**Table S1. Random Forest Hyperparameters.**

The following are the parameters in the final model, which were obtained through hyperparameter optimization.

|  |  |  |
| --- | --- | --- |
| **Hyperparameter** | **Value** | **Description** |
| Criterion | Mean squared error | Function used to measure the quality of a split |
| Maximum depth | 15 | The maximum depth a tree may grow to |
| Maximum features | All features | The number of features that are taken into account when looking for the best split |
| Minimum samples leaf | 3 | The minimum number of samples required to be a leaf node |
| Number of estimators | 120 | The number of individual regressor trees |

**Table S2. List of Final Model Features.**

Features are ranked by the expected fraction of the samples they contribute to as a measure of feature importance.

|  |  |
| --- | --- |
| Feature Description | Additional Details/Codes Included |
| Date of death within the same calendar month of hospital discharge for stroke event |  |
| Patient length of hospital stay  | From the start of the first visit to the end of the last visit in a continuous series of visits. Recorded in days |
| Aphagia/dysphagia diagnosis | ICD9: 78720, V416; ICD10: R130, R1310 |
| Discharged to home or self-care |  |
| Unspecified side hemiplegia diagnosis | ICD9: 34280, 34290; ICD10: G8190 |
| Tissue plasminogen activator administered to patient (based on medications administered, procedural codes, and diagnosis codes) | If a patient had any of the following: medications administered with NDC: 24477004001, 50242004164, 50242004413, 50242008527, 50242012001, 67286004002, ICD Procedural Code: ICD9 99.10, ICD10 3E03017, 3E03317, 3E04317, 3E05317, 3E06317; HCPCS procedural code: J2997, Diagnosis codes: ICD9 V4588, ICD10: Z9282 |
| Aphasia diagnosis  | ICD9: 7843; ICD10: R4701 |
| Age of patient at the time of stroke | Calculated based on year of birth |
| Count of procedural codes that fall within M2B Berenson-Eggers Type of Service Codes |  |
| Medications administered by feeding tube |  |
| Patient's Charlson Comorbidity Index prior to stroke  | See reference [1] |
| Count of custom procedure codes: Fall risk |  |
| Transient ischemic attack diagnosis | ICD9: 435, 4350, 4353, 4358, 4359; ICD10: G45.9 |
| Count of procedural codes that fall within M2C Berenson-Eggers Type of Service Codes |  |
| Medications administered within the medication class 'Salicylates' |  |
| Narcotic and agonist analgesic combinations medications administered |  |
| Other discharge disposition |  |
| Count of procedure codes: Subsequent hospital care, per day, for the evaluation and management of a patient, which requires at least 2 of these 3 key components: A detailed interval history; A detailed examination; Medical decision making of high complexity.  | CPT4: 99233 |
| Count of procedural codes that fall within T1A Berenson-Eggers Type of Service Codes |  |
| Count of procedural codes that fall within M2A Berenson-Eggers Type of Service Codes |  |
| Neurological neglect syndrome diagnosis | ICD9: 7818, ICD10: R414 |
| Medications administered within the medication class 'Gastrointestinal anticholinergics' |  |
| Presence of procedure code: Critical care, evaluation and management of the critically ill or critically injured patient; first 30-74 minutes | CPT4: 99291 |
| Count of procedure codes: Therapeutic procedure, 1 or more areas, each 15 minutes; gait training (includes stair climbing) | CPT4: 97116 |
| Count of procedural codes that fall within O1E Berenson-Eggers Type of Service Codes |  |
| Presence of procedure code: Radiologic examination, abdomen; single anteroposterior view | CPT4: 74000 |
| Count of procedure codes: Radiologic examination, chest; single view, frontal | CPT4: 71010 |
| Count of procedural codes that fall within I2A Berenson-Eggers Type of Service Codes |  |
| Count of procedural codes that fall within T1H Berenson-Eggers Type of Service Codes |  |
| Count of procedural codes that fall within T2A Berenson-Eggers Type of Service Codes |  |
