

**Supplementary Table 1:** Classification of Clinic Classification Software codes for Readmissions

## Causes

| Causes of readmission       | CCS code   | Diagnosis   |
|-----------------------------|--|---|
| Respiratory                 | 127  | Chronic obstructive pulmonary disease and bronchiectasis        |
|                             | 128  | Asthma  |
|                             | 130  | Pleurisy, pneumothorax, pulmonary collapse                      |
|                             | 131  | Respiratory failure, insufficiency and arrest                   |
|                             | 132  | Lung disease due to external agents                             |
|                             | 133  | Other lower respiratory disease                                 |
|                             | 134  | Other upper respiratory disease                                 |
|                             | 221  | Respiratory distress syndrome                                   |
| Infection                   | 1  | Tuberculosis  |
|                             | 2  | Septicemia  |
|                             | 3  | Bacterial infection   |
|                             | 4  | Mycoses   |
|                             | 5  | HIV infection   |
|                             | 6  | Hepatitis   |
|                             | 7  | Viral infection   |
|                             | 8  | Other infection   |
|                             | 9  | Sexually transmitted infection                                  |
|                             | 76   | Meningitis  |
|                             | 77   | Encephalitis  |
|                             | 78   | Other CNS infection and poliomyelitis                           |
|                             | 90   | Inflammation or infection of eye                                |
|                             | 122  | Pneumonia   |
|                             | 123  | Influenza   |
|                             | 124  | Acute and chronic tonsillitis                                   |
|                             | 125  | Acute bronchitis  |
|                             | 126  | Other upper respiratory infections                              |
|                             | 129  | Aspiration pneumonitis  |
|                             | 135  | Intestinal infection  |
| 197                         | Skin and subcutaneous tissue infections  |   |
| 201                         | Infective arthritis and osteomyelitis (except that caused by tuberculosis or sexually transmitted disease) |   |
| Bleeding                    | 60   | Acute posthemorrhagic anemia                                    |
|                             | 153  | Gastrointestinal hemorrhage                                     |
|                             | 182  | Hemorrhage during pregnancy; abruptio placenta; placenta previa |
| Peripheral vascular disease | 114  | Peripheral and visceral atherosclerosis                         |
|                             | 115  | Aortic, peripheral and visceral artery aneurysms                |
|                             | 116  | Aortic and peripheral arterial embolism or thrombosis           |
|                             | 117  | Other circulatory disease                                       |
|                             | 118  | Phlebitis, thrombophlebitis and thromboembolism                 |
|                             | 119  | Varicose veins of lower extremities                             |
| Genitourinary               | 159  | Urinary tract infection   |
|                             | 160  | Calculus of the urinary tract                                   |

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|                  | 161 | Other diseases of kidney and ureters               |
|                  | 162 | Other diseases of bladder and urethra              |
|                  | 163 | Genitourinary symptoms and ill-defined conditions  |
|                  | 164 | Hyperplasia of prostate                            |
|                  | 165 | Inflammatory conditions of the male genital organs |
|                  | 166 | Other male genital disorders                       |
|                  | 170 | Prolapse of female genital organs                  |
|                  | 175 | Other female genital disorders                     |
|                  | 215 | Genitourinary congenital anomalies                 |
| Renal disease    | 156 | Nephritis; nephrosis; renal sclerosis              |
|                  | 157 | Acute and unspecified renal failure                |
|                  | 158 | Chronic kidney disease                             |
| Gastrointestinal | 138 | Esophageal disorders                               |
|                  | 139 | Gastroduodenal ulcer (except hemorrhage)           |
|                  | 140 | Gastritis and duodenitis                           |
|                  | 141 | Other disorders of stomach and duodenum            |
|                  | 142 | Appendicitis and other appendiceal conditions      |
|                  | 143 | Abdominal hernia                                   |
|                  | 144 | Regional enteritis and ulcerative colitis          |
|                  | 145 | Intestinal obstruction without hernia              |
|                  | 146 | Diverticulosis and diverticulitis                  |
|                  | 147 | Anal and rectal conditions                         |
|                  | 148 | Peritonitis and intestinal abscess                 |
|                  | 149 | Biliary tract disease                              |
|                  | 150 | Liver disease; alcohol-related                     |
|                  | 151 | Other liver diseases                               |
|                  | 152 | Pancreatic disorders (not diabetes)                |
|                  | 154 | Noninfectious gastroenteritis                      |
|                  | 155 | Other gastrointestinal disorders                   |
|                  | 214 | Digestive congenital anomalies                     |
|                  | 222 | Hemolytic jaundice and perinatal jaundice          |
|                  | 250 | Nausea and vomiting                                |
|                  | 251 | Abdominal pain                                     |
| TIA/stroke       | 109 | Acute cerebrovascular disease                      |
|                  | 110 | Occlusion of stenosis of precerebral arteries      |
|                  | 111 | Other and ill-defined cerebrovascular disease      |
|                  | 112 | Transient cerebral ischemia                        |
|                  | 113 | Late effects of cerebrovascular disease            |
| Trauma           | 207 | Pathological fracture                              |
|                  | 225 | Joint disorders and dislocations; trauma-related   |
|                  | 226 | Fracture of neck of femur (hip)                    |
|                  | 227 | Spinal cord injury                                 |
|                  | 228 | Skull and face fractures                           |
|                  | 229 | Fracture of upper limb                             |
|                  | 230 | Fracture of lower limb                             |
|                  | 231 | Other fractures                                    |

