

# MEASURE INFORMATION FORM

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**Project Title:**

End-Stage Renal Disease Vascular Access Measure Development

**Project Overview:**

The Centers for Medicare & Medicaid Services (CMS) has contracted with the University of Michigan Kidney Epidemiology and Cost Center (UM-KECC) to review the NQF endorsed Vascular Access measures (Minimizing Use of Catheters as Chronic Dialysis Access (#0256), and Maximizing Placement of Arterial Venous Fistula (#0257)) and consider possible revisions to the existing measures, including potential risk adjustment. The contract name is ESRD Quality Measure Development, Maintenance, and Support. The contract number is HHSM-500-2013-13017I.

**Date:**

Information included is current on April 15, 2016

**Measure Name:**

Hemodialysis Vascular Access: Standardized Fistula Rate

**Descriptive Information:****Measure Name (Measure Title De.2.)**

Hemodialysis Vascular Access: Standardized Fistula Rate

**Measure Type De.1.**

Intermediate Clinical Outcome

**Brief Description of Measure De.3.**

Adjusted percentage of adult hemodialysis patient-months using an autogenous arteriovenous fistula (AVF) as the sole means of vascular access.

**If Paired or Grouped De.4.**

The numerator is the adjusted count of adult patient-months using an AVF as the sole means of vascular access as of the last hemodialysis treatment session of the month.

**Subject/Topic Areas De.5.**

Renal, Renal: End Stage Renal Disease (ESRD)

**Crosscutting Areas De 6.**

N/A

## **Measure Specifications:**

### **Measure-specific Web Page S.1.**

N/A

### **If This Is an eMeasure S.2a.**

This is not an eMeasure

### **Data Dictionary, Code Table, or Value Sets S.2b.**

See Data Dictionary/Code Table

### **For Endorsement Maintenance S.3.**

N/A

### **Numerator Statement S.4.**

The numerator is the adjusted count of adult patient-months using an AVF as the sole means of vascular access as of the last hemodialysis treatment session of the month.

### **Time Period for Data S.5.**

12 months

### **Numerator Details S.6.**

The number of patient-months using an AVF as the sole means of vascular access at a given facility, adjusted for patient-mix.

An AVF is considered in use if the CROWNWeb “Access Type IDs” of 14 or 22 has been recorded for a given month, where “14” represents AV fistula only (with 2 needles) and “22” represents AV fistula only with an approved single needle device.

### **Denominator Statement S.7.**

All patients at least 18 years old as of the first day of the reporting month who are determined to be maintenance hemodialysis patients (in-center and home HD) for the entire reporting month at the same facility.

### **Target Population Category S.8.**

Populations at Risk

### **Denominator Details S.9.**

For each patient, we identify the dialysis provider at each month using a combination of Medicare-paid dialysis claims, the Medical Evidence Form (Form CMS-2728), and data from CROWNWeb. These sources are used to identify patients that are on in-center or home hemodialysis for the entire reporting month. Patients are required to have been treated by the same facility for the complete month in order to be assigned to that facility for the reporting month.

To be included in the denominator for a particular reporting month, the patient must be receiving home or in-center hemodialysis for the complete reporting month at the facility, and be at least 18 years old as of the first day of the month.

The monthly patient count at a facility includes all eligible prevalent and incident patients. The number of patient-months over a time period is the sum of patients reported for the months covered by the time period. An individual patient may contribute up to 12 patient-months per year.

### **Denominator Exclusions (NQF Includes “Exceptions” in the “Exclusion” Field) S.10.**

Exclusions that are implicit in the denominator definition include:

- Pediatric patients (<18 years old)
- Patients on Peritoneal Dialysis
- Patient-months with in-center or home hemodialysis for less than a complete reporting month at the same facility

In addition, the following exclusions are applied to the denominator:

Patients with a catheter that have limited life expectancy:

- Patients under hospice care in the current reporting month
- Patients with metastatic cancer in the past 12 months
- Patients with end stage liver disease in the past 12 months
- Patients with coma or anoxic brain injury in the past 12 months

### **Denominator Exclusion Details (NQF Includes “Exceptions” in the “Exclusion” Field) S.11.**

Determination of peritoneal dialysis treatment modality is derived from a combination of Medicare-paid dialysis claims, the Medical Evidence Form (Form CMS-2728), and data from CROWNWeb. These sources also determine patient assignment to the facility. Patients not treated by the facility for the entire month are excluded for that reporting month.

The patient’s age is determined by subtracting the patient’s date of birth from the first day of the reporting month. Patients that are <18 years old as of the first day of the reporting month are excluded.

For the exclusion of catheter patients with limited life expectancy, catheter use in the reporting month is defined as the CROWNWeb “Access Type ID” having any of the following values: (16,18,19,20,21,“.”), where Access\_Type\_ID “16” represents AV Fistula combined with a Catheter, “18” represents AV Graft combined with a Catheter, “19” represents Catheter only, “20” represents Port access only, “21” represents other/unknown, and “.” represents missing.

Hospice status is determined from a separate CMS file that contains final action claims submitted by Hospice providers. Once a beneficiary elects Hospice, all Hospice related claims will be found in this file, regardless if the beneficiary is in Medicare fee-for-service or in a Medicare managed care plan. Patients are identified as receiving hospice care if they have any final action claims submitted to Medicare by hospice providers in the current month.

Diagnoses of metastatic cancer, end stage liver disease, or coma in the past 12 months were determined from Medicare claims. Medicare claim types include inpatient admissions, outpatient claims (including dialysis claims) and physician services. Claims from providers, such as laboratories that report diagnosis codes when testing for the presence of a condition are excluded. A detailed list of ICD-9/ICD-10 diagnostic codes used to identify these comorbidities is included in the attached data dictionary code table (excel file).

**Stratification Details/Variables S.12.**

N/A

**Risk Adjustment Type S.13.**

Statistical risk model

**Statistical Risk Model and Variables S.14.**

The proposed SFR measure is a directly standardized percentage, in that each facility's percentage of AVF use is adjusted to the national distribution of covariates (risk factors) (with 'national' here referring to all-facilities-combined). The SFR for facility *i* is an estimate of what the facility's percentage of AVF would equal if the facility's patient mix was equal to that of the nation as a whole. The measure is adjusted for patient demographic and clinical characteristics based on a logistic regression model. This model includes the facility indicators and assumes that the regression coefficients of risk factors are the same across all facilities. The common risk effects are assumed in order to improve computational stability in estimating facility-specific effects.

The patient characteristics included in the logistic regression model as covariates are:

- Age
- BMI at incidence
- Nursing home status in previous year
- Nephrologist's care prior to ESRD
- Duration of ESRD
- Inability to ambulate/transfer at ESRD incidence (CMS-2728 form)
- Comorbidities either at ESRD incidence (CMS-2728 form) or prevalent comorbidities based on Medicare claims filed in prior 12 months
  - Diabetes
  - Heart diseases
  - Peripheral vascular disease
  - Cerebrovascular disease
  - Chronic obstructive pulmonary disease
  - Anemia (unrelated to ESRD/CKD)
  - Non-Vascular Access-Related Infections
  - Drug dependence
- Indicator for Medicare coverage for at least 6 months during the past 12 months

**Detailed Risk Model Specifications S.15.**

See Data Dictionary/Code Table

**Type of Score S.16.**

Rate/proportion

**Interpretation of Score S.17.**

Better quality = Higher score

**Calculation Algorithm/Measure Logic S.18.**

See calculation flowchart in Appendix

**Calculation Algorithm/Measure Logic Diagram URL or Attachment S.19.**

See calculation flowchart in Appendix

**Sampling S.20.**

N/A

**Survey/Patient-Reported Data S.21.**

N/A

**Missing Data S.22.**

Patients with a missing vascular access type are counted in the denominator, but not the numerator. For comorbidities, if the patient had missing comorbidity values both in the preceding 12 months of Medicare claims and in the Medical Evidence Form for the corresponding comorbidity, we assume this patient did not have the comorbidity in that reporting month. The same methodology is applied to the comorbidity exclusions and the hospice exclusion.

**Data Source S.23.**

Administrative claims, Electronic Clinical Data

**Data Source or Collection Instrument S.24.**

CROWNWeb, Medicare Claims and the CMS Medical Evidence form 2728 are used as the data sources for establishing the denominator. CROWNWeb is the data source for establishing the numerator. Medicare claims and the CMS Medical Evidence form 2728 are data sources for the risk adjustment factors. Medicare claims and CROWNWeb are used for the exclusion criteria.

**Data Source or Collection Instrument (Reference) S.25.**

No data collection instrument provided

**Level of Analysis S.26.**

Facility

**Care Setting S.27.**

Dialysis Facility

**Composite Performance Measure S.28.**

N/A

# MEASURE JUSTIFICATION FORM

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**Project Title:**

End-Stage Renal Disease Vascular Access Measure Development

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The Centers for Medicare & Medicaid Services (CMS) has contracted with the University of Michigan Kidney Epidemiology and Cost Center (UM-KECC) to review the NQF endorsed Vascular Access measures (Minimizing Use of Catheters as Chronic Dialysis Access (#0256), and Maximizing Placement of Arterial Venous Fistula (#0257)) and consider possible revisions to the existing measures, including potential risk adjustment. The contract name is ESRD Quality Measure Development, Maintenance, and Support. The contract number is HHSM-500-2013-13017I.

**Date:**

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**Measure Name:**

Hemodialysis Vascular Access: Standardized Fistula Rate

**Type of Measure:**

Intermediate Outcome

**Importance:****1a—Opportunity for Improvement****1a.1. This is a Measure of**

Intermediate clinical outcome (*e.g., lab value*): standardized fistula rate

**1a.2.—Linkage**

1a.2.1 Rationale

N/A

**1a.3.—Linkage**

Several observational studies have demonstrated an association between type of vascular access used for hemodialysis and patient mortality. Arteriovenous fistulae (AVF) are associated with the lowest mortality risk while long term catheters have the highest mortality. Arteriovenous grafts (AVG) have been found to have a risk of death that is higher than AVF but lower than catheters.

The measure focus is the process of assessing AV Fistula use at chronic dialysis facilities.

This process leads to improvement in mortality as follows:

Measure AV Fistula Rate -> Assess value -> Identify patients who do not have an AV Fistula -> Evaluation for an AV fistula by a qualified dialysis vascular access provider -> Increase Fistula Rate -> Lower patient mortality.

### **1a.3.1. Source of Systematic Review**

Clinical Practice Guideline recommendation

### **1a.4. — Clinical Practice Guideline Recommendation**

#### **1a.4.1. Guideline Citation**

National Kidney Foundation KDOQI Clinical Practice Guidelines and Clinical Practice Recommendations for 2006 Updates: Hemodialysis Adequacy, Peritoneal Dialysis Adequacy and Vascular Access. Am J Kidney Dis 48:S1-S322, 2006 (suppl 1).

[http://www.kidney.org/professionals/KDOQI/guidelines\\_commentaries](http://www.kidney.org/professionals/KDOQI/guidelines_commentaries)

#### **1a.4.2. Specific Guideline**

##### **GUIDELINE 2. SELECTION AND PLACEMENT OF HEMODIALYSIS ACCESS**

A structured approach to the type and location of long-term HD accesses should help optimize access survival and minimize complications. Options for fistula placement should be considered first, followed by prosthetic grafts if fistula placement is not possible. Catheters should be avoided for HD and used only when other options listed are not available.

