**Appendix**

|  |  |  |  |
| --- | --- | --- | --- |
| *Variable* | Definition/Source | Source of Data  | Values |
| Patient demographics |  |
| *Age* | Categories are: 66-70, 71-75, 76-80, 81-85, Over 85 | Beneficiary Summary Files (2008-2009) | 1 if in age category, 0 otherwise |
| *Gender* | Categories are M, F | Beneficiary Summary Files (2008-2009) | 1 if male, 0 female |
| *Race* | Categories are Unknown, White, Black, Other, Asian, Hispanic, Native American | Beneficiary Summary Files (2008-2009) | 1 if in race category, 0 otherwise |
| *Metro/non-metro geographic location* | Used Rural-Urban Continuum Codes1-9 developed by the USDA Economic Research Service (ERS): summarized to metro(1-3) and non-metro(4-9)areas. | Beneficiary Summary Files (2008-2009) | 1 if in location category, 0 otherwise |
| *Average life expectancy* | Average life expectancy in quartiles by zip code (Murray et al, 2005) | U.S. Census, NCHS | 1 if in each category, 0 otherwise |
| *Dual eligible status* | Dual eligibility status at the time of index AMI and recent change in dual eligibility status | Beneficiary Summary Files (2008-2009) | 1 if dual eligible in AMI month, 0 otherwise; 1 if dual eligibility status changed within last 12 months |
| *Low income subsidy* | Indicates a beneficiary’s subsidy and/or copayment status: cost share group codes 04-08 at the time of index AMI | Beneficiary Summary Files (2008-2009) | 1 if LIS in AMI month, 0 otherwise |
| *Area characteristics* | Median percent of: residents living in poverty, non-English speakers, immigrant residents, low income residents, residents who did not complete high school by zip code  | 2000 U.S. Census | Beneficiaries who lived in zip codes where these values were above the median percentage received a “1” for that variable, and “0” otherwise. |
| Baseline medical history/comorbidities |  |
| *Time period* | Two sets of variables measured: (1) up to 365 days pre admission and (2) during admission  |  |  |
| *AMI (Acute Myocardial Infarction)* | At least 1 inpatient claim with ICD-9 codes 410.01, 410.11, 410.21, 410.31, 410.41, 410.51, 410.61, 410.71, 410.81, 410.91 (ONLY first or second ICD-9 on the claim) (CCW, 2011)  | Part A (Inpatient) | 1 if code occurs, 0 otherwise |
| *Stroke* | At least 1 inpatient claim or 2 HOP or Carrier claims with ICD-9 codes 430, 431, 434.00, 434.01, 434.10, 434.11, 434.90, 434.91, 435.0, 435.1, 435.3, 435.8, 435.9, 436, 997.02 (any ICD-9 on the claim); If any of the qualifying claims have: 800 <= ICD-9 Code <= 804.9, 850 <= ICD-9 Code <= 854.1 in any ICD-9 position or ICD-9 V57xx as the principal ICD-9 code, then EXCLUDE. (CCW, 2011), exclude 435.X per Carnahan (2012) | Part A (Inpatient) Part B (outpatient, Carrier) | 1 if code occurs, 0 otherwise |
| *TIA (Transient Ischemic Attack)* | ICD-9 codes 435.x in hospitalization or emergency encounter data (Carnahan 2012) | Part A/B | 1 if code occurs, 0 otherwise |
| *Heart failure* | ICD-9 398.91, 402.01, 402.11, 402.91, 404.01, 404.11, 404.91, 404.03, 404.13, 404.93, 428.0, 428.1, 428.20, 428.21, 428.22, 428.23, 428.30, 428.31, 428.32, 428.33, 428.40, 428.41, 428.42, 428.43, 428.9 (Any ICD-9 on the claim); At least 1 inpatient, HOP or Carrier claim with ICD-9 codes (CCW, 2011) | Part A (Inpatient) Part B (outpatient, Carrier) | 1 if code occurs, 0 otherwise |