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|                     | 232 | Sprains and strains  |
|                     | 233 | Intracranial injury  |
|                     | 234 | Crushing injury or internal injury   |
|                     | 235 | Open wounds of head; neck; and trunk   |
|                     | 236 | Open wounds of extremities   |
|                     | 239 | Superficial injury; contusion  |
|                     | 244 | Other injuries and conditions due to external causes   |
|                     | 260 | All (external causes of injury and poisoning)  |
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| Endocrine/metabolic | 48  | Thyroid disorders  |
|                     | 49  | Diabetes mellitus without complication   |
|                     | 50  | Diabetes mellitus with complication  |
|                     | 51  | Other endocrine disorders  |
|                     | 53  | Disorders of lipid metabolism  |
|                     | 58  | Other nutritional and endocrine/metabolic disorders  |
|                     | 186 | Diabetes or abnormal glucose tolerance complicating pregnancy; childbirth; or the puerperium |
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| Neuropsychiatric    | 650 | Adjustment disorders   |
|                     | 651 | Anxiety disorders  |
|                     | 652 | Attention-deficit, conduct, and disruptive behavior disorders                                |
|                     | 653 | Delirium, dementia, and amnestic and other cognitive disorders                               |
|                     | 654 | Developmental disorders  |
|                     | 655 | Disorders usually diagnosed in infancy and childhood or adolescence                          |
|                     | 656 | Impulse control disorders, NEC   |
|                     | 657 | Mood disorders   |
|                     | 658 | Personality disorders  |
|                     | 659 | Schizophrenia and other psychotic disorders  |
|                     | 660 | Alcohol-related disorders  |
|                     | 661 | Substance-related disorders  |
|                     | 662 | Suicide and intentional self-inflicted injury  |
|                     | 663 | Screening and history of mental health and substance abuse codes                             |
|                     | 670 | Miscellaneous mental health disorders  |
|                     | 79  | Parkinson's disease  |
|                     | 80  | Multiple sclerosis   |
|                     | 81  | Other hereditary and degenerative nervous system conditions                                  |
|                     | 82  | Paralysis  |
|                     | 83  | Epilepsy, convulsions  |
|                     | 84  | Headache including migraine  |
|                     | 85  | Coma, stupor and brain damage  |
|                     | 95  | Other nervous system disorders   |
|                     | 216 | Nervous system congenital anomalies  |
|                     | 650 | Adjustment disorders   |
|                     | 651 | Anxiety disorders  |
|                     | 652 | Attention-deficit, conduct, and disruptive behavior disorders                                |
|                     | 653 | Delirium, dementia, and amnestic and other cognitive disorders                               |
|                     | 654 | Developmental disorders  |
|                     | 655 | Disorders usually diagnosed in infancy and childhood or adolescence                          |

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|                          | 663 | Screening and history of mental health and substance abuse codes |
|                          | 670 | Miscellaneous mental health disorders                            |
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| Hematological/neoplastic | 11  | Cancer of head and neck  |
|                          | 12  | Cancer of esophagus  |
|                          | 13  | Cancer of stomach  |
|                          | 14  | Cancer of colon  |
|                          | 15  | Cancer of rectum and anus  |
|                          | 16  | Cancer of liver and intrahepatic bile ducts                      |
|                          | 17  | Cancer of pancreas   |
|                          | 18  | Cancer of other gastrointestinal organs, peritoneum              |
|                          | 19  | Cancer of bronchus, lung   |
|                          | 20  | Cancer of other respiratory and intrathoracic                    |
|                          | 21  | Cancer of bone and connective tissue                             |
|                          | 22  | Melanoma of skin   |
|                          | 23  | Other non-epithelial cancer of skin                              |
|                          | 24  | Cancer of breast   |
|                          | 25  | Cancer of uterus   |
|                          | 26  | Cancer of cervix   |
|                          | 27  | Cancer of ovary  |
|                          | 28  | Cancer of other female genital organs                            |
|                          | 29  | Cancer of prostate   |
|                          | 30  | Cancer of testis   |
|                          | 31  | Cancer of other male genital organs                              |
|                          | 32  | Cancer of bladder  |
|                          | 33  | Cancer of kidney and renal pelvis                                |
|                          | 34  | Cancer of other urinary organs                                   |
|                          | 35  | Cancer of brain and nervous system                               |
|                          | 36  | Cancer of thyroid  |
|                          | 37  | Hodgkin's disease  |
|                          | 38  | Non-Hodgkin's lymphoma   |
|                          | 39  | Leukemias  |
|                          | 40  | Multiple myeloma   |
|                          | 41  | Cancer, other and unspecified primary                            |
|                          | 42  | Secondary malignancies   |
|                          | 43  | Malignant neoplasm without specification of site                 |
|                          | 44  | Neoplasm of unspecified nature or uncertain behavior             |
|                          | 46  | Benign neoplasm of uterus  |
|                          | 47  | Other and unspecified benign neoplasm                            |
|                          | 59  | Deficiency and other anemias                                     |