2.1 The order of preference for placement of fistulae in patients with kidney failure who choose HD as their initial mode of KRT should be (in descending order of preference):

2.1.1 Preferred: Fistulae. (B)

2.1.2 Acceptable: AVG of synthetic or biological material. (B)

2.1.3 Avoid if possible: Long-term catheters. (B)

2.1.4 Patients should be considered for construction of a primary fistula after failure of every dialysis AV access. (B)

#### **1a.4.3. Grade**

KDOQI Guideline 2.1 was graded B, indicating moderate evidence supports the guideline.

The “B” rating indicates: It is recommended that clinicians routinely follow the guideline for eligible patients. There is moderately strong evidence that the practice improves health outcomes.

#### **1a.4.4. Grades and Associated Definitions**

The rating system defined in the KDOQI Guidelines was used to grade the strength of the Guideline recommendation. KDOQI defined grades as follows:

Grade A: It is strongly recommended that clinicians routinely follow the guideline for eligible patients. There is strong evidence that the practice improves health outcomes.

Grade B: It is recommended that clinicians routinely follow the guideline for eligible patients. There is moderately strong evidence that the practice improves health outcomes.

Grade CPR: It is recommended that clinicians consider following the guideline for eligible patients. This recommendation is based on either weak evidence or on the opinions of the Work Group and reviewers that the practice might improve health outcomes.

#### **1a.4.5. Methodology Citation**

National Kidney Foundation. KDOQI Clinical Practice Guidelines and Clinical Practice Recommendations for 2006 Updates: Hemodialysis Adequacy, Peritoneal Dialysis Adequacy and Vascular Access. Am J Kidney Dis 48:S1-S322, 2006 (suppl 1).

[http://www.kidney.org/professionals/KDOQI/guidelines\\_commentaries](http://www.kidney.org/professionals/KDOQI/guidelines_commentaries)

#### **1a.4.6. Quantity, Quality, and Consistency**

Yes → complete section 1a.7

#### **1a.5. — United States Preventative Services Task Force Recommendation**

1a.5.1. Recommendation Citation

N/A

#### **1a.5.2. Specific Recommendation**

N/A

#### **1a.5.3. Grade**

N/A

#### **1a.5.4. Grades and Associated Definitions**

N/A

#### **1a.5.5. Methodology Citation**

N/A

#### **1a.6. — Other Systematic Review of the Body of Evidence**

##### **1a.6.1. Review Citation**

N/A

##### **1a.6.2. Methodology**

Citation

N/A

#### **1a.7. — Findings from Systematic Review of Body of the Evidence Supporting the Measure**

##### **1a.7.1. Specifics Addressed in Evidence Review**

The evidence review focuses on the advantages of AV fistula compared to other types of vascular access and highlights the superior patency, reduced need for interventions, and lower infection rates associated with AV fistula.

##### **1a.7.2. Grade**

The quality of evidence was not explicitly graded in the KDOQI guidelines. However, it was implicitly assessed according to the criteria outlined in the table in 1a.7.3 below. The workgroup considered the overall methodological quality, the target population (e.g. patients on dialysis), and whether the health outcome was studied directly or not.

Overall, the evidence that supports the guideline was assessed as: Moderately Strong.

The workgroup defined “Moderately Strong” as: Evidence is sufficient to determine effects on health outcomes in the target population, but the strength of the evidence is limited by the number, quality, or consistency of the individual studies; OR evidence is from studies with some problems in design and/or



analysis; OR evidence is from well-designed, well-conducted studies on surrogate endpoints for efficacy and/or safety in the target population.

### 1a.7.3. Grades and Associated Definitions

| Outcome           | Population                   | Methodologic Quality                                      |   |  |
|-------------------|------------------------------|---|---|--|
|                   |                              | Well designed and analyzed (little if any potential bias) | Some problems in design and/or analysis (some potential bias) | Poorly designed and/or analyzed (large potential bias) |
| Health Outcomes   | Target Population            | Strong  | Moderately Strong   | Weak   |
| Health Outcomes   | Other than target population | Moderately Strong   | Moderately Strong   | Weak   |
| Surrogate Measure | Target Population            | Moderately Strong   | Weak  | Weak   |
| Surrogate Measure | Other than target population | Weak  | Weak  | Weak   |

**Strong-** Evidence includes results from well-designed, well-conducted study/studies in the target population that directly assess effects on health outcomes.

**Moderately strong-** Evidence is sufficient to determine effects on health outcomes in the target population, but the strength of the evidence is limited by the number, quality, or consistency of the individual studies; OR evidence is from a population other than the target population, but from well-designed, well conducted studies; OR evidence is from studies with some problems in design and/or analysis; OR evidence is from well-designed, well-conducted studies on surrogate endpoints for efficacy and/or safety in the target population.

**Weak-** Evidence is insufficient to assess the effects on net health outcomes because it is from studies with some problems in design and/or analysis on surrogate endpoints for efficacy and/or safety in the target population; OR the evidence is only for surrogate measures in a population other than the target population; OR the evidence is from studies that are poorly designed and/or analyzed.

### 1a.7.4. Time Period

January 1997 – June 2005

### 1a.7.5. Number and Type of Study Designs

The 2006 Clinical Practice Guidelines for Vascular Access is an update to the original vascular access guidelines published in 1997 by the National Kidney Foundation. In the eight years that the literature review included for the update, there have been no randomized controlled trials for type of vascular access. Specifically, for the guideline used to support this measure, a total of 84 peer-reviewed publications are included in the body of evidence presented. While these are all observational studies, some are based on either national data such as the United States Renal Data System (USRDS) that includes all patients with end stage kidney disease in the US, or international data, such as the Dialysis Outcomes Practice Pattern Study (DOPPS) that provides a global perspective for US vascular access outcomes.

### 1a.7.6. Overall Quality of Evidence

The overall quality of evidence is moderately strong. All studies are in the target population of hemodialysis patients. Some studies have evaluated health outcomes such as patient mortality, but have limitations due to the observational nature of the design. Other studies have more rigorous design, but use surrogate outcomes such as access thrombosis.

### 1a.7.7. Estimates of Benefit

The 12 studies listed below highlight the core benefits such as reduced mortality and morbidity associated with using an AV fistula relative to either an AV graft or a tunneled catheter. Specifically, AV fistulae have:

- Lowest risk of thrombosis: in a systematic review of 34 studies evaluating access patency, AVF were found to have superior primary patency at 18 months compared to AV grafts (51% vs. 33%).<sup>1</sup>
- Lowest rate of angioplasty/intervention: Procedure rates have been reported as 0.53 procedures/patient/year for AV fistula compared to 0.92 procedures/patient/year for AV grafts.<sup>2</sup>
- Longest survival: Case-mix adjusted survival analysis indicated substantially better survival of AV fistula compared with AV grafts in the US [risk ratios (RR) of failure 0.56,  $P < 0.0009$ ]<sup>3</sup>
- Lowest Cost<sup>4-6</sup>: Based on 1990 costs to Medicare, graft recipients cost HCFA (CMS) \$3,700 more than fistula patients when pro-rating graft reimbursements to the median fistula survival time.<sup>5</sup>
- Lowest rates of infection: AV fistula have the lowest rates of infection followed by AV grafts and then tunneled dialysis catheters<sup>7</sup>. Vascular access infections are common, and represent the second most common cause of death for patients receiving hemodialysis.<sup>8</sup>
- Lowest mortality and hospitalization: Patients using catheters (RR=2.3) and grafts (RR=1.47) have a greater mortality risk than patients dialyzed with fistulae<sup>9</sup>. Other studies have also found that use of fistulae reduces mortality and morbidity<sup>10-12</sup> compared to AV grafts or catheters.

### References:

1. Huber TS, Carter JW, Carter RL, Seeger JM: Patency of autogenous and polytetrafluoroethylene upper extremity arteriovenous hemodialysis accesses: A systematic review. *J Vasc Surg* 38(5):1005-11, 2003
2. Perera GB, Mueller MP, Kubaska SM, Wilson SE, Lawrence PF, Fujitani RM: Superiority of autogenous arteriovenous hemodialysis access: Maintenance of function with fewer secondary interventions. *Ann Vasc Surg* 18:66-73, 2004
3. Pisoni RL, Young EW, Dykstra DM, et al: Vascular access use in Europe and the United States: Results from the DOPPS. *Kidney Int* 61:305-316, 2002
4. Mehta S: Statistical summary of clinical results of vascular access procedures for haemodialysis, in Sommer BG, Henry ML (eds): *Vascular Access for Hemodialysis-II* (ed 2). Chicago, IL, Gore, 1991, pp 145-157
5. The Cost Effectiveness of Alternative Types of Vascular access and the Economic Cost of ESRD. Bethesda, MD, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, 1995, pp 139-157

6. Eggers P, Milam R: Trends in vascular access procedures and expenditures in Medicare's ESRD program, in Henry ML (ed): *Vascular Access for Hemodialysis-VII*. Chicago, IL, Gore, 2001, pp 133-143
7. Nassar GM, Ayus JC: Infectious complications of the hemodialysis access. *Kidney Int* 60:1-13, 2001
8. Gulati S, Sahu KM, Avula S, Sharma RK, Ayyagiri A, Pandey CM: Role of vascular access as a risk factor for infections in hemodialysis. *Ren Fail* 25:967-973, 2003
9. Dhingra RK, Young EW, Hulbert-Shearon TE, Leavey SF, Port FK: Type of vascular access and mortality in U.S. hemodialysis patients. *Kidney Int* 60:1443-1451, 2001
10. Woods JD, Port FK: The impact of vascular access for haemodialysis on patient morbidity and mortality. *Nephrol Dial Transplant* 12:657-659, 1997
11. Xue JL, Dahl D, Ebben JP, Collins AJ: The association of initial hemodialysis access type with mortality outcomes in elderly Medicare ESRD patients. *Am J Kidney Dis* 42:1013-1019, 2003
12. Polkinghorne KR, McDonald SP, Atkins RC, Kerr PG: Vascular access and all-cause mortality: A propensity score analysis. *J Am Soc Nephrol* 15:477-486, 2004

#### 1a.7.8. Benefits Over Harms

The potential harms of placing an AV fistula include: (1) failure of the AV fistula to mature such that additional surgery is needed for vascular access, (2) steal syndrome where the distal arm becomes ischemic, and (3) prolonged maturation times that increase reliance on a tunneled dialysis catheter and its attendant risk of infection. Overall these risks associated with an AV fistula are considered to be small and overshadowed by the long-term benefits outlined above.

#### 1a.7.9. Provide for Each New Study

1a.8. This systematic review and thematic synthesis of qualitative studies describes patients' perspectives on vascular access initiation and maintenance in hemodialysis. 46 studies were reviewed and found that initiation of vascular access signifies kidney failure and imminent dialysis, which is emotionally confronting. Patients strive to preserve their vascular access for survival, but at the same time describe it as an agonizing reminder of their body's failings and "abnormality" of being amalgamated with a machine disrupting their identity and lifestyle. Timely education and counseling about vascular access and building patients' trust in health care providers may improve the quality of dialysis and lead to better outcomes for patients with chronic kidney disease requiring hemodialysis. Impact: Adds the patient's perspective to the discussion on vascular access options.

Al-Jaishi AA, Oliver MJ, Thomas SM, et al. **Patency rates of the arteriovenous fistula for hemodialysis: a systematic review and meta-analysis.** *Am J Kidney Dis.* 2014 Mar;63(3):464-78. doi: 10.1053/j.ajkd.2013.08.023. Epub 2013 Oct 30. Review.