| *Cardiac arrest* | 427.5 (Aujesky, 2006) | Part A/B | 1 if code occurs, 0 otherwise |
| *Ventricular arrhythmia* | ICD-9 427.1, 427.4 , 427.41, 427.42 (Liperoti, 2005) | Part A/B | 1 if code occurs, 0 otherwise |
| *Hypotension* | ICD-9458.x (Rochon, 1999) or ICD-9 458.0 (Wilchesky, 2004)and ICD-9 458.9, 785.5x, and 998.0 (Romano, 2002) | Part A/B | 1 if code occurs, 0 otherwise |
| *Renal failure* | acute renal failure/acute tubular necrosis (ICD-9 584.xx) or acute glomerulonephritis (ICD-9 580.xx) (Griffin, 2000; Cziraky, 2006)) | Part A/B | 1 if code occurs, 0 otherwise |
| *CKD (Chronic Kidney Disease)* | ICD-9 016.00, 016.01, 016.02, 016.03, 016.04, 016.05, 016.06, 095.4, 189.0, 189.9, 223.0, 236.91, 249.40, 249.41, 250.40, 250.41, 250.42, 250.43, 271.4, 274.10, 283.11, 403.01, 403.11, 403.91, 404.02, 404.03, 404.12, 404.13, 404.92, 404.93, 440.1, 442.1, 572.4, 580.0, 580.4, 580.81, 580.89, 580.9, 581.0, 581.1, 581.2, 581.3, 581.81, 581.89, 581.9, 582.0, 582.1, 582.2, 582.4, 582.81, 582.89, 582.9, 583.0, 583.1, 583.2, 583.4, 583.6, 583.7, 583.81, 583.89, 583.9, 584.5, 584.6, 584.7, 584.8, 584.9, 585, 585.1, 585.2, 585.3, 585.4, 585.5, 585.6, 585.9, 586, 587, 588.0, 588.1, 588.81, 588.89, 588.9, 591, 753.12, 753.13, 753.14, 753.15, 753.16, 753.17, 753.19, 753.20, 753.21, 753.22, 753.23, 753.29, 794.4 (any ICD-9 on the claim); At least 1 inpatient, SNF or HHA claim or 2 HOP or Carrier claims with ICD-9 codes (CCW, 2011) | Part A (Inpatient, SNF, HHA) Part B (outpatient, Carrier) | 1 if code occurs, 0 otherwise |
| *Diabetes* | ICD-9 249.00, 249.01, 249.10, 249.11, 249.20, 249.21, 249.30, 249.31, 249.40, 249.41, 249.50, 249.51, 249.60, 249.61, 249.70, 249.71, 249.80, 249.81, 249.90, 249.91, 250.00, 250.01, 250.02, 250.03, 250.10, 250.11, 250.12, 250.13, 250.20, 250.21, 250.22, 250.23, 250.30, 250.31, 250.32, 250.33, 250.40, 250.41, 250.42, 250.43, 250.50, 250.51, 250.52, 250.53, 250.60, 250.61, 250.62, 250.63, 250.70, 250.71, 250.72, 250.73, 250.80, 250.81, 250.82, 250.83, 250.90, 250.91, 250.92, 250.93, 357.2, 362.01, 362.02, 366.41 (any ICD-9 on the claim); At least 1 inpatient, SNF or HHA claim or 2 HOP or Carrier claims with ICD-9 codes (CCW, 2011)  | Part A (Inpatient, SNF, HHA) Part B (outpatient, Carrier)Part D | 1 if code occurs, 0 otherwise |
| *Hypertension (complicated)* | ICD-9 402.10, 402.90, 404.10, 404.90, 405.1, 405.9 (Elixhauser, 1998) | Part A/B | 1 if code occurs, 0 otherwise |
| *Hypertension**(uncomplicated)* |  ICD-9 401.1, 401.9 (Elixhauser, 1998)  | Part A/B | 1 if code occurs, 0 otherwise |
| *Hyperlipidemia* | ICD-9 272.xx OR a pharmacy claim for a lipid lowering medication (Lund, 2001) | Part A/B/D | 1 if code occurs, 0 otherwise |
| *COPD* | ICD-9 491.0, 491.1, 491.20, 491.21, 491.22, 491.8, 491.9, 492.0, 492.8, 494.0, 494.1, 496 (any ICD-9 on the claim) (CCW, 2011) | Part A/B | 1 if code occurs, 0 otherwise |
| *Cancer (general)* | ICD-9 140.x-172.x, 174.x-195.8, 200.x-208.x (Klabunde, 2000) | Part A/B | 1 if code occurs, 0 otherwise |
| *Metastatic Cancer* | ICD-9 196.x-199.x (Elixhauser, 1998) | Part A/B | 1 if code occurs, 0 otherwise |
