Supplemental Table 1. Codes used to identify heart transplant hospitalizations were exclusively applied to the procedural section of the NIS database to select for the index transplant admissions.

|  |  |
| --- | --- |
| ICD Code | Code Description |
| ICD 10 Codes |  |
| Z941 | Heart transplant status |
| Z4821 | Encounter for aftercare following heart transplant |
| 02YA0Z0 | Transplantation of Heart, Allogeneic, Open Approach |
| 02YA0Z1 | Transplantation of Heart, Syngeneic, Open Approach |
| 02YA0Z2 | Transplantation of Heart, Zooplastic, Open Approach |
| ICD 9 Codes |  |
| 375 | Heart Transplantation (End 2003) |
| 3751 | Heart Transplantation (Begin 2003) |
| V421 | Heart replaced by transplant |

Supplemental Table 2. Diagnostic codes used to identify patients with NDDs.

|  |  |  |  |
| --- | --- | --- | --- |
| ICD 10 Codes | Code Description | ICD 10 Codes | Code Description |
| 'F840' | Autistic disorder | 'F812' | Mathematics disorder |
| 'F842' | Rett's syndrome | 'F8181' | Disorder of written expression |
| 'F843' | Other childhood disintegrative disorder | 'F8189' | Other developmental disorders of scholastic skills |
| 'F845' | Asperger's syndrome | 'F819' | Developmental disorder of scholastic skills, unspecified |
| 'F848' | Other pervasive developmental disorders | 'F82' | Specific developmental disorder of motor function |
| 'F849' | Pervasive developmental disorder, unspecified | 'F88' | Other disorders of psychological development |
| 'F70' | Mild intellectual disabilities | 'F89' | Unspecified disorder of psychological development |
| 'F71' | Moderate intellectual disabilities | 'F900' | Attention-deficit hyperactivity disorder, predominantly inattentive type |
| 'F72' | Severe intellectual disabilities | 'F901' | Attention-deficit hyperactivity disorder, predominantly hyperactive type |
| 'F73' | Profound intellectual disabilities | 'F902' | Attention-deficit hyperactivity disorder, combined type |
| 'F78' | Other intellectual disabilities | 'F908' | Attention-deficit hyperactivity disorder, other type |
| 'F78A1' | SYNGAP1-related intellectual disability | 'F909' | Attention-deficit hyperactivity disorder, unspecified type |
| 'F78A9' | Other genetic related intellectual disability | 'F948' | Other childhood disorders of social functioning |
| 'F79' | Unspecified intellectual disabilities | 'F949' | Childhood disorder of social functioning, unspecified |
| 'F800' | Phonological disorder | 'F950' | Transient tic disorder |
| 'F801' | Expressive language disorder | 'F951' | Chronic motor or vocal tic disorder |
| 'F802' | Mixed receptive-expressive language disorder | 'F952' | Tourette's disorder |
| 'F809' | Developmental disorder of speech and language, unspecified | 'F958' | Other tic disorders |
| 'F8081' | Childhood onset fluency disorder | 'F959' | Tic disorder, unspecified |
| 'F8082' | Social pragmatic communication disorder | 'F984' | Stereotyped movement disorders |
| 'F8089' | Other developmental disorders of speech and language | 'F985' | Adult onset fluency disorder |
| 'F810' | Specific reading disorder | 'F988' | Other specified behavioral and emotional disorders with onset usually occurring in childhood and adolescence |
| ICD 9 Codes | Code Description | ICD 9 Codes | Code Description |
| '29900' | INFANTILE AUTISM-ACTIVE | '31532' | RECEPTIVE LANG DIS OCT96-- |
| '29901' | INFANTILE AUTISM-RESID | '31539' | SPEECHLANGUAGE DIS NEC |
| '29910' | DISINTEGR PSYCH-ACTIVE | '3154' | COORDINATION DISORDER |
| '29911' | DISINTEGR PSYCH-RESIDUAL | '3155' | MIXED DEVELOPMENT DIS |
| '30723' | GILLES TOURETTE DISORDER | '3158' | DEVELOPMENT DELAYS NEC |
| '30722' | CHRONIC MOTOR TIC DIS | '3159' | DEVELOPMENT DELAY NOS |
| '31500' | READING DISORDER NOS | '317' | MILD MENTAL RETARDATION |
| '31501' | ALEXIA | '3180' | MILD MENTAL RETARDATION |
| '31502' | DEVELOPMENTAL DYSLEXIA | '3181' | SEVERE MENTAL RETARDAT |
| '31509' | READING DISORDER NEC | '3182' | PROFOUND MENTAL RETARDAT |
| '3151' | ARITHMETICAL DISORDER | '319' | -MENTAL RETARDATION NOS- |
| '3152' | OTH LEARNING DIFFICULTY | 'V400' | PROBLEMS WITH LEARNING |
| '31531' | DEVELOPMENT LANGUAGE DIS | 'V401' | PROBLEMS WITH COMMUNICATION |