This systematic review and meta-analysis reported that in recent years AVFs had a high rate of primary failure and low to moderate primary and secondary patency rates. Consideration of these outcomes is required when choosing a patient's preferred access type.

Impact: Updates primary and secondary patency rates of AVF for more contemporary cohorts of dialysis patients. The lower success rates suggests that some patients may not realize the full benefits of AVF that have been previously reported in the KDOQI systematic review.

Oliver MJ, Quinn RR. **Recalibrating vascular access for elderly patients.** *Clin J Am Soc Nephrol.* 2014 Apr;9(4):645-7. doi: 10.2215/CJN.01560214. Epub 2014 Mar 20.

Governments in numerous jurisdictions have set targets for fistula utilization and some have tied reimbursement to attaining these targets. This creates an environment in which it is tempting to overemphasize the benefits of fistulas and the risks of catheters when discussing vascular access options with patients.

Impact: Highlights that not all older patients may benefit from an AVF.

Drew DA, Lok CE, Cohen JT, et al. **Vascular access choice in incident hemodialysis patients: a decision analysis.** *J Am Soc Nephrol.* 2015 Jan;26(1):183-91. doi: 10.1681/ASN.2013111236. Epub 2014 Jul 25.

Decision analysis evaluating AV fistula, AV graft, and central venous catheter (CVC) strategies for patients initiating hemodialysis with a CVC, a scenario occurring in over 70% of United States dialysis patients. An AV fistula attempt strategy was found to be superior to AV grafts and CVCs in regard to mortality and cost for the majority of patient characteristic combinations, especially younger men without diabetes. Women with diabetes and elderly men with diabetes had similar outcomes, regardless of access type. Overall, the advantages of an AV fistula attempt strategy lessened considerably among older patients, particularly women with diabetes, reflecting the effect of lower AV fistula success rates and lower life expectancy. These results suggest that vascular access-related outcomes may be optimized by considering individual patient characteristics.

Impact: Certain patient groups, such as women with diabetes, have lower reported success rates of AVF creation and may have equivalent outcomes with an AVG.

Wish JB. **Catheter last, fistula not-so-first.** *J Am Soc Nephrol.* 2015 Jan;26(1):5-7. doi: 10.1681/ASN.2014060594. Epub 2014 Jul 25.

The issue of vascular access choice is not as black and white as the Centers for Medicare & Medicaid Services (CMS) would like it to appear, with arteriovenous fistula (AVF) always being good or “first” and central venous catheters (CVCs) always being bad or “last.” Nonetheless, CMS has instituted a quality incentive program (QIP) for dialysis providers that rewards high AVF prevalence and penalizes high CVC prevalence without regard to patient mix. For payment year 2014, vascular access constitutes 30% of the total QIP score. This may have already led to access to care issues, as some dialysis providers are refusing to accept patients with CVCs. CMS has recently given ground on this issue by renaming the “Fistula First” initiative “Fistula First Catheter Last” (FFLC) to emphasize that CVC avoidance is as important or more important than AVF use.

Impact: Opinion piece on changes in the Fistula First initiative reflecting the implementation of the current NQF endorsed fistula and catheter vascular access measures in the CMS Quality Incentive Program (QIP). The emphasis of the opinion piece suggests a greater shift to catheter avoidance versus only prioritizing promotion of fistula use.

Grubbs V, Wasse H, Vittinghoff E, et al. **Health status as a potential mediator of the association between hemodialysis vascular access and mortality.** *Nephrol Dial Transplant.* 2014 Apr;29(4):892-8. doi: 10.1093/ndt/gft438. Epub 2013 Nov 13.

Selection of healthier patients for arteriovenous fistula (AVF) placement may explain higher observed catheter-associated mortality among elderly hemodialysis patients. A proportional hazard model was used to examine 117 277 incident hemodialysis patients aged 67-90 years from USRDS for the association of initial vascular access type and 5-year mortality after accounting for health status. Patients with catheter alone had more limited functional status (25.5 versus 10.8% of those with AVF)

and 3-fold more prior hospital days than those with AVF (mean 18.0 versus 5.4). In a fully adjusted model including health status, mortality differences between access type were attenuated, but remained statistically significant <AVG [HR 1.18 (1.13-1.22)], catheter plus AVF [HR 1.20 (1.17-1.23)], catheter plus AVG [HR 1.38 (1.26 (1.21-1.31))] and catheter only [HR 1.54 (1.50-1.58)],  $P < 0.001$ >. The observed attenuation in mortality differences previously attributed to access type alone suggests the existence of selection bias. Nevertheless, the persistence of an apparent survival advantage after adjustment for health status suggests that AVF should still be the access of choice for elderly individuals beginning hemodialysis until more definitive data eliminating selection bias become available.

Impact: Underscores the need to adjust for patient characteristics and comorbidities when evaluating the association between vascular access type and outcomes such as mortality.

Lok, Charmaine E & Foley, Robert. **Vascular access morbidity and mortality: trends of the last decade.** *Clin J Am Soc Nephrol.* 2013 Jul;8(7):1213-9. doi: 10.2215/CJN.01690213.

During the past decade, clear trends in the types of incident and prevalent hemodialysis vascular access can be observed. There has been a steady increase and recent stabilization of patients initiating hemodialysis with a central venous catheter, representing approximately 80% of all incident accesses. There has also been a steady increase in prevalent fistula use, currently greater than 50% within 4 months of hemodialysis initiation. Patient and vascular access related morbidity and mortality are reflected in the type of vascular access used at initiation and for long-term maintenance dialysis. There is a three- to fourfold increase in risk of infectious complications in patients initiating dialysis with a catheter compared with either a fistula or graft and a sevenfold higher risk when the catheter is used as a prevalent access. Procedure rates have increased two- to threefold for all types of access. There is a significant increased risk of mortality associated with catheter use, especially within the first year of dialysis initiation.

Impact: Despite longstanding KDOQI guidelines, many patients still start hemodialysis with a tunneled catheter and experience higher rates of infectious complications compared to those with an AVF.

Ravani, Pietro & Palmer, Suetonia C & Oliver, Matthew J et al. **Associations between hemodialysis access type and clinical outcomes: a systematic review.** *J Am Soc Nephrol.* 2013 Feb;24(3):465-73. doi: 10.1681/ASN.2012070643. Epub 2013 Feb 21.

Clinical practice guidelines recommend an arteriovenous fistula as the preferred vascular access for hemodialysis, but quantitative associations between vascular access type and various clinical outcomes remain controversial. This systematic review of cohort studies evaluates the associations between type of vascular access (arteriovenous fistula, arteriovenous graft, and central venous catheter) and risk for death, infection, and major cardiovascular events. 67 (62 cohort studies comprising 586,337 participants) studies were selected. In a random effects meta-analysis, compared with persons with fistulas, those individuals using catheters had higher risks for all-cause mortality (risk ratio=1.53, 95% CI=1.41-1.67), fatal infections (2.12, 1.79-2.52), and cardiovascular events (1.38, 1.24-1.54). Similarly, compared with persons with grafts, those individuals using catheters had higher risks for mortality (1.38, 1.25-1.52), fatal infections (1.49, 1.15-1.93), and cardiovascular events (1.26, 1.11-1.43). Compared with persons with fistulas, those individuals with grafts had increased all-cause mortality (1.18, 1.09-1.27) and fatal infection (1.36, 1.17-1.58), but we did not detect a difference in the risk for cardiovascular events (1.07, 0.95-1.21). The risk for bias, especially selection bias, was high. In conclusion, persons using catheters for hemodialysis seem to have the highest risks for death, infections, and cardiovascular events compared with other vascular access types, and patients with usable fistulas have the lowest risk.

Impact: This study emphasizes that the body of evidence is consistent in the magnitude and direction of effect with regards to the benefits of AVF over central venous catheter.

Moist, Louise M & Lok, Charmaine E & Vachharajani, Tushar J et al. **Optimal hemodialysis vascular access in the elderly patient.** *Semin Dial.* 2012 Nov-Dec;25(6):640-8. doi: 10.1111/sdi.12037.

The optimal vascular access for elderly patients remains a challenge due to the difficulty balancing the benefits and risks in a population with increased comorbidity and decreased survival. Age is commonly associated with failure to mature in fistula and decreased rates of primary and secondary patency in both fistula and grafts. In the elderly, at 1 and 2 years, primary patency rates range from 43% to 74% and from 29% to 67%, respectively. Secondary patency rates at 1 and 2 years range from 56% to 82% and 44% to 67%, respectively. Cumulative fistula survival is no better than grafts survival when primary failures are included. Several observational studies consistently demonstrate a lower adjusted mortality among those using a fistula compared with a catheter; however, catheter use in the elderly is increasing in most countries with the exception of Japan. Both guidelines and quality initiatives do not acknowledge the trade-offs involved in managing the elderly patients with multiple chronic conditions and limited life expectancy or the value that patients place on achieving these outcomes. The framework for choice of vascular access presented in this article considers: (1) likelihood of disease progression before death, (2) patient life expectancy, (3) risks and benefits by vascular access type, and (4) patient preference. Future studies evaluating the timing and type of vascular access with careful assessments of complications, functionality, cost benefit, and patients' preference will provide relevant information to individualize and optimize care to improve morbidity, mortality, and quality of life in the elderly patient.

Impact: Outlines the importance of considering patient factors in vascular access options for elderly patients.

Schmidt, Rebecca J & Goldman, Richard S & Germain, Michael. **Pursuing permanent hemodialysis vascular access in patients with a poor prognosis: juxtaposing potential benefit and harm.** *Am J Kidney Dis.* 2012 Dec;60(6):1023-31. doi: 10.1053/j.ajkd.2012.07.020. Epub 2012 Sep 19.

For patients with end-stage renal disease requiring hemodialysis, the native arteriovenous fistula remains the gold standard of vascular access, with tunneled cuffed central venous catheters reserved for temporary use or as a last resort in patients for whom a permanent vascular access is not possible. It is expected that most patients receiving hemodialysis will be suitable for arteriovenous fistula placement, with suitable patients defined as those: (1) for whom long-term dialysis is expected to confer benefit, (2) with vascular anatomy amenable to arteriovenous fistula placement, and (3) with progressive irreversible kidney failure who are more likely to require dialysis than to die before reaching dialysis dependence. The present article reviews considerations for vascular access decision making, focusing on older patients and those with a poor prognosis, weighing the risks and benefits of arteriovenous fistulas, arteriovenous grafts, and central venous catheters and emphasizing that in the process of vascular access decision making for such patients, medical and ethical obligations to avoid central venous catheters must be balanced by the obligation to do no harm.

Impact: Risks and benefits of arteriovenous fistulas, relative to arteriovenous grafts, and central venous catheters need to be considered, particularly carefully in older patients and those with poor prognosis (limited life expectancy).

Vassalotti, Joseph A & Jennings, William C & Beathard, Gerald A et al. **Fistula first breakthrough initiative: targeting catheter last in fistula first.** *Semin Dial.* 2012 May;25(3):303-10. doi: 10.1111/j.1525-139X.2012.01069.x. Epub 2012 Apr 4.