| *Asthma* | ICD-9 493.0, 493.1, 493.9 (Blais, 2006) | Part A/B | 1 if code occurs, 0 otherwise |
| *Non-AMI Ischemic Heart Disease (AMI codes removed)* | ICD-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, 411.0, 411.1, 411.81, 411.89, 412, 413.0, 413.1, 413.9, 414.00, 414.01, 414.02, 414.03, 414.04, 414.05, 414.06, 414.07, 414.10, 414.11, 414.12, 414.19, 414.2, 414.3, 414.8, 414.9 Proc 00.66, 36.01, 36.02, 36.03, 36.04, 36.05, 36.06, 36.07, 36.09, 36.10, 36.11, 36.12, 36.13, 36.14, 36.15, 36.16, 36.17, 36.19, 36.2, 36.31, 36.32 HCPCS 33510, 33511, 33512, 33513, 33514, 33516, 33517, 33518, 33519, 33521, 33522, 33523, 33533, 33534, 33535, 33536, 33542, 33545, 33548, 92975, 92977, 92980, 92982, 92995, 33140, 33141 (any ICD-9, PROC or HCPCS on the claim); At least 1 inpatient, SNF, HHA, HOP or Carrier claim with ICD-9, Procedure or HCPC codes (CCW, 2011) | Part A (Inpatient, SNF, HHA) Part B (outpatient, Carrier) | 1 if code occurs, 0 otherwise |
| *CABG* | ICD9 Procedure codes 36.0-36.39 (Glance, HSR 2006)or CPT 33510-33536 (Lucas 2006) | Part A/B | 1 if code occurs, 0 otherwise |
| *Stent* | Stent alone CPT codes 92980-92981 (Lucas 2006)ICD-9-CM procedure code 36.06,drug-eluting stent (ICD-9-CM procedure code 36.07), or both (Malenka, 2008) | Part A/B | 1 if code occurs, 0 otherwise |
| *PTCA* | Angioplasty only: ICD-9 procedure codes 36.01, 36.02, 36.05, 36.06 (Glance, 2006)  | Part A/B | 1 if code occurs, 0 otherwise |
| *Charlson Comorbidity Index* | Klabunde, 2000 | Part A/B | 0-19 points possible  |
| *Serious myopathy* | A primary or secondary discharge code for myoglobinuria((ICD-9-CM 791.3), OR a primary code for “other disorders of muscle,” (ICD-9-CM 728.89, 729.1, 359.4,359.8, 359.9, 710.4, 728.9, 729.8X, E942.2) OR a secondary code for any of the above codes ”accompanied by a claim for a CK test within 7 days of hospitalization or a discharge code for acute renal failure (CPT codes 82550, 82552, 82554, 80012, 80016, 80018, or 80019). (Andrade, 2005) | Part A/B | 1 if code occurs, 0 otherwise |
| *Non-serious myopathy* | All codes above, but no claim type or position restrictions, and no CK test required. | Part A/B | 1 if code occurs, 0 otherwise |
| *Bradycardia* | ICD-9 code 427.8 (Rochon, 1999) | Part A/B | 1 if code occurs, 0 otherwise |
| *Heart block* | ICD-9 code 426.x (Rochon, 1999) | Part A/B | 1 if code occurs, 0 otherwise |
| *Hyperkalemia* | ICD-9 code 276.7(Jurrlink, et al) | Part A/B | 1 if code occurs, 0 otherwise |
| *Hepatic events* | Acute/sub-acute necrosis of liver (570.xx) or hepatitis(573.3x) or other disorders of liver (573.8x, 573.9x) (Cziraky, 2006). |  |  |
| *VAD*  | CPT 36533 and 36489 (Reeves, 2001) or ICD-9 procedure codes 37.62, 37.65 and 37.66 (Hernandez, 2008) | Part A/B | 1 if code occurs, 0 otherwise |
| *Pacemaker implantation* | ICD-9 procedure codes 37.80-37.89 (Brown,2005) | Part A/B | 1 if code occurs, 0 otherwise |
| Depression | ICD-9 311.x, 298.0x, 300.4x, 309.1x, 296.20-6, 296.30-6, 296.50-6, 296.60-6, 296.89 (CCW, 2011) | Part A/B | 1 if code occurs, 0 otherwise |
| Angioedema | ICD-9 995.1x; (OMOP, 2011) | Part A/B | 1 if code occurs, 0 otherwise |
| Other Cardiac Arrhythmias | ICD-9 427.xx or 798.xx (Carnahan, 2012) | Part A/B | 1 if code occurs, 0 otherwise |