Supplemental Table 3. ICD-9-CM/PCS and ICD-10-CM/PCS codes for comorbidities and heart transplant complications.

|  |  |
| --- | --- |
| ICD-9 and ICD-10 codes | Variables |
| 401.X, 402.X, 405.X, I10, I11.X, I12.X, I15.X | Hypertension |
| 250.X, E08.X, E09.X, E10.X, E11.X, E12.X, E13.X, E14.X | Diabetes Mellitus |
| 585.X, N18.X | Chronic Kidney Disease |
| 571.X, 573.X, 572.2, 572.3, 572.4, 572.8, K70.2, K70.9, K703.X, K71.3, K71.4, K71.5X, K71.7, K71.8, K71.9, K71.6, K72.1X, K72.9X, K73.X, K74.X, K74.6X, K75.3, K75.4, K75.9, K75.81, K75.89, K76.X | Chronic Liver Disease |
| 78057, 32720, 32723, 32729, 78051, 78603, 78053, 32700, 32726, G4730, G4733, G4739, R0681 | Obstructive Sleep Apnea |
| 39.95. 5A1D00Z, 5A1D60Z, 5A1D70Z 5A1D80Z, 5A1D90Z | Renal Replacement Therapy with Hemodialysis |
| 493.X, J45.X | Asthma |
| 416.X, I27.X | Pulmonary Hypertension |
| 438.X, I69.X, V12.54, Z86.73 | Stroke History |
| 280.X, 281.X, D50.X, D51.X, D52.X, D53.X | Anemia |
| 278.00, 278.01, 278.03, E66.01, E66.09, E66.1, E66.2, E66.8, E66.9 | Obesity |
| F204, F313, F314, F315, F341, F412, F432, 2962, 2963, 2965, 3004, 311 | Major Depressive Disorder |
| q248, q249, 74689, 7469 | Congenital Heart Disease |
| Z85.X, V10.X | Malignancy History |
| 42518, 42511, I421, I422 | Hypertrophic Cardiomyopathy |
| I420, 4254 | Dilated Cardiomyopathy |
| I400, I401, I408, I409, I41, 42290, 42291, 42292, 42293, 42299, I408 | Myocarditis |
| 412, I25.2 | History of Myocardial Infarction |
| Z8774, V1365 | History of Surgically Corrected Congenital Heart Lesion |
| 430, I60.X, 431, 432.9, I61.X, 432.X, I62.X, 433.X, 434.X, 435.X, 436, 432.9, I63.X, I200, I2101, I2102, I2109, I2111, I2119, I2121, I2129, I213, I214, I219, I21A1, I21A9, I220, I221, I222, I228, I229, 4100, 41000, 41001, 41002, 4101, 41010, 41011, 41012, 4102, 41002, 4101, 41010, 41011, 41012, 4102, 41020, 41021, 41022, 4103, 41030, 41031, 41032, 4104, 41040, 41041, 41042, 4105 | MACE (mortality, stroke or myocardial infarction) |
| T8622, 99683, 99680, T8621, 99680, 99683, T8623, 99680, 99683, T86290, 99680, 99683,  | Acute Transplant Complications |
| 4230, 4233, I312, I314, I97710, 9971, I97790, I9788, I9789 | Iatrogenic or Pericardial Complications of Cardiac Surgery |
| 998.11, 998.12, I97.621, I97.630, I97.631, I97.638, I97.410, I97.411, I97.418, I97.42, I97.410, I97.411, I97.418, I97.42, I97.610, I97.611, I97.618, I97.620, 568.81, K66.1, 456.0, 456.20, 530.21, 530.7, 530.82, 531.00, 531.01, 531.20, 531.21, 531.40, 531.41, 531.60, 531.61, 532.00, 532.01, 532.20, 532.31, 532.40, 532.41, 532.60, 532.61, 533.00, 533.01, 533.20, 533.21, 533.40, 533.41, 533.60, 533.61, 534.00, 534.01, 534.20, 534.21, 534.40, 534.41, 534.60, 534.61, 535.01, 535.11, 535.21, 535.31, 535.41, 535.51, 535.61, 535.71, 537.83, 537.84, 562.02, 562.03, 562.12, 562.13, 569.3, 569.85, 