   | 0.025   | 0.024   | 0.460   |         |         |         |         |
| PRE180_ALPHA_AGNOISTCENTRAL | 0.038 | 0.028   | 0.050   | <0.0001* |         |         |         |         |
| PRE180_ALPHA_BLOCKERPERIPHERAL | 0.072 | 0.072   | 0.071   | 0.753   |         |         |         |         |
| PRE180_ANTICOAG_OTH        | 0.009   | 0.010   | 0.007   | 0.021*  |         |         |         |         |
| PRE180_ANTIPATELETO_OTH   | 0.010   | 0.010   | 0.011   | 0.359   |         |         |         |         |
| PRE180_ASPIRIN            | 0.016   | 0.016   | 0.016   | 0.768   |         |         |         |         |
| PRE180_BACTRIM            | 0.050   | 0.049   | 0.050   | 0.7826  |         |         |         |         |
| Drug Class                          | PRE180_BETA_BLOCKER | PRE180_BILE_ACID | PRE180_CC_BLOCKER | PRE180_CLOPIDOGREL | PRE180_DIURETIC_OTH | PRE180_EZETIMIBE | PRE180_FIBRATE | PRE180_HEPARIN | PRE180_K_SPARING | PRE180_K_SUPP | PRE180_LIPID_OTH | PRE180_LITHIUM | PRE180_NIAcin | PRE180_NSaid | PRE180_PP_INHIBITOR | PRE180_RENIN_INHIB | PRE180_STATIN | PRE180_TICLOPIDINE | PRE180_VASODILATOR | PRE180_WARFARIN | POST30_ALDO_RECEPT_ANTAG | POST30_ALPHA_AGNOIST_CENTRAL | POST30_ALPHA_BLOCKER_PERIPHERAL | POST30_ANTICOAG_OTH | POST30_ANTIPATELET_OTH | POST30_ASPIRIN | POST30_BACTRIM | POST30_BETA_BLOCKER | POST30_BILE_ACID | POST30_CC_BLOCKER |
|-----------------------------------|---------------------|------------------|-------------------|--------------------|---------------------|-------------------|----------------|----------------|-----------------|----------------|------------------|----------------|--------------|-------------|---------------------|--------------------------|----------------|----------------------|-------------------|-------------------|----------------------|------------------|------------------|-------------------|------------------|-------------------|
| Drug                                      | Baseline 1 | Baseline 2 | Baseline 3 | Baseline 4 | Baseline 5 | Baseline 6 | Baseline 7 |
|-------------------------------------------|------------|------------|------------|------------|------------|------------|------------|
| POST30_CLOPIDOGREL                       | 0.299      | 0.270      | 0.334      | <0.0001*   |            |            |            |
| POST30_DIURETIC_OTH                      | 0.250      | 0.169      | 0.349      | <0.0001*   |            |            |            |
| POST30_HEPARIN                            | 0.002      | 0.001      | 0.002      | 0.215      |            |            |            |
| POST30_K_SPARING                         | 0.017      | 0.020      | 0.013      | <0.0001*   |            |            |            |
| POST30_K_SUPP                             | 0.117      | 0.106      | 0.131      | <0.0001*   |            |            |            |
| POST30_LIPID_OTH                          | 0.001      | 0.000      | 0.001      | 0.001*     |            |            |            |
| POST30_LITHIUM                            | 0.001      | 0.001      | 0.000      | 0.001*     |            |            |            |
| POST30_NIACIN                             | 0.009      | 0.008      | 0.009      | 0.259      |            |            |            |
| POST30_PPP_INHIBITOR                      | 0.205      | 0.185      | 0.229      | <0.0001*   |            |            |            |
| POST30_RENIN_INHIB                        | 0.004      | 0.002      | 0.006      | <0.0001*   |            |            |            |
| POST30_STATIN                             | 0.534      | 0.465      | 0.616      | <0.0001*   |            |            |            |
| POST30_TICLOPIDINE                        | 0.000      | 0.000      | 0.001      | 0.740      |            |            |            |
| POST30_VASODILATOR                        | 0.037      | 0.032      | 0.047      | <0.0001*   |            |            |            |