| Unstable Angina | ICD-9 411.xx (Jacobs, 1999) | Part A/B | 1 if code occurs, 0 otherwise |
| Baseline and Post-Discharge medications |  |
| *Time Period* | 180 days prior to index admission date AND 30 days post discharge for ACE/ARBs and beta blockers only |  |  |
| *Drug classes* | All drug classes identified by linking Part D claims to Multum Lexicon Plus dataset (Copyright 2012 Lexi-Comp, Inc. and/or Cenner Multum, Inc) |  |  |
| *nitrates* |  | Part D | 1 if prescription filled during time period, 0 otherwise |
| *clopidogrel* |  | Part D |  |
| *ACE inhibitors* |  | Part D |  |
| *ARBs* |  | Part D |  |
| *beta blockers* |  | Part D |  |
| *lipid-lowing agents* |  | Part D |  |
| *calcium-channel**blockers* |  | Part D |  |
| *warfarin* |  | Part D |  |
| *lmw heparin* |  | Part D |  |
| *diuretics (loop diuretics, thiazide diuretics, potassium sparing diurectics),* |  | Part D |  |
| *other antihypertensive* |  | Part D |  |
| *fenofibrates and other lipid-lowering agents* |  | Part D |  |
| *insulin* |  | Part D |  |
| *Anti-diabetics**Alpha-glucosidase, amylin analogues, biguanides, dipeptidyl peptidase 4 inhibitors, glucagon-like peptide 1 receptor agonists, meglitinides, sulfonylureas, thiazolidinedione, others (epalrestat, exenatide, glybuzole)* |  | Part D |  |
| Diagnosis on admission |  |
| *Anterior wall AMI* | ICD-9 410.0 410.1 (Fang, 2006) | Part A/B | 1 if code occurs, 0 otherwise |
| *Subendocardial Infarction (NSTEMI),* | ICD-9 410.7x (Fang, 2006) | Part A/B | 1 if code occurs, 0 otherwise |
| *Stroke* | At least 1 inpatient claim or 2 HOP or Carrier claims with ICD-9 codes 430, 431, 434.00, 434.01, 434.10, 434.11, 434.90, 434.91, 435.0, 435.1, 435.3, 435.8, 435.9, 436, 997.02 (any ICD-9 on the claim); If any of the qualifying claims have: 800 <= ICD-9 Code <= 804.9, 850 <= ICD-9 Code <= 854.1 in any ICD-9 position OR ICD-9 V57xx as the principal ICD-9 code, then EXCLUDE. (CCW, 2011) – exclude TIA codes below if separating | Part A/B | 1 if code occurs, 0 otherwise |
| *Other AMI locations* | Other AMI locations ICD-9 410.5-410.6, 410.8-410.9 (Fang 2006) | Part A/B | 1 if code occurs, 0 otherwise |
| Complications during admission |  |
| *Cardiac arrest* | 427.5 (Aujesky, 2006) | Part A/B | 1 if code occurs, 0 otherwise |
| *Ventricular arrhythmia* | ICD-9 427.1, 427.4 , 427.41, 427.42 (Liperoti, 2005) | Part A/B | 1 if code occurs, 0 otherwise |
| *Heart failure* |  ICD-9 398.91, 402.01, 402.11, 402.91, 404.01, 404.11, 404.91, 404.03, 404.13, 404.93, 428.0, 428.1, 428.20, 428.21, 428.22, 428.23, 428.30, 428.31, 428.32, 428.33, 428.40, 428.41, 428.42, 428.43, 428.9 (Any ICD-9 on the claim); At least 1 inpatient, HOP or Carrier claim with ICD-9 codes (CCW, 2011) | Part A (Inpatient)Part B (outpatient, Carrier) | 1 if code occurs, 0 otherwise |
| *Cardiogenic shock* | ICD-9 785.51(Aujesky, 2006) | Part A/B | 1 if code occurs, 0 otherwise |
| *Hypotension* | ICD-9 458.x (Rochon, 1999) or ICD-9 458.0 (Wilchesky, 2004)and ICD-9 458.9, 785.5x, and 998.0 (Romano, 2002) | Part A/B | 1 if code occurs, 0 otherwise |
| *Renal failure* | acute renal failure/acute tubular necrosis (ICD-9 584.xx) or acute glomerulonephritis (ICD-9 580.xx) (Griffin, 2000; Cziraky, 2006) | Part A/B | 1 if code occurs, 0 otherwise |