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|   | 61  | Sickle cell anemia  |
|   | 62  | Coagulation and hemorrhagic disorders                                   |
|   | 63  | Disease of white blood cells  |
|   | 64  | Other hematologic conditions  |
| Rheumatology problem                    | 54  | Gout and other crystal arthropathies                                    |
| Ophthalmology problem                   | 86  | Cataract  |
|   | 87  | Retinal detachment defects, vascular occlusion and retinopathy          |
|   | 88  | Glaucoma  |
|   | 89  | Blindness and vision defects  |
|   | 91  | Other eye disorders   |
| ENT problem                             | 92  | Otitis media and related conditions                                     |
|   | 93  | Conditions associate with dizziness or vertigo                          |
|   | 94  | Other ear and sense organ disorder                                      |
| Non-specific chest pain                 | 102 | Non-specific chest pain   |
| Oral health problem                     | 136 | Disorders of teeth and jaw  |
|   | 137 | Diseases of mouth; excluding dental                                     |
| Obstetric admission including pregnancy | 174 | Female infertility  |
|   | 176 | Contraceptive and procreative management                                |
|   | 177 | Spontaneous abortion  |
|   | 178 | Induced abortion  |
|   | 179 | Postabortion complication   |
|   | 180 | Ectopic pregnancy   |
|   | 181 | Other complications of pregnancy  |
|   | 184 | Early or threatened labor   |
|   | 185 | Prolonged pregnancy   |
|   | 187 | Malposition; malpresentation  |
|   | 188 | Fetopelvic disproportion; obstruction                                   |
|   | 189 | Previous C-section  |
|   | 190 | Fetal distress and abnormal forces of labor                             |
|   | 191 | Polyhydramnios and other problems of amniotic cavity                    |
|   | 192 | Umbilical cord complication   |
|   | 193 | OB-related trauma to perineum and vulva                                 |
|   | 194 | Forceps delivery  |
|   | 195 | Other complications of birth; puerperium affecting management of mother |
|   | 196 | Other pregnancy and deliver including normal                            |
|   | 218 | Liveborn  |
|   | 219 | Short gestation; low birth weight; and fetal growth retardation         |
|   | 220 | Intrauterine hypoxia and birth asphyxia                                 |
|   | 223 | Birth trauma  |
|   | 224 | Other perinatal conditions  |
| Dermatology problem                     | 198 | Other inflammatory condition of skin                                    |
|   | 199 | Chronic ulcer of skin   |
|   | 200 | Other skin disorders  |
| Poisoning                               | 241 | Poisoning by psychotropic agents  |
|   | 242 | Poisoning by other medication and drugs                                 |
|   | 243 | Poisoning by nonmedical substances                                      |