An arteriovenous fistula (AVF) is the optimal vascular access for hemodialysis (HD), because it is associated with prolonged survival, fewer infections, lower hospitalization rates, and reduced costs. The AVF First breakthrough initiative (FFBI) has made dramatic progress, effectively promoting the increase in the national AVF prevalence since the program's inception from 32% in May 2003 to nearly 60% in 2011. Central venous catheter (CVC) use has stabilized and recently decreased slightly for prevalent patients (treated more than 90 days), while CVC usage in the first 90 days remains unacceptably high at nearly 80%. This high prevalence of CVC utilization suggests important specific improvement goals for FFBI. In addition to the current 66% AVF goal, the initiative should include specific CVC usage target(s), based on the KDOQI goal of less than 10% in patients undergoing HD for more than 90 days, and a substantially improved initial target from the current CVC proportion. These specific CVC targets would be disseminated through the ESRD networks to individual dialysis facilities, further emphasizing CVC avoidance in the transition from advanced CKD to chronic kidney failure, while continuing to decrease CVC by prompt conversion of CVC-based hemodialysis patients to permanent vascular access, utilizing an AVF whenever feasible.

Impact: Emphasizes that catheter avoidance should receive more attention than simply increasing the proportion of patients with an AVF.

Tamura, Manjula Kurella & Tan, Jane C & O'Hare, Ann M. **Optimizing renal replacement therapy in older adults: a framework for making individualized decisions.** *Kidney Int.* 2012 Aug;82(3):261-9. doi: 10.1038/ki.2011.384. Epub 2011 Nov 16.

It is often difficult to synthesize information about the risks and benefits of recommended management strategies in older patients with end-stage renal disease since they may have more comorbidity and lower life expectancy than patients described in clinical trials or practice guidelines. In this review, we outline a framework for individualizing end-stage renal disease management decisions in older patients. The framework considers three factors: life expectancy, the risks and benefits of competing treatment strategies, and patient preferences. We illustrate the use of this framework by applying it to three key end-stage renal disease decisions in older patients with varying life expectancy: choice of dialysis modality, choice of vascular access for hemodialysis, and referral for kidney transplantation. In several instances, this approach might provide support for treatment decisions that directly contradict available practice guidelines, illustrating circumstances when strict application of guidelines may be inappropriate for certain patients. By combining quantitative estimates of benefits and harms with qualitative assessments of patient preferences, clinicians may be better able to tailor treatment recommendations to individual older patients, thereby improving the overall quality of end-stage renal disease care.

Impact: An individualized approach to vascular access decisions that relies on both quantitative assessment of benefits and harms, as well as patient preference, can lead to treatment decisions that contradict practice guidelines.

Ng, Leslie J & Chen, Fangfei & Pisoni, Ronald L et al. **Hospitalization risks related to vascular access type among incident US hemodialysis patients.** *Nephrol Dial Transplant.* 2011 Nov;26(11):3659-66. doi: 10.1093/ndt/gfr063. Epub 2011 Mar 3.

The excess morbidity and mortality related to catheter utilization at and immediately following dialysis initiation may simply be a proxy for poor prognosis. This study examined hospitalization burden related

to vascular access (VA) type among incident patients who received some predialysis care using the DOPPS patient cohort (1996-2004) who reported predialysis nephrologist care. VA utilization was assessed at baseline and throughout the first 6 months on dialysis. Poisson regression was used to estimate the risk of all-cause and cause-specific hospitalizations during the first 6 months. Among 2635 incident patients, 60% were dialyzing with a catheter, 22% with a graft and 18% with a fistula at baseline. Compared to fistulae, baseline catheter use was associated with an increased risk of all-cause hospitalization [adjusted relative risk (RR) = 1.30, 95% confidence interval (CI): 1.09-1.54] and graft use was not (RR = 1.07, 95% CI: 0.89-1.28). Allowing for VA changes over time, the risk of catheter versus fistula use was more pronounced (RR = 1.72, 95% CI: 1.42-2.08) and increased slightly for graft use (RR = 1.15, 95% CI: 0.94-1.41). Baseline catheter use was most strongly related to infection-related (RR = 1.47, 95% CI: 0.92-2.36) and VA-related hospitalizations (RR = 1.49, 95% CI: 1.06-2.11). These effects were further strengthened when VA use was allowed to vary over time (RR = 2.31, 95% CI: 1.48-3.61 and RR = 3.10, 95% CI: 1.95-4.91, respectively). A similar pattern was noted for VA-related hospitalizations with graft use. Among potentially healthier incident patients, hospitalization risk, particularly infection and VA-related, was highest for patients dialyzing with a catheter at initiation and throughout follow-up, providing further support to clinical practice recommendations to minimize catheter placement.

Impact: Additional support for the association between catheter use and risk of hospitalization, particularly infection related hospitalizations.

## **1a.8. — Other Source of Evidence**

### **1a.8.1. Process Used**

N/A

### **1a.8.2. Citation**

N/A

## **1b.—Evidence to Support Measure Focus**

### **1b.1. Rationale**

The NKF K/DOQI guidelines state the following: 1) AV fistulas have the lowest rate of thrombosis and require the fewest interventions, 2) cost of AV fistula use and maintenance is the lowest, 3) fistulas have the lowest rates of infection, and 4) fistulas are associated with the highest survival and lowest hospitalization rates. Indeed, a number of epidemiologic studies consistently demonstrate the reduced morbidity and mortality associated with greater use of AV fistulas for vascular access in maintenance hemodialysis.

As the accompanying literature review indicates, there are a growing number of studies reporting that creating AVF in some patients is less likely to be successful in the presence of certain comorbidities. In addition, certain patient groups may have less incremental benefit from an AV fistula relative to an AV graft. By adjusting the fistula rate for patient characteristics and comorbidities associated with low AV fistula success rates, this measure accounts for patients where a graft or even a catheter may be a more appropriate option.

This measure is intended to be jointly reported with Hemodialysis Vascular Access: Long-term Catheter Rate. These two vascular access quality measures, when used together, consider Arterial Venous Fistula (AVF) use as a positive outcome and prolonged use of a tunneled catheter as a negative outcome. With



the growing recognition that some patients have exhausted options for an AVF or have comorbidities that may limit the success of AVF creation, joint reporting of the measures accounts for all three vascular access options. The fistula measure adjusts for patient factors where fistula placement may be either more difficult or not appropriate and acknowledges that in certain circumstances an AV graft may be the best access option. This paired incentive structure that relies on both measures (SFR, long-term catheter rate) reflects consensus best practice, and supports maintenance of the gains in vascular access success achieved via the Fistula First/Catheter Last Project over the last decade.

### **1b.2. Performance Scores**

Analysis of CROWNWeb data from January 2014- December 2014 indicated the facility level mean percentage of patient-months with a fistula was 64.6% (SD=10.4%). Distribution: Min=9.2%, 1st quartile=57.8%, median=64.8%, 3rd quartile=71.7%, Max=97.5%. Information about the data used in these analyses can be found under “Scientific Acceptability”.

### **1b.3. Summary of Data Indicating Opportunity**

N/A

### **1b.4. and 1b.5. Disparities**

Using data from calendar year 2014, age, sex, race and ethnicity were evaluated in a logistic regression model for AV Fistula use. Below are the odds ratios for these patient characteristics. The other covariates included in the model are not shown here as the odds ratios were very similar to those reported in Table 5 of the testing form (risk adjusted model results). Age, sex, race, and ethnicity are all statistically significant predictors of AVF use. Specifically, patients 75 years of age or older were 18% less likely to have an AV fistula when compared to the younger reference group while females are about half as likely to have fistulas as males. Hispanic ethnicity was associated with higher odds of fistula use whereas blacks are about 33% less likely to have fistulas than whites. The analysis results for age, race, and sex indicate potential disparity in fistula use. In the absence of biological effects explaining these differences, risk adjustment for these demographic factors could potentially mask disparities in care.

#### **Age:**

For the 18-<25 age group, the Odds Ratio (95% CI) is 1.08 (0.85, 1.36), P-value is 0.542.

For the 25-<60 age group, the Odds Ratio (95% CI) is 1.07 (1.02, 1.12), P-value is 0.005

The 60-<75 age group was used as the reference group.

For the 75+ age group, the Odds Ratio (95% CI) is 0.82 (0.78, 0.87), P-value is <.0001

#### **Sex:**

For Female: the Odds Ratio (95% CI) is 0.52 (0.50, 0.54), P-value is <.0001

Male was used as the reference group.

#### **Race:**

White was used as the reference group.

For Black: the Odds Ratio (95% CI) is 0.67 (0.63, 0.71), P-value is <.0001

For Other race: the Odds Ratio (95% CI) is 1.07 (0.96, 1.19), P-value is 0.206

#### **Ethnicity:**

For Hispanic: the Odds Ratio (95% CI) is 1.16 (1.08, 1.25), P-value is <.0001

Non-Hispanic was used as the reference group.

## **1c.—High Priority**

### **1c.1. Demonstrated High-Priority Aspect of Health Care**

Affects large numbers, A leading cause of morbidity/mortality

### **1c.3. Epidemiologic or Resource Use Data**

Numerous studies demonstrate that the use of AV fistulas have the best 5-year patency rates and require the fewest interventions compared with other access types. The advantages of AV fistula over other accesses are clearly delineated in the NKF K/DOQI guidelines, summarized as follows: 1) AV fistulas have the lowest rate of thrombosis and require the fewest interventions, 2) cost of AV fistula use and maintenance is the lowest, 3) fistulas have the lowest rates of infection, and 4) fistulas are associated with the highest survival and lowest hospitalization rates. Indeed, a number of epidemiologic studies consistently demonstrate the reduced morbidity and mortality associated with greater use of AV fistulas for vascular access in maintenance hemodialysis.

### **1c.4. Citations**

1. National Kidney Foundation: DOQI Clinical Practice Guidelines for Vascular Access.  
[http://www.kidney.org/Professionals/kdoqi/guideline\\_upHD\\_PD\\_VA/index.htm](http://www.kidney.org/Professionals/kdoqi/guideline_upHD_PD_VA/index.htm)

### **1c.5. Patient-Reported Outcome Performance Measure (PRO-PM)**

N/A

## **Scientific Acceptability:**

### **1.—Data Sample Description**

#### **1.1. What Type of Data was Used for Testing?**

Measure Specified to Use Data From: administrative claims, clinical database/registry  
Measure Tested with Data From: administrative claims, clinical database/registry

#### **1.2. Identify the Specific Dataset**

National CROWNWeb data from January 2014-December 2014 and Medicare claims data from January 2013 – December 2014

#### **1.3. What are the Dates of the Data Used in Testing?**

January 2013-December 2014

#### **1.4. What Levels of Analysis Were Tested?**

Measure Specified to Measure Performance of: hospital/facility/agency  
Measure Tested at Level of: hospital/facility/agency

#### **1.5. How Many and Which Measured Entities Were Included in the Testing and Analysis?**

Patients on both home and in-center hemodialysis during the last HD treatment of the month from January 2014- December 2014 were included in the analyses. The number of facilities per month ranged from 5,736- 5,871 and the total number of patients per month ranged from 344,945- 363,257.

Public reporting of this measure on DFC or in the ESRD QIP would be restricted to facilities with at least 11 eligible patients throughout the year for the measure. We have applied this restriction to all the reliability and validity testing reported here.

### **1.6. How Many and Which Patients Were Included in the Testing and Analysis?**

There were a total of 4,274,619 eligible patient-months. Among those patient-months over the whole year, the average age was 62.7 years, 43.8% of patient-months were female, 56.3% were white, 37.1% were black, 66.7% had race listed as other, 18.4% were Hispanic and 46.4% had type II diabetes as the primary cause of ESRD.