| POST30_WARFARIN                           | 0.200      | 0.200      | 0.200      | 0.886      |            |            |            |
| NDC_admission_0                           | 0.406      | 0.429      | 0.378      | <0.0001*   | NDC drugs at admission: 6.27 | 0.002* | 0.405 | 0.401 | 0.411 | 0.411 | 0.402 | 0.830 |
| NDC_admission1to3                         | 0.416      | 0.418      | 0.413      | 0.460      |            |            |            | 0.422 | 0.427 | 0.410 | 0.405 | 0.414 | 0.759 |
| NDC_admission4plus                        | 0.178      | 0.153      | 0.209      | <0.0001*   |            |            |            | 0.173 | 0.173 | 0.179 | 0.184 | 0.184 | 0.044* |
| OT_acute                                 | 0.628      | 0.618      | 0.639      | 0.0004*    | Therapy days during acute stay: 4.16 | 0.006* | 0.626 | 0.630 | 0.618 | 0.625 | 0.638 | 0.312 |
| PT_acute                                 | 0.853      | 0.843      | 0.866      | <0.0001*   |            |            |            | 0.853 | 0.849 | 0.848 | 0.859 | 0.858 | 0.163 |
| ST_acute                                 | 0.572      | 0.564      | 0.582      | 0.003*     |            |            |            | 0.567 | 0.565 | 0.562 | 0.574 | 0.593 | 0.004* |
| transfer                                  | 0.845      | 0.844      | 0.847      | 0.562      | Admission Type: 0.446 | 0.640 | 0.853 | 0.835 | 0.850 | 0.851 | 0.838 | 0.328 |
| days_icc                                  | 0.795      | 0.780      | 0.812      | 0.168      |            |            |            | 0.018 | 0.017 | 0.015 | 0.017 | 0.013 | 0.103 |
| days_icu                                  | 0.381      | 0.378      | 0.385      | 0.695      | Institutional stay LOS divisions: 3.03 | 0.006* | 0.376 | 0.380 | 0.358 | 0.400 | 0.391 | 0.973 |
| days_ccu                                  | 0.475      | 0.459      | 0.494      | 0.063      |            |            |            | 0.453 | 0.432 | 0.489 | 0.484 | 0.516 | 0.002* |
| days_reg_IP                               | 2.721      | 2.708      | 2.737      | 0.515      |            |            |            | 2.636 | 2.840 | 2.759 | 2.714 | 2.658 | 0.348 |
|          |        |        |        |        |        |        |        |        |        |        |        |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| days_SNF_sum | 12.048 | 11.571 | 12.624 | 0.002* |        | 12.386 | 11.92  | 11.44  | 12.16  | 12.32  | 0.138  |
|          |        |        |        |        |        |        |        |        |        |        |        |
| days_IRF_sum | 3.468  | 3.114  | 3.896  | <0.0001* | 3.565  | 3.333  | 3.575  | 3.409  | 3.456  | 0.628  |

a. Based on Area Treatment Ratio (ATR) of actual ACE/ARB treatment rate over predicted ACE/ARB treatment rate for the 50 AMI patients living closest to each patient’s residence ZIP code.
b. P value of T-test of characteristic difference between treated and non-treated patients.
c. Chow F-statistic used to test the exclusion restrictions of the specified set of covariates in the ARC/ARB choice equations. Chow GC. Tests of equality between sets of coefficients in two linear regressions. *Econometrica: Journal of the Econometric Society. 1960:591-605.*
d. P value for Chow F-tests.
e. Cochran-Armitage two-sided test of trend in characteristic value across patients grouped into quintiles based on local area ACE/ARB Area Treatment Ratios (ATRs). For example, the p value for age66to70 tests whether a linear trend in the percentage of patients in this age group exists across quintiles of the ACE/ARB choice ATR-based patient groups.

*p<0.05* signifies positive relationship with ACE/ARB choice or positive association with local area ACE/ARB Area Treatment rates. *p<0.01* signifies negative relationship with ACE/ARB choice or positive association with local area ACE/ARB Area Treatment rates.
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