| Count of procedure codes: Respiratory ventilation procedure | ICD9: 9670, 9671, 9672; ICD10: 5A1935Z, 5A1945Z, 5A1955Z |
| Do not resuscitate status diagnosis | ICD9: V4986; ICD10: Z66 |
| Encounter for palliative care diagnosis  | ICD9: V667, ICD10: Z515 |
| Count of procedural codes that fall within P6C Berenson-Eggers Type of Service Codes |  |
| Presence of procedure code: Dilation of artery or extirpation of matter from artery | ICD10: 0270346, 027034Z, 02703DZ, 02703ZZ, 02C03ZZ, 037G3ZZ, 037K3DZ, 037L34Z, 037L3DZ, 037N34Z, 03C63ZZ, 03CG3ZZ, 03CG4ZZ, 03CH0ZZ, 03CH3ZZ, 03CJ0ZZ, 03CJ3ZZ, 03CK0ZZ, 03CK3ZZ, 03CL3ZZ, 03CL4ZZ, 03CM0ZZ, 03CP3ZZ, 03CQ3ZZ, 03CY3ZZ, 04703ZZ, 047C3ZZ, 047H3ZZ, 047K3ZZ, 047M3ZZ, 04C00ZZ, 04CC0ZZ, 04CL0ZZ, 04CM3ZZ, 027134Z, 02713DZ, 027234Z, 05C83ZZ, 05CC3ZZ, 05CF3ZZ, 04HY32ZICD9: 0040, 3812, 0044, 3974, 0045, 0066, 3607, 3950, 0041, 3606, 0061, 0062, 0063, 1755, 0046, 3818, 3949, 0042, 0047, 3803, 3808 |
| Count of procedural codes that fall within T2D Berenson-Eggers Type of Service Codes  |  |
| Beta-adrenergic antagonists (beta blockers) w/o ISA medications administered |  |
| Facial weakness diagnosis | ICD9: 78194, ICD10: R29810 |
| Atrial fibrillation diagnosis | ICD9: 42731; ICD10: 480, 482, 4891 |
| Patient gender |  |
| Count of procedural codes that fall within M3 Berenson-Eggers Type of Service Codes |  |
| Medications administered by rectal route |  |
| Cerebral edema/intracranial injury diagnosis | ICD9: 3485, 85400, 85401; ICD10: S061X0A, S06300A, S06890A, S069X0A |
| Count of procedural codes that fall within I2C Berenson-Eggers Type of Service Codes |  |
| Insertion of feeding device | ICD9: 4311; ICD10: 0DH63UZ, 0DH64UZ |
| Count of procedure codes: Initial hospital care, per day, for the evaluation and management of a patient, which requires these 3 key components: A comprehensive history; a comprehensive examination; and medical decision making of high complexity | CPT4: 99223 |
| Count of procedural codes that fall within Z2 Berenson-Eggers Type of Service Codes |  |
| Count of procedure codes: Critical care, evaluation and management of the critically ill or critically injured patient; each additional 30 minutes | CPT4: 99292 |
| Count of procedural codes that fall within T1E Berenson-Eggers Type of Service Codes |  |
| Count of procedural codes that fall within I3C Berenson-Eggers Type of Service Codes |  |
| Dominant-side hemiplegia diagnosis | ICD9: 34281, 34291; ICD10: G8191, G8192 |
| Count of procedural codes that fall within M5D Berenson-Eggers Type of Service Codes |  |
| Count of procedure codes: Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, complete, with spectral Doppler echocardiography, and with color flow Doppler echocardiography | CPT4: 93306 |
| Presence of procedure codes: Respiratory ventilation procedure | ICD9: 9670, 9671, 9672; ICD10: 5A1935Z, 5A1945Z, 5A1955Z |
| Count of procedure codes: Treatment of swallowing dysfunction and/or oral function for feeding | CPT4: 92526 |
| Anxiolytic; benzodiazepine medication administered |  |
| Count of procedure codes: Computed tomography, head or brain; without contrast material  | CPT4: 70450 |
| Aphasia due to cerebrovascular disease diagnosis  | ICD9: 43811; ICD10: I69020, I69120, I69220, I69320, I69820, I69920 |
| Alpha- & beta-adrenergic antagonists medication administered |  |
| Count of procedure codes: Electrocardiogram, routine ECG with at least 12 leads; interpretation and report only | CPT4: 93010 |
| Discharged or transferred to a skilled nursing facility |  |
| Count of procedure codes: Subsequent hospital care, per day, for the evaluation and management of a patient, which requires at least 2 of these 3 key components: A problem focused interval history; a problem focused examination; medical decision making that is straightforward or of low complexity | CPT4: 99231 |
| Count of procedure codes: Hospital discharge day management; more than 30 minutes | CPT4: 99239 |