### **1.7. Sample Differences, if Applicable**

N/A

### **1.8 What were the patient-level sociodemographic (SDS) variables that were available and analyzed in the data or sample used?**

Patient level:

- Employment status 6 months prior to ESRD
- Race
- Sex
- Ethnicity
- Medicare coverage\*

*\*Assessed at a specific time point (e.g., at the reporting month). Medicare coverage in model was defined as:*

- 1. Medicare as primary and Medicaid*
- 2. Medicare as primary and NO Medicaid*
- 3. Medicare as secondary or Medicare HMO (e.g. Medicare Advantage)*
- 4. Non-Medicare/missing*

Data on patient level SDS/SES factors obtained from Medicare claims and administrative data.

ZIP code level – Area Deprivation Index (ADI) elements from Census data:

- Unemployment rate (%)
- Median family income
- Income disparity
- Families below the poverty level (%)
- Single-parent households with children <18 years old (%)
- Home ownership rate (%)
- Median home value
- Median monthly mortgage
- Median gross rent
- Population (aged 25+) with <9 years of education (%)
- Population (aged 25+) without high school diploma (%)

## **2a.2—Reliability Testing**

### **2a2.1. Level of Reliability Testing**

Performance measure score (e.g., signal-to-noise analysis)

### 2a2.2. Method of Reliability Testing

We used January 2014 – December 2014 CROWNWeb data to calculate facility-level annual performance scores. The NQF-recommended approach for determining measure reliability is a one-way analysis of variance (ANOVA), in which the between-facility variation ( $\sigma_b^2$ ) and the within-facility variation ( $\sigma_{t,w}^2$ ) in the measure is determined. The inter-unit reliability (IUR) measures the proportion of the total variation of a measure (i.e.,  $\sigma_b^2 + \sigma_{t,w}^2$ ) that is attributable to the between-facility variation, the true signal reflecting the differences across facilities. We assessed reliability by calculating inter-unit reliability (IUR) for the annual performance scores. A small IUR (near 0) reveals that most of the variation of the measure between facilities is driven by random noise, indicating the measure would not be a good characterization of the differences among facilities, whereas a large IUR (near 1) indicates that most of the variation between facilities is due to the real difference between facilities.

Here we describe our approach to calculating IUR. Let  $T_1, \dots, T_N$  be the Standardized Fistula Rate (SFR) for  $N$  facilities. Since the variation in  $T_1, \dots, T_N$  is mainly driven by the estimates of facility-specific intercepts ( $\alpha_1, \dots, \alpha_N$ ), we use their asymptotic distributions to estimate the within-facility variation in SFR. Applying the delta method, we estimate the variance of  $T_i$  and denote the estimate as  $S_i^2$ . Calling on formulas from the one-way ANOVA, the within-facility variance in SFR can be estimated by

$$s_{t,w}^2 = \frac{\sum_{i=1}^N [(n_i - 1)S_i^2]}{\sum_{i=1}^N (n_i - 1)},$$

and the total variation in SFR can be estimated by

$$s_t^2 = \frac{1}{n'(N - 1)} \sum_{i=1}^N n_i (T_i - \bar{T})^2,$$

where  $n_i$  is the number of subjects in the  $i$ th facility,  $\bar{T} = \sum n_i T_i / \sum n_i$ , and

$$n' = \frac{1}{N - 1} \left( \sum n_i - \frac{\sum n_i^2}{\sum n_i} \right)$$

is approximately the average facility size (number of patients per facility). Thus, the IUR =  $\sigma_b^2 / (\sigma_b^2 + \sigma_{t,w}^2)$  can be estimated by  $(s_t^2 - s_{t,w}^2) / s_t^2$ .

The reliability of SFR calculation only included facilities with at least 11 patients during the entire year.

### 2a2.3. Statistical Results from Reliability Testing

The IUR is 0.736 which indicates that about 74% of the variation in the annual SFR can be attributed to between-facility differences in performance (signal) and about 26% to the within-facility variation (noise).

### 2a2.4. Interpretation

The result of IUR testing suggests a high degree of reliability.

### 2b2—Validity Testing

### **2b2.1. Level of Validity Testing**

Performance measure score

Empirical validity testing

Systematic assessment of face validity of performance measure score as an indicator

### **2b2.2. Method of Validity Testing**

Validity was assessed using Poisson regression models to measure the association between facility level quintiles of performance scores and the 2014 Standardized Mortality Ratio (SMR, NQF 0369) and 2014 Standardized Hospitalization Ratio (SHR, NQF 1463). Facility-level performance scores were divided into quintiles (Q1 to Q5) and the relative risk (RR) of mortality (and hospitalization, separately) was calculated for each quintile, using the combined Q4 and Q5 as the reference group. Thus, a  $RR > 1.0$  would indicate a higher relative risk of mortality or hospitalization, compared to the highest performance score quintiles.

In 2015 a vascular access TEP was convened to provide input on the development of access measures, and specifically input on exclusions for both catheter and fistula measures, and for fistula, risk adjustment factors to be considered. Ultimately, evaluation and selection of the clinical and patient risk factors for this measure was informed by the final TEP recommendations. The TEP recognized that while fistulas are preferred, an unintended consequence of a fistula measure that doesn't account for the patient's overall health status could harm patients by subjecting them to fistula surgery that is less likely to succeed or limit access to care for patients with more comorbidities. To accomplish this goal the TEP discussed adjusting the measure for conditions or scenarios where a graft may be an acceptable or preferred alternative to a fistula. The candidate measure was reviewed and validated by the Technical Expert Panel (TEP) in 2015.

### **2b2.3. Statistical Results from Validity Testing**

Quintiles of the performance scores were defined as follows:

Q1: 9.2%-<55.9%

Q2: 55.9%-<62.0%

Q3: 62.0%-<67.4%

Q4\*: 67.4%-<73.4%

Q5\*: 73.4%-<97.5%

\*Q4 and Q5 as Reference

Results from the Poisson model indicated that the percent of patient-months with a fistula was significantly associated with the risks of mortality and hospitalization.

For the 2014 SMR, the relative risk of mortality increased as the performance measure quintile decreased from the reference group (combined Q4 and Q5) with the highest risk in quintile 1. For quintile 3,  $RR=1.03$  (95% CI: 1.01, 1.05;  $p=0.003$ ), quintile 2,  $RR=1.05$  (95% CI: 1.03, 1.07;  $p<0.001$ ), and quintile 1,  $RR=1.10$  (95% CI: 1.08, 1.12;  $p<0.001$ ).

Similarly, for 2014 SHR, the relative risk of hospitalization increased as the performance measure quintile decreased from the reference group (combined Q4 and Q5) with the highest risk in quintile 1. For quintile 3, RR=1.07 (95% CI: 1.06, 1.07; p<0.001), quintile 2, RR=1.08 (95% CI: 1.08, 1.09; p<0.001), and quintile 1, RR=1.11 (95% CI: 1.11, 1.11; p<0.001).

#### 2b2.4. Interpretation

These results of the Poisson regression suggest the predictive relationship of lower fistula use with higher mortality and hospitalization, as measured by the respective standardized mortality and hospitalization rates, and compared to facilities with higher fistula use.

### 2b3—Exclusion Analysis

#### 2b3.1. Method of Testing Exclusion

The following exclusions are applied to the denominator:

Patients with a catheter that have limited life expectancy. Limited life expectancy is defined as:

- Patients under hospice care in the current reporting month
- Patients with metastatic cancer in the past 12 months
- Patients with end stage liver disease in the past 12 months
- Patients with coma or anoxic brain injury in the past 12 months

The facility-level standardized fistula rate with and without the patient-month exclusions are calculated and compared.

#### 2b3.2. Statistical Results from Testing Exclusion

The following tables show percent of patient months at risk and number of unique patients excluded as a result of the above mentioned exclusion strategy.

Table 1: Percent of patient-months at risk excluded

| Year | Before Exclusion | After Exclusion | Percent |
|------|------------------|-----------------|---------|
| 2014 | 4,314,450        | 4,274,619       | 0.92%   |

Table 2: Number and percent of unique patients excluded

| Year | Before Exclusion | After Exclusion | Percent |
|------|------------------|-----------------|---------|
| 2014 | 468,910          | 457,902         | 2.35%   |

Table 3: Distribution of performance scores before and after the exclusion

| Standardized Fistula Rate | N    | Mean  | Standard Deviation | Minimum | Maximum |
|---------------------------|------|-------|--------------------|---------|---------|
| Before exclusion          | 5928 | 0.640 | 0.103              | 0.092   | 0.975   |
| After exclusion           | 5928 | 0.646 | 0.104              | 0.092   | 0.975   |

Figure 1: Scatterplot –SFR with and without measure exclusions

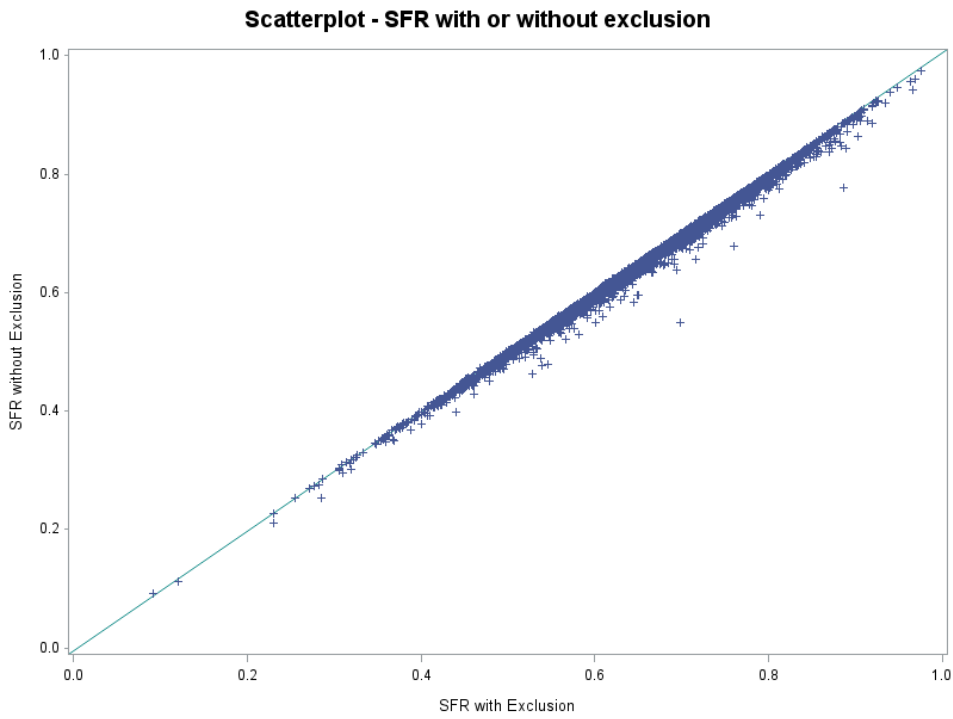
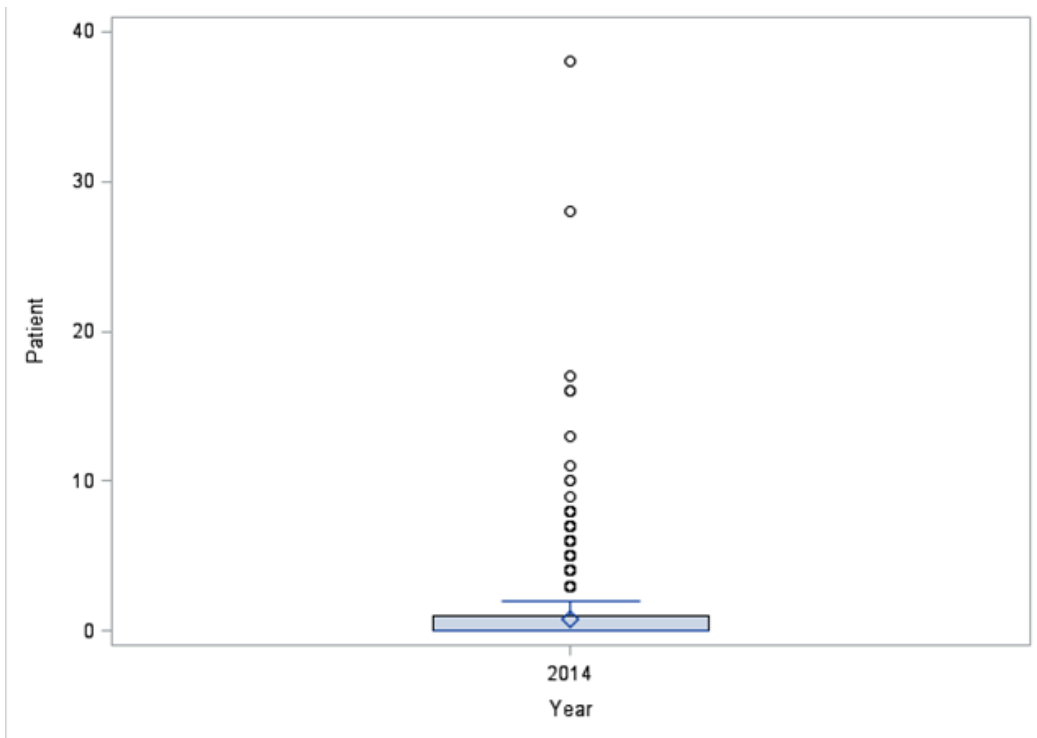


Figure 2. Distribution of Excluded Patients at facility level for 2014



### **2b3.3. Interpretation**

The exclusion criteria are necessary since the percentage of patients excluded at each facility is not evenly distributed across facilities (Distribution shown in the boxplot above). Due to the unequal distribution across facilities, the exclusion criteria take into account that some facilities treat a higher portion of patients with limited life expectancy. Additionally, our results shown in both the scatter-plot (Figure 1) as well as the Pearson Correlation Coefficient of 0.998 (p-value <0.0001) between SFRs with and without the exclusion suggests that the overall impact of the exclusion on the measure's validity is not substantial since the two are highly correlated.

## **2b4—Risk Adjustment or Stratification**

### **2b4.1. Method of controlling for differences**

Statistical risk model with 19 patient-month level risk factors

### **2b4.2. Rationale why Risk Adjustment is not Needed**

N/A

### **2b4.3. Conceptual, Clinical, and Statistical Methods**

Although there have been significant gains in the proportion of dialysis patients that have an AV fistula, it is generally recognized that some patients on hemodialysis will need to have an AV graft or even a catheter. As evidence, the CMS AV fistula target at the facility level is 68%, rather than 100%, which recognizes that one third of patients will require a different type of access. Given that there is variation in the burden of comorbidities between different facilities, adjusting for these factors when calculating an AV fistula rate implicitly recognizes that some patients are more likely to have AV grafts. Several of the studies (listed in 1a.7.9) detail particular patient characteristics that are associated with a decreased likelihood of having a successful AV fistula created. Ultimately, evaluation and selection of the clinical and patient risk factors was informed by the final TEP recommendations. The TEP recognized that while fistulas are preferred, an unintended consequence of a fistula measure that doesn't account for the patient's overall health status could harm patients by subjecting them to fistula surgery that is less likely to succeed or limit access to care for patients with more comorbidities. The TEP recognized that they could not make the statement that fistulas and grafts are truly equivalent in all patients, but wanted to ensure that grafts were a strongly preferred outcome to catheters and should not be disincentivized. To accomplish this goal the TEP discussed adjusting the measure for conditions or scenarios where a graft may be an acceptable or preferred alternative to a fistula. The covariates in the final model represent a combination of those recommended by the TEP for inclusion as well as factors that empiric analyses indicated were predictive of AV fistula use. Final decisions of the risk factors were based on both the clinical and statistical association with the lower likelihood of fistula use in patients with these risk factors, and that these factors were not likely to be associated with facility care.

Risk adjustment is based on a multivariate logistic regression model. The adjustment is made for age, BMI at incident, nursing home status, nephrologist's care prior to ESRD, duration of ESRD, diabetes as primary cause of ESRD, and comorbidities. Although covariates are assumed to have the same effects across facilities, the adjustment model is fitted with different facility effects (through facility-specific intercept terms), which provides valid estimates even if the distribution of adjustment variables differs across facilities. The common risk effects are assumed in order to improve computational stability in estimating facility-specific effects. All analyses are done using SAS.



In general, adjustment factors for the SFR were selected based on several considerations. We began with a large set of patient characteristics, including demographics, comorbidities at ESRD incidence or past 12 months, and other characteristics. We used an indicator to identify patients with < 6 months of Medicare coverage in the past 12 months as part of the analyses that relied on Medicare claims for comorbidities. Factors considered appropriate were then investigated with statistical models to determine if they were related to AVF use. Factors related to the SFR were also evaluated for face validity before being included.

We used two data sources to collect comorbidity information: CMS-2728 and Medicare claims filed in prior 12 months. The covariates for comorbidities included in the final model take a value of 1 if there was any evidence of the condition in either CMS-2728 or Medicare claims, otherwise 0. Some patient characteristics or comorbidities are only available in CMS-2728, some are only available in Medicare claims, and some are available from both sources. We considered the condition to be present if it was noted in either the CMS-2728 form, or Medicare claims, or both. Table 4 shows that most all of the comorbidities had a statistically significant association with AVF use. As a comparison, using data from January 2014 we compared analysis results of two additional risk adjustment models that included: 1) no comorbidity adjustment at all (denoted as Model 0), and 2) comorbidities defined by CMS-2728 only (denoted as Model 1). Table A1 in the Appendix shows that the c-statistic of our final model was the highest, compared with Model 0 and Model 1 (c-statistic=0.688 for Model 0; 0.691 for Model 1; and 0.700 for our final model). In Table A2 of the Appendix, some of regression coefficients (especially for age, nursing home status and peripheral vascular disease) increased or decreased from those in Models 0 and 1.

In response to the requirements for NQF’s Trial Period for the assessment of sociodemographic risk adjustment factors for quality measures, we investigated several patient and zip code level data elements (see list in 1.8). Sociodemographic factors included in the analysis were based on conceptual criteria and empirically demonstrated findings in the literature which have shown differences in fistula use exist among racial minorities, women and the poor. In addition, the particular patient and area level variables chosen were based on availability of data for the analyses. We were able to acquire individual area-level variables included in the Area Deprivation Index (ADI) developed by Singh and colleagues at the University of Wisconsin[1].

1. Singh, GK. Area deprivation and widening inequalities in US mortality, 1969–1998. Am J Public Health. 2003;93(7):1137–1143.

**2b4.4a. Statistical Results**

In the table below, we list results from the adjusted model described above. For a given covariate, the regression coefficient represents the logit of the rate. We also report the odds ratio for each covariate. With a few exceptions (youngest age group, other heart diseases and anemia), all main effects are statistically significant at the 0.05 level.

Table 4. Model Coefficients and Odds Ratios, Data Year 2014

| Covariate  | Coefficient | Odds Ratio | P-value |
|------------|-------------|------------|---------|
| <b>Age</b> |             |            |         |
| 18-<25     | 0.073       | 1.076      | 0.530   |
| 25-<59     | 0.087       | 1.091      | 0.000   |

| <b>Covariate</b>  | <b>Coefficient</b> | <b>Odds Ratio</b> | <b>P-value</b> |
|---|--------------------|-------------------|----------------|
| 60-<75  | reference          |                   |                |
| 75+   | -0.202             | 0.817             | <.0001         |
| <b>BMI</b>  |                    |                   |                |
| underweight(< 18.5)   | -0.215             | 0.806             | 0.001          |
| normal(18.5 - 24.9)   | reference          |                   |                |
| overweight(>24.9 )  | 0.054              | 1.055             | 0.026          |
| <b>Nursing home status*</b>   | -0.321             | 0.726             | <.0001         |
| <b>Nephrologist's Care prior to ESRD*</b>                                       | 0.257              | 1.293             | <.0001         |
| <b>Duration of ESRD</b>   |                    |                   |                |
| <1 year   | -1.171             | 0.310             | 0.000          |
| 1-<5 years  | reference          |                   |                |
| 5-<9 years  | -0.234             | 0.792             | 0.000          |
| 9+  | -0.602             | 0.548             | 0.000          |
| <b>Primary Cause of ESRD</b>  |                    |                   |                |
| Diabetes  | -0.053             | 0.948             | 0.034          |
| Other   | reference          |                   |                |
| <b>Comorbidities*</b>   |                    |                   |                |
| Diabetes (NOT as primary cause of ESRD)   | -0.121             | 0.886             | <.0001         |
| Heart Failure   | -0.046             | 0.955             | 0.038          |
| Other Heart Diseases  | -0.037             | 0.963             | 0.114          |
| Peripheral Vascular Disease   | -0.340             | 0.712             | <.0001         |
| Cerebrovascular Disease   | -0.113             | 0.893             | <.0001         |
| Chronic Obstructive Pulmonary Disease   | -0.083             | 0.921             | 0.001          |
| Drug Dependence   | -0.207             | 0.813             | <.0001         |
| Inability to ambulate/transfer  | -0.497             | 0.609             | <.0001         |
| Anemia (unrelated to ESRD/CKD)  | -0.049             | 0.952             | 0.228          |
| Non-Vascular Access-Related Infections:<br>Pneumonia/Hepatitis/HIV/Tuberculosis | -0.286             | 0.751             | <.0001         |

| Covariate   | Coefficient | Odds Ratio | P-value |
|---|-------------|------------|---------|
| Less than 6-months of Medicare coverage in past 12 months | -0.447      | 0.640      | <.0001  |
| * 'No' was used as reference.                             |             |            |         |

**2b4.4b. Statistical Results for SDS factors**

The table below shows the parameter estimates for patient and area level SDS/SES variables based on a logistic regression model for AV fistula use that included all these variables along with all the other clinical covariates used for adjustment in SFR. Here we only report results for the SDS/SES factors.