569.86, 578.X, I85.01, I85.11, K22.11, K22.6, K22.8, K25.0, K25.2, K25.4, K25.6, K26.0, K26.2, K26.4, K26.6, K27.0, K27.2, K27.4, K27.6, K28.0, K28.2, K28.4, K28.6, K29.01, K29.21, K29.31, K29.41, K29.51, K29.61, K29.71, K29.81, K29.91, K31.811, K57.11, K57.13, K57.31, K57.33, K62.5, K55.21, K31.82, K63.81, K92.0, K92.1, K92.2, 596.7, 599.70, 599.71, N32.89, R31.9, R31.0, 786.30, 786.39, R04.2, R04.9, 784.7, R04.0, 459.0, R58 | All Major Bleeding |
| 9902, 9903, 9904, 30230H0, 30230H1, 30230N0, 30230N1, 30233H0, 30233H1, 30233N0, 30233N1, 30240H0, 30240H1, 30240N0, 30240N1, 30243H0, 30243H1, 30243N0, 30243N1, 990.5, 30230R0, 30230R1, 30233R0, 30233R1, 30240R0, 30240R1, 30243R0, 30243R1, 990.7, 30230L0, 30230L1, 30233L0, 30233L1, 30240L0, 30240L1, 30243L0, 30243L1 | Blood Product Transfusion |
| 038.X, 995.91, 995.92, A40.X, A41.X, R65.2, 785.52, 998.02, T81.12, 998.51, 998.59, T814XXA, 996.60, 996.61, T826XXA | Infectious Complications |
| 415.11, 415.13, 415.19, 451.81, 451.9, 453.40, 453.41, 453.42, 453.8, 453.9, I82.491, I82.492, I82.493, I82.499, I82.409, I82.621, I82.622, I82.629, I82.401, I82.402, I82.623, I82.419, I824Y1, I82.4Y2, I82.4Y3, I82.403, I82.4Z1, I82.4Z2, I82.4Z3, I82.429, I82.A19, I82.890, I82.423, I82.439, I82.449, I82.413, I82.411, I82.412, I82.A11, I82.A12, I82.C11, I82.C12, I82.433, I82.443, I82.A13, I82.432, I82.441, I82.442, I82.C19, I82.421, I82.422, I82.C13, I82.431, I82.B19, I82.B13, I82.B11, I82.B12, I82.611, I82.612, I82.220, I82619, I82.613, I82.90, I82.4Y9, I82.4Z9, I82.649, I82.3, I81, I82.210, T8172XA, I82601, I82.602, I82.603, I97.89, I82.609, I82.451, I82.451, I82.452, I82.453, I82.459, I82.461, I82.462, I82.290, I26.99, I26.93, I26.02, I26.09 | Post-operative Deep Venous Thrombosis and Pulmonary Embolism |
| Z781, V4987, F05, 2930, 2931, F23 | Delirium or Restraint Use |
| I490.X, 4274.X, 4271, I470, I472 | Ventricular Dysrhythmia |
| 42731, I480, I481, I482, I4891, 42732, I483, I484, I4892 | Atrial Fibrillation/Flutter |
| 9982, 9992, 99771, 99772, 99779, 4470, I9751, I9752, T801XXA, T81710A, T81711A, T81718A, T8172XA, I770, 3956, 3931, 3941, 3949, 3952, 3957, 3959, 3979, 02QP0ZZ, 02QP3ZZ, 02QP4ZZ, 02QQ0ZZ, 02QQ3ZZ, 02QQ4ZZ, 02QR0ZZ, 02QR3ZZ, 02QR4ZZ, 02QW0ZZ, 02QW3ZZ, 02QW4ZZ, 02QX0ZZ, 02QX3ZZ, 02QX4ZZ, 02QS0ZZ, 02QS3ZZ, 02QS4ZZ, 02QV0ZZ, 02QV3ZZ, 02QV4ZZ, 900.X, 901.X, 902.X, 903.X, 904.X, 03Q.X, 04Q.X, 0W3.X, 02UP.X, 02UQ.X, 02U3.X, 02UR.X, 02US.X, 02UT,X, 02UV.X, 02UW.X, 03U.X, 03U.X, | Vascular Complications |
| 4275, I46.X | Cardiac Arrest |
| 5A2204Z, 9961, 9962 | Cardioversion |
| 584.X, 586, 997.5, N17.X, N19, N99.0 | Acute Kidney Injury |
| 998.01, T81.11 | Post Procedure Cardiogenic Shock |
| D47Z1, 23877 | Post-Transplant Lymphoproliferative Disorder |
| 5120, 5121, 5128, J930, J939, J9311, J9312, J9382, J9383, J95811, J95812 | Pneumothorax |