| *Sepsis* | ICD-9 995.91; (Carnahan, 2012)  | Part A/B | 1 if code occurs, 0 otherwise |
| *Pneumonia* | Secondary ICD-9 481 to 483 (Rello 2002) | Part A/B | 1 if code occurs, 0 otherwise |
| Procedures during hospitalization |  |
| *CABG* | ICD9 Procedure codes 36.0-36.39 (Glance, 2006)and CPT 33510-33536 (Lucas 2006) | Part A/B | 1 if code occurs, 0 otherwise |
| *stent* | ICD-9-CM procedure code 36.06, drug-eluting stent (ICD-9-CM procedure code 36.07), (Malenka, 2008) | Part A/B | 1 if code occurs, 0 otherwise |
| *PTCA* | Angioplasty only: ICD-9 procedure codes 36.01, 36.02, 36.05, 36.06 (Glance, 2006) | Part A/B | 1 if code occurs, 0 otherwise |
| *Stress test* | ICD-9 89.4x, CPT 93015 or CPT codes 93015-93018, 93350, 78460-78465, 78472-78483, 78494, 78496, 78491-78492 (includes nuclear imaging) (Lucas, 2006) | Part A/B | 1 if code occurs, 0 otherwise |
| *Cardiac catheterization* | CPT codes 93508, 93510-93529, 93539-93540, 93543, 93545-93552 (Lucas, 2006) | Part A/B | 1 if code occurs, 0 otherwise |
| *Echocardiography* | On inpatient claim, ICD-9 procedure code 88.72; on outpatient claim, CPT 93307, 93320, 93325, 93308 (Okrah, 2010) | Part A (Inpatient)Part B (outpatient) | 1 if code occurs, 0 otherwise |
| *VAD* | CPT 36533 and 36489 (Reeves, 2001) or ICD-9 procedure codes 37.62, 37.65 and 37.66 (Hernandez, 2008) | Part A/B | 1 if code occurs, 0 otherwise |
| *Pacemaker implantation* | ICD-9 procedure codes 37.80-37.89 (Brown,2005) | Part A/B | 1 if code occurs, 0 otherwise |
| Insurance variables |  |
| *Benefit phase* | 1/0 variables for whether patient was in deductible, pre-ICL, ICL (“donut hole”) or catastrophic phase at index admission | PDE  | 1 if code occurs, 0 otherwise |
| *Plan premium quartile* | Plan premium rates by beneficiary separated into quartiles  | Pharmacy characteristics file | 1 if in each category, 0 otherwise |
| *Cumulative beneficiary responsibility amount* | Cumulative beneficiary Part D responsibility amount from January 1 to index admission separated into quartiles  | PDE | 1 if in each category, 0 otherwise |
| *Cumulative total cost* | Cumulative total Part D cost from January 1 to index admission separated into quartiles  | PDE | 1 if in each category, 0 otherwise |
| *Utilization variables* |
| *Days in ICU* | Number of days in ICU as measured by occurrence of revenue center code 0201 | Part A | Number |
| *Days in CCU* | Number of days in CCU as measured by occurrence of revenue center code 0210 | Part A | Number |
| *Days in IMC* | Number of days in IMC as measured by occurrence of revenue center code 0206 | Part A | Number |
| *Other acute days*  | Number of other acute days as measured by remainder of days in acute LOS | Part A | Number |
| *Other non-acute institutional days* | Number of other institutional days as measured by remainder of all other days in LOS | Part A | Number |
| *ER use* | Occurrence of revenue center code 0450 | Part A | 1 if used, 0 otherwise |
| *Transferred to another facility* | Occurrence of multiple short term or CAH hospitals in overall stay | Part A | 1 if transferred, 0 otherwise |

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