Table 5. Coefficients and odds ratios for SDS/SES variables

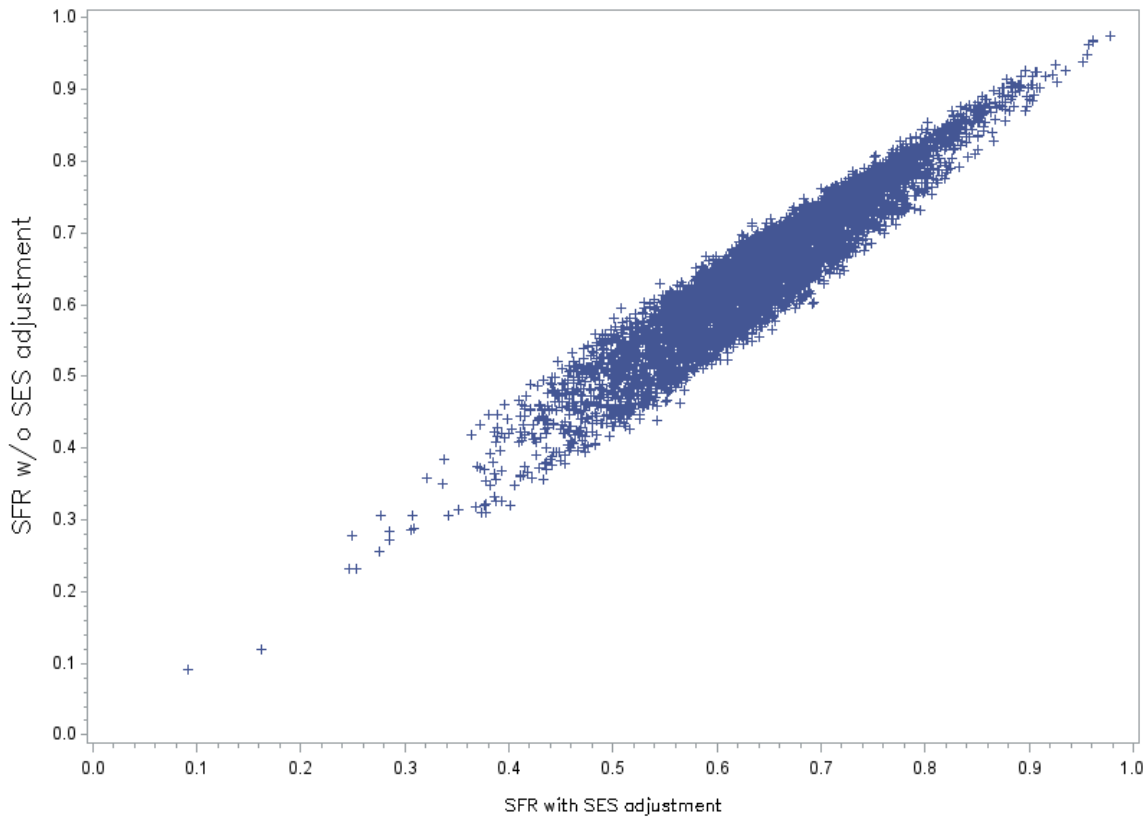
| Variable                                     | Estimate  | Odds Ratio | P-value |
|--|-----------|------------|---------|
| <b>Sex</b>                                   |           |            |         |
| Female                                       | -0.647    | 0.524      | <.0001  |
| Male   | Reference |            |         |
| <b>Ethnicity</b>                             |           |            |         |
| Hispanic                                     | 0.160     | 1.173      | <.0001  |
| Non-Hispanic                                 | Reference |            |         |
| <b>Race</b>                                  |           |            |         |
| White  | Reference |            |         |
| Black  | -0.406    | 0.666      | <.0001  |
| Other  | 0.081     | 1.085      | 0.126   |
| <b>Employment Status (2728)</b>              |           |            |         |
| Employed                                     | Reference |            |         |
| Unemployed                                   | -0.139    | 0.870      | <.0001  |
| Other  | -0.172    | 0.842      | <.0001  |
| <b>Medicare Coverage</b>                     |           |            |         |
| Medicare as primary without Medicaid         | Reference |            |         |
| Medicare as primary with Medicaid            | -0.008    | 0.992      | 0.770   |
| Medicare as secondary or Medicare HMO        | 0.044     | 1.045      | 0.135   |
| Non-Medicare/missing                         | -0.212    | 0.809      | <.0001  |
| <b>ADI (zipcode_level)</b>                   |           |            |         |
| Unemployment rate (%)                        | 0.003     | 1.003      | 0.688   |
| Median family income                         | -0.005    | 0.995      | 0.695   |
| Families below the poverty level (%)         | 0.001     | 1.001      | 0.861   |
| Single-parent households w/ children <18 (%) | -0.001    | 0.999      | 0.590   |
| Home ownership rate (%)                      | 0.000     | 1.000      | 0.929   |
| Median home value                            | 0.004     | 0.948      | 0.871   |
| Median monthly mortgage                      | -0.002    | 0.998      | 0.981   |
| Median gross rent                            | -0.037    | 0.964      | 0.680   |
| Population (aged 25+) without High School    | 0.002     | 1.002      | 0.589   |

| Variable         | Estimate | Odds Ratio | P-value |
|------------------|----------|------------|---------|
| diploma (%)      |          |            |         |
| Income disparity | -0.026   | 0.975      | 0.434   |

Patient-level SDS/SES: Compared to males, females were less likely to have an autogenous arteriovenous fistula (AVF) (OR=0.52;  $p<0.01$ ). Hispanics were more likely to have an AVF (OR=1.17;  $p<0.01$ ), compared to non-Hispanics. Compared to white patients, black patients were less likely to have an AVF (OR=0.67,  $p<0.01$ ). As for employment status, unemployed and other patients were less likely to have an AVF (OR=0.87;  $p<0.01$ ; OR=0.84;  $p<0.01$ ), compared to employed patients. Note that for employment categories, the “Other” category represents diverse patient groups with regards to SES, such as students, homemakers, and those who are retired. Compared to Medicare only patients, patients with both Medicare and Medicaid or patients with Medicare as secondary coverage/Medicare HMO have no significant difference in fistula use (OR=0.99,  $p=0.77$ ; OR=1.05,  $p=0.14$ ), while patients classified as no Medicare/missing were less likely to have an AVF (OR=0.81,  $p<0.01$ ).

Area-level SDS/SES: Area-level effects were generally very small and were not statistically significant.

Figure 3. Correlation between SFRs with and without SDS/SES adjustment



The standard and SDS/SES-adjusted SFRs were highly correlated at 0.95 ( $p<.001$ ).

| SFR w/o SDS/SES | SFR with SDS/SES |
|-----------------|------------------|
|-----------------|------------------|

|                      | Better than expected | As expected  | Worse than expected | Total        |
|----------------------|----------------------|--------------|---------------------|--------------|
| Better than expected | 196 (3.3%)           | 65 (1.1%)    | 0                   | 261 (4.4%)   |
| As expected          | 64 (1.1%)            | 5409 (91.2%) | 53 (0.9%)           | 5526 (93.2%) |
| Worse than expected  | 0                    | 52 (0.9%)    | 89 (1.5%)           | 141 (2.4%)   |
| Total                | 260 (4.4%)           | 5526 (93.2%) | 142 (2.4%)          | 5928         |

After adjustment for SDS/SES, 234 facilities (4.0%) changed performance categories. 118 (2.0%) facilities were down-graded and 116 (2.0%) facilities were upgraded.

These analyses indicate that patient-level, but not area-level, variables for SDS/SES impact expected AVF rates. Furthermore, we observed that adjustment for SDS/SES shifted facility performance, but more facilities declined in performance ranking with SDS/SES adjustment than improved.

Area-level factors are not included as adjustments due to the absence of clinically meaningful or statistically observed differences on the fistula rate with these adjustments. Patient-level SDS/SES variables are not included as adjustments in the measure due to the absence of a convincing biological or clinical rationale that warrant accounting for different outcomes on the basis of race, sex, or socioeconomic status. For example, some providers in the dialysis community believe that women are less likely to have AVF due to smaller vessels and hypothesize that this may be a biologic explanation for subsequent higher primary failure rates seen in women. While several studies have reported that women have smaller vasculature than men [1,2], this has not been a consistent finding, and may be isolated to forearm vessels. Studies that have focused on upper arm AVF have demonstrated similar AVF rates between men and women, suggesting a lack of sufficient biological or clinical support for different outcomes in fistula rates between female and males [3].

1. Jemcov, TK Morphologic and functional vessel characteristics assessed by ultrasonography for prediction of radiocephalic fistula maturation. *J Vasc Access* 2013; 14(4):356-363
2. Allon, M et al. Effect of preoperative sonographic mapping on vascular access outcomes in hemodialysis patients. *Kidney International*, Vol. 60 (2001), pp. 2013–2020
3. Caplin, N et al. Venous Access: Women Are Equal. *Am J Kidney Dis* 2003. 41:429-432.

#### **2b4.5. Method Used to Develop the Statistical Model or Stratification Approach**

Risk factors were selected for the final model based on the magnitude of the coefficients, evaluation of their statistical significance, and the model c-statistic.

#### **2b4.6. Statistical Risk Model Discrimination Statistics (e.g., c-statistic, R<sup>2</sup>)**

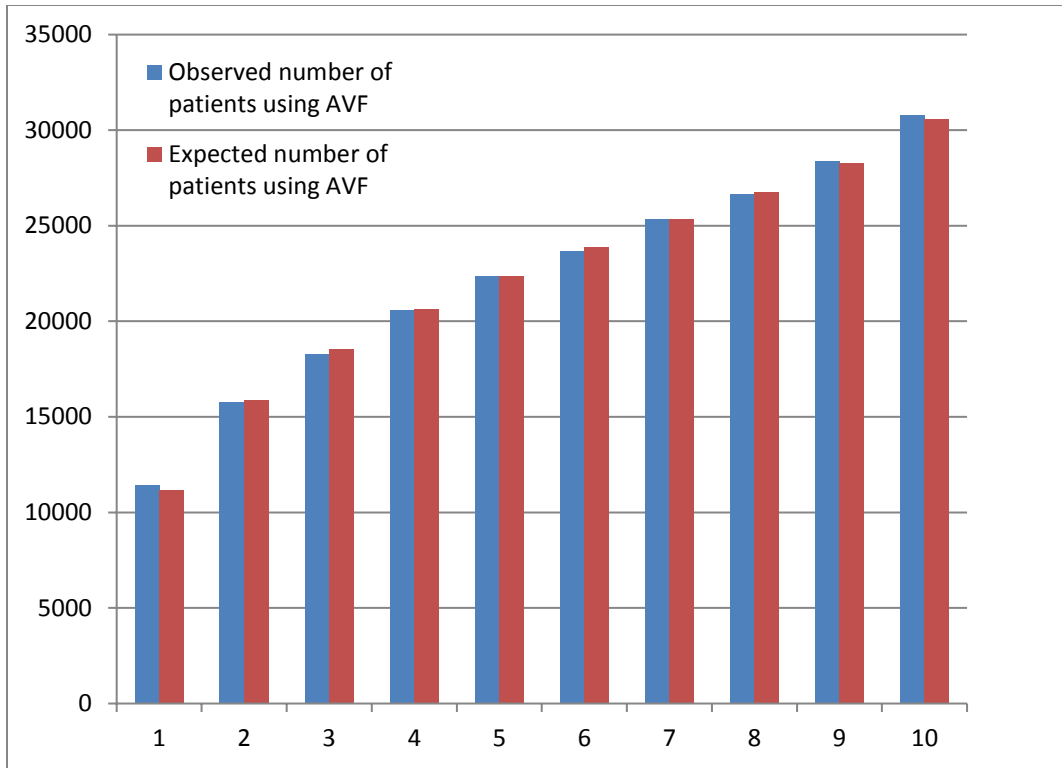
The C-statistic (also known as the Index of Concordance) was 0.70. This indicates that the model correctly ordered 70% of the pairs of patient-months that were discordant with respect to the response variate.