| Count of procedure codes: Blood count; complete (CBC), automated (Hgb, Hct, RBC, WBC and platelet count) and automated differential WBC count | CPT4: 85025 |
| Altered mental state diagnosis | ICD9: 78097, ICD10: R410, R4182 |
| Other or unspecified hyperlipidemia diagnosis | ICD9: 2724; ICD10: E784, E785 |
| Irritant or stimulant laxative medication administered |  |
| Medications administered topically |  |
| Histamine H2 antagonist medications administered |  |
| Count of procedural codes that fall within I4B Berenson-Eggers Type of Service Codes |  |
| Count of procedural codes: Injection, enoxaparin sodium, 10 mg | HCPCS: J1650 |
| Count of procedural codes: Prothrombin time | CPT4: 85610 |
| Antiemetic agents (5-hydroxytryptamine-3 (5HT-3) antagonist) medication administered |  |
| Count of procedure codes: Blood count; complete (CBC), automated (Hgb, Hct, RBC, WBC and platelet count) | CPT4: 85027 |
| Narcotic agonist analgesics medications administered |  |
| Dysarthria diagnosis | ICD9: 78451; ICD10: R471 |
| Count of procedure codes: Glucose, blood by glucose monitoring device(s) cleared by the FDA specifically for home use | CPT4: 82962 |
| Count of procedure codes: Therapeutic activities, direct (one-on-one) patient contact (use of dynamic activities to improve functional performance), each 15 minutes | CPT4: 97530 |
| Medications administered by other route  | Excludes: Feeding tube, Implant, In vitro, Inhalation, Intra-arterial, Intramuscular, Intravenous, Irrigation, Nasal, Ophthalmic, Oral, Other injection, Otic, Rectal, Subcutaneous, Topical, Urinary tract, Vaginal |
| Count of procedure codes: Computed tomographic angiography, neck, with contrast material(s), including non-contrast images, if performed, and image postprocessing | CPT4: 70498 |
| Count of procedural codes that fall within I2C Berenson-Eggers Type of Service Codes |  |
| Insertion of endotracheal tube | ICD9: 9604; ICD10: 0BH17EZ, 0BH18EZ |
| Count of procedure codes: Troponin, quantitative | CPT4: 84484 |
| Count of procedure codes: Magnetic resonance (e.g., proton) imaging, brain (including brain stem); without contrast material | CPT4: 70551 |
| Count of procedural codes: Infusion, normal saline solution, 1000 mL | HCPCS: J7030 |
| Count of procedure code: Cerebral perfusion analysis using computed tomography with contrast administration, including post-processing of parametric maps with determination of cerebral blood flow, cerebral blood volume, and mean transit time | CPT4: 0042T |
| Dementia/delirium diagnosis  | ICD9: 2900, 29010,29012, 29013, 29020, 29021, 2903, 2909, 2930, 2931, 29420; ICD10: F0390, F05 |
| Count of custom procedure codes: Pneumo vaccine |  |
| Musculoskeletal symptoms diagnosis | ICD9: 71966, 72989, 78199; ICD10: R296, R29818, R29898, R2990, R2991 |
| Antidepressant medication administered |  |
| Heparins or glycosaminoglycans medications administered |  |
| Count of procedural codes that fall within I1E Berenson-Eggers Type of Service Codes |  |
| Presence of procedure code: Cerebral perfusion analysis using computed tomography with contrast administration, including post-processing of parametric maps with determination of cerebral blood flow, cerebral blood volume, and mean transit time | CPT4: 0042T |
| Count of procedural codes that fall within I1F Berenson-Eggers Type of Service Codes |  |
| Respiratory failure diagnosis | ICD9: 51851, 51881; ICD10: J95821, J9600, J9601, J9602, J9690, J9691, J9692 |
| Speech disturbances diagnosis | ICD9: 78459; ICD10: R4702, R4781, R4789, R479 |
| Non-dominant side hemiplegia diagnosis | ICD9: 34282, 34292; ICD10: G8193, G8194 |
| Antipsychotic medication administered |  |
| Count of procedural codes that fall within P1G Berenson-Eggers Type of Service Codes |  |
| Pneumonitis due to inhaling food/vomit diagnosis | ICD9: 5070; ICD10: J690 |

**Reference**

1. Quan H, Sundararajan V, Halfon P, Fong A, Burnand B, Luthi JC *et al*. Coding algorithms for defining comorbidities in ICD-9-CM and ICD-10 administrative data. Med Care. 2005;43(11):1130-9.