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|---------------------|-----|---|
| Syncope             | 245 | Syncope   |
| Other non-cardiac   | 10  | Immunization and screening for infectious disease                                     |
|                     | 45  | Maintenance chemotherapy, radiotherapy  |
|                     | 52  | Nutritional deficiencies  |
|                     | 55  | Fluid and electrolyte disorders   |
|                     | 56  | Cystic fibrosis   |
|                     | 57  | Immunity disorder   |
|                     | 120 | Hemorrhoids   |
|                     | 121 | Other diseases of veins and lymphatics  |
|                     | 167 | Nonmalignant breast conditions  |
|                     | 168 | Inflammatory disease of female pelvic organs  |
|                     | 169 | Endometriosis   |
|                     | 172 | Ovarian cyst  |
|                     | 173 | Menopausal disorders  |
|                     | 202 | Rheumatoid arthritis and related disease  |
|                     | 203 | Osteoarthritis  |
|                     | 204 | Other non-traumatic joint disorders   |
|                     | 205 | Spondylosis; intervertebral disc disorders; other back problems                       |
|                     | 206 | Osteoporosis  |
|                     | 208 | Acquired foot deformities   |
|                     | 209 | Other acquired deformities  |
|                     | 210 | Systemic lupus erythematosus and connective tissue disorders                          |
|                     | 211 | Other connective tissue disease   |
|                     | 212 | Other bone disease and musculoskeletal deformities                                    |
|                     | 217 | Other congenital anomalies  |
|                     | 237 | Complication of device; implant or graft  |
|                     | 238 | Complications of surgical procedure or medical care                                   |
|                     | 240 | Burns   |
|                     | 246 | Fever of unknown origin   |
|                     | 247 | Lymphadenitis   |
|                     | 248 | Gangrene  |
|                     | 252 | Malaise and fatigue   |
|                     | 253 | Allergic reactions  |
|                     | 254 | Rehabilitation care; fitting of prostheses; and adjustment of devices                 |
|                     | 255 | Administrative/social admission   |
|                     | 256 | Medical examination/evaluation  |
|                     | 257 | Other aftercare   |
|                     | 258 | Other screening for suspected conditions (not mental disorders or infectious disease) |
|                     | 259 | Residual codes; unclassified  |
| Heart failure       | 108 | Congestive heart failure non-hypertensive   |
| Arrhythmia          | 106 | Cardiac dysrhythmias  |
|                     | 107 | Cardiac arrest and ventricular fibrillation   |
| Conduction disorder | 105 | Conduction disorders  |
| Valve disorders     | 96  | Heart valve disorder  |
| Hyper/hypotension   | 98  | Essential hypertension  |
|                     | 99  | Hypertension with complications and secondary hypertension                            |

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|  | 183 | Hypertension complicating pregnancy; childbirth and the puerperium |
|  | 249 | Shock  |
| Pericarditis                             | 97  | Peri-, endo- and myocarditis, cardiomyopathy                       |
| Coronary artery disease including angina | 101 | Coronary atherosclerosis and other heart disease includes angina   |
| Acute myocardial infarction              | 100 | Acute myocardial infarction  |
| Others (cardiac)                         | 103 | Pulmonary heart disease  |
|  | 104 | Other and ill-defined heart disease                                |
|  | 213 | Cardiac and circulatory congenital anomalies                       |

**Supplementary Table 2:** Rates of unplanned readmissions within each timepoint (a) and cumulative rates (b) for acute coronary syndrome and stable ischemic heart disease cohorts.

(a)

| Group   | 0-7 day<br>(n=2,215,514) | 8-30 days<br>(n=2,161,213) | 31-90 days<br>(n=1,651,393) | 91-180 days<br>(n=1,023,324) |
|---|--------------------------|----------------------------|-----------------------------|------------------------------|
| No diagnosis of acute myocardial infarction readmissions  | 26,620<br>(2.49%)        | 81,693<br>(7.85%)          | 80,871<br>(10.06%)          | 35,851<br>(9.24%)            |
| Diagnosis of acute myocardial infarction readmissions   | 27,681<br>(2.41%)        | 83,210<br>(7.43%)          | 66,501<br>(7.85%)           | 46,046<br>(6.83%)            |
| Total readmitted  | 54,301<br>(2.45%)        | 164,903<br>(7.63%)         | 147,372<br>(8.92%)          | 81,897<br>(8.00%)            |
| Total not readmitted  | 2,161,213<br>(97.55%)    | 1,996,310<br>(92.37%)      | 1,504,021<br>(91.18%)       | 941,427<br>(92.00%)          |
| p-value for difference between acute myocardial infarction and not a diagnosis of acute myocardial infarction | 0.011                    | <0.001                     | <0.001                      | <0.001                       |

(b)

| Group   | 0-7 days<br>(n=2,215,514) | 0-30 days<br>(n=2,215,514) | 0-90 days<br>(n=1,834,667) | 0-180 days<br>(n=1,252,384) |
|---|---------------------------|----------------------------|----------------------------|-----------------------------|
| No diagnosis of acute myocardial infarction   | 26,620<br>(2.49%)         | 108,313<br>(10.14%)        | 172,332<br>(19.25%)        | 166,054<br>(26.84%)         |
| Diagnosis of acute myocardial infarction  | 27,681<br>(2.41%)         | 110,891<br>(9.66%)         | 158,313<br>(16.85%)        | 144,904<br>(22.86%)         |
| Total readmitted  | 54,301<br>(2.45%)         | 219,204<br>(9.89%)         | 330,645<br>(18.02%)        | 310,958<br>(24.83%)         |
| Total not readmitted  | 2,161,213<br>(97.55%)     | 1,996,310<br>(91.11%)      | 1,504,022<br>(81.98%)      | 941,426<br>(75.17%)         |
| p-value for difference between acute myocardial infarction and not a diagnosis of acute myocardial infarction | 0.011                     | <0.001                     | <0.001                     | <0.001                      |



**Supplementary Figure 1: Cost associated with unplanned readmissions at different time points**