#### **2b4.7. Statistical Risk Model Calibration Statistics (e.g., Hosmer-Lemeshow statistic)**

The Hosmer-Lemeshow test statistic based on deciles of risk is 39.1 with p-value <0.0001. In very large samples such as this even relatively small departures from the model will lead to significant results. The c-statistic and risk decile plot show that the model provides an overall good fit to the data.

#### **2b4.8. Statistical Risk Model Calibration—Risk decile plots or calibration curves**

Figure 4: Decile plots for the number of patients using AVF



**2b4.9. Results of Risk Stratification Analysis**

N/A

**2b4.10. Interpretation**

The decile plot (Figure 4) shows that the risk factors in the model are discriminating well between patients. There is good separation among all 10 groups by risk scores, and the ordering is as predicted by the model (i.e., patients predicted to have a lower probability of AVF use actually do have a lower percentage of AVF use). The absolute differences between the risk groups are also large, with patients predicted to have the highest likelihood of AVF use (Group 10) having 3 times higher AVF rate than those predicted to have the lowest likelihood (Group 1). This means that the model fit is good and therefore adequately adjusts for patient characteristics (case mix).

**2b4.11. Optional Additional Testing for Risk Adjustment**

N/A

**2b5—Identification of statistically significant and clinically meaningful differences**

**2b5.1. Method for determining**

Differences in measure performance were evaluated separately for each facility, where the annual standardized fistula rate (SFR) of each facility was compared to the overall national distribution.

Here we describe our approach for testing of statistical significance. Let  $T_1, \dots, T_N$  be the Standardized Fistula Rate (SFR) for  $N$  facilities. Since the variation in  $T_1, \dots, T_N$  is mainly driven by the estimates of

facility-specific intercepts ( $\alpha_1, \dots, \alpha_N$ ), we use their asymptotic distributions and apply the delta method to estimate the standard errors of SFRs. Let  $S_i$  denote the standard error estimate of  $T_i$ . The test-statistic is then calculated by  $(T_i - \text{national average of SFR}) / S_i$ , which asymptotically follows the standard normal distribution under the null hypothesis. A two-sided test with significant level 0.05 was used. As the reference null distribution, we used Efron's empirical null distribution in lieu of the theoretical null distribution since the empirical null method is more robust approach that takes account of the national random variation among facilities not accounted for in the model (Efron, 2004; Kalbfleisch and Wolfe, 2013). It essentially rescales the critical value for the test statistic. The rescaling multiple is estimated by the slope (estimated via robust regression) correlating the empirical and theoretical Z-score quantiles (e.g., with a multiple of 1 indicating that in fact no rescaling is required). In this approach, facilities are flagged if they have outcomes that are more extreme when compared to the variation in national AVF rate.

Efron, Bradley. Large-Scale Simultaneous Hypothesis Testing: The Choice of a Null Hypothesis. *Journal of the American Statistical Association*. Vol. 99, No. 465 (Mar., 2004), pp. 96-104

Kalbfleisch JD, Wolfe RA. On monitoring outcomes of medical providers. *Statistics in the Biosciences*. November 2013, Volume 5, Issue 2, pp 286-302

## 2b5.2. Statistical Results

Proportion of facilities with statistically significant differences (p-values < 0.05) is shown as follows:

| Category             | Number of facilities | Percent of facilities |
|----------------------|----------------------|-----------------------|
| Better than expected | 261                  | 4.40%                 |
| As expected          | 5526                 | 93.22%                |
| Worse than expected  | 141                  | 2.38%                 |

## 2b5.3. Interpretation

For the annual SFR, 5,526 (93%) facilities have achieved expected performance, 141 (2.4%) facilities have performed worse than expected (lower fistula rate), 261 (4.4%) facilities have performed better than expected (higher fistula rate).

In general, a higher rate of fistula use represents better quality of care. This analysis demonstrates both practical and statistically significant differences in performance across facilities based on their adjusted proportion of patient months with a fistula in use.

## 2b6—Comparability of performance scores

### 2b6.1. Method of testing conducted to demonstrate comparability

N/A

## **2b6.2. Statistical Results**

N/A

## **2b6.3. Interpretation**

N/A

### ***Feasibility:***

#### **3a.1. How are the data elements needed to compute measure scores generated**

Generated or collected by and used by healthcare personnel during the provision of care (e.g., blood pressure, lab value, diagnosis, depression score)

#### **3b.1. Are the data elements needed for the measure as specified available electronically**

ALL data elements are in defined fields in a combination of electronic sources

#### **3b.3. If this is an eMeasure, provide a summary of the feasibility assessment**

N/A

#### **3c.1. Describe what you have learned or modified as a result of testing**

N/A

#### **3c.2. Describe any fees, licensing, or other requirements**

N/A

### ***Usability and Use:***

#### **4.1—Current and Planned Use**

Planned: Public Reporting, Payment Program

#### **4a.1. Program, sponsor, purpose, geographic area, accountable entities, patients**

N/A

#### **4a.2. If not publicly reported or used for accountability, reasons**

Measure is currently under development.

#### **4a.3. If not, provide a credible plan for implementation**

CMS will determine if and when the measure will be implemented in a CMS program. Upon endorsement, CMS will consider retiring the currently endorsed measure of fistula use (#0257) in favor of this new measure for implementation in a future performance year for the ESRD QIP and reporting period for Dialysis Facility Compare at the next available opportunity.

#### **4b.1. Progress on improvement**

N/A

#### **4b.2. If no improvement was demonstrated, what are the reasons**

The measure is not yet implemented in a public reporting program, so improvement could not be



evaluated. CMS currently anticipates implementation of the standardized fistula rate. Once implemented facility performance on the measure can be evaluated to determine if the measure has supported and detected quality improvement in promoting fistula use for the incident and prevalent populations, while also taking into account those patient risk factors that hinder successful fistula use in certain subpopulations.

## ***Related and Competing Measures***

### **5—Relation to Other NQF-Endorsed Measures**

Yes

#### **5.1a. The measure titles and NQF numbers are listed here**

0251 : Vascular Access—Functional Arteriovenous Fistula (AVF) or AV Graft or Evaluation for Placement

2594 : Optimal End Stage Renal Disease (ESRD) Starts

#### **5.1b. If the measures are not NQF-endorsed, indicate the measure title**

N/A

### **5a—Harmonization**

#### **5a.1. Are the measure specifications completely harmonized**

No

#### **5a.2. If not completely harmonized, identify the differences rationale, and impact**

Measure 0251 contains several components in addition to assessing fistula use. It is a referral process measure. The most basic requirement to get into the numerator is referral to a vascular surgeon (or other qualified physician). This has the potential for facilities to score well on the measure separate from whether patients are receiving treatment with a fistula, graft, or catheter, as long as the patient was referred to or evaluated by a vascular surgeon. We acknowledge this is an important step to fistula placement however it departs from the intent of this fistula measure to function as a more direct incentive to encourage fistula use. Moreover, consistent with the concerns and recommendations made by the vascular access TEP, the SFR is risk adjusted and includes risk factors to account for patients where fistula may not be the appropriate access type. Measure 2594 is not directed toward dialysis facilities. The setting focus addresses a different provider type which falls outside the purview of measures evaluating dialysis facility performance on fistula use. This suggests a fundamental difference in the measure target populations, setting and intent that cannot be harmonized. Additionally, the measure is limited to incident patients, while the SFR includes both incident and prevalent patients as the measured population.

### **5b—Competing measures**

5b.1 Describe why this measure is superior to competing measures

There are no competing measures.

## ***Additional Information:***

### **Co.1. — Measure Steward Point of Contact**

---

**Co.1.1. Organization Centers for Medicare & Medicaid Services**

**Co.1.2. First Name**

Sophia

**Co.1.3. Last Name**

Chan

**Co.1.4. Email Address**

sophia.chan@cms.hhs.gov

**Co.1.5. Phone Number**

N/A

**Co.2. — Developer Point of Contact (indicate if same as Measure Steward Point of Contact)**

**Co.2.1. Organization**

University of Michigan Kidney Epidemiology and Cost Center

**Co.2.2. First Name**

Jennifer

**Co.2.3. Last Name**

Sardone

**Co.2.4. Email Address**

jmsto@med.umich.edu

**Co.2.5. Phone Number**

734-548-3057

**Ad.1. Workgroup/Expert Panel Involved in Measure Development**

According to the CMS Measure Management System Blueprint, TEPs are advisory to the measure contractor. In this advisory role, the primary duty of the TEP is to suggest candidate measures and related specifications, review any existing measures, and determine if there is sufficient evidence to support the proposed candidate measures.

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**Ad.2. Year the Measure Was First Released**

2016

**Ad.3. Month and Year of Most Recent Revision**

04, 2016

**Ad.4. What is your frequency for review/update of this measure?**

Annually

**Ad.5. When is your next scheduled review/update for this measure?**

04, 2017

**Ad.6. Copyright Statement**

N/A

**Ad.7. Disclaimers**

N/A

**Ad.8. Additional Information/Comments**

N/A

# Data Dictionary

| Variable   | Primary Data Source   |
|--|---|
| Facility CCN #   | CMS data sources <sup>*1</sup>                                      |
| Reporting year and month   | CROWNWeb  |
| Vascular Access Type   | CROWNWeb  |
| Date of Birth  | CMS data sources <sup>*1</sup>                                      |
| Date of First ESRD   | Medical Evidence Form (CMS-2728)                                    |
| Age at the first day of reporting month  | CMS data sources <sup>*1</sup>                                      |
| BMI at incidence   | Medical Evidence Form (CMS-2728)                                    |
| Nursing home status (in the previous calendar year)  | CMS Minimum Data Set  |
| Nephrologist's Care prior to ESRD  | Medical Evidence Form (CMS-2728)                                    |
| Diabetes - Primary cause of ESRD   | Medical Evidence Form (CMS-2728)                                    |
| Diabetes –Not as primary cause of ESRD <sup>*5</sup>   | Medicare Claims <sup>*3</sup><br>Medical Evidence Form (CMS-2728)   |
| Heart Failure <sup>*5</sup>  | Medicare Claims <sup>*3</sup><br>Medical Evidence Form (CMS-2728)   |
| Other Heart Diseases <sup>*5</sup>   | Medicare Claims <sup>*3</sup><br>Medical Evidence Form (CMS-2728)   |
| Peripheral Vascular Disease <sup>*5</sup>  | Medicare Claims <sup>*3</sup><br>Medical Evidence Form (CMS-2728)   |
| Cerebrovascular Disease <sup>*5</sup>  | Medicare Claims <sup>*3</sup><br>Medical Evidence Form (CMS-2728)   |
| Chronic Obstructive Pulmonary Disease <sup>*5</sup>  | Medicare Claims <sup>*3</sup><br>Medical Evidence Form (CMS-2728)   |
| Drug Dependence <sup>*5</sup>  | Medicare Claims <sup>*3</sup> ,<br>Medical Evidence Form (CMS-2728) |
| Inability to ambulate/transfer   | Medical Evidence Form (CMS-2728)                                    |
| Anemias (unrelated to ESRD/CKD) <sup>*5</sup>  | Medicare Claims <sup>*3</sup>                                       |
| Non-Vascular Access-Related Infections: Pneumonias/<br>Hepatitis/HIV/AIDS/Tuberculosis <sup>*5</sup> | Medicare Claims <sup>*3</sup>                                       |
| Not having at least 6-month Medicare eligible in past 12 months                                      | Medicare Claims <sup>*3</sup>                                       |
| Hospice_status in the current month <sup>*4</sup>  | CMS Hospice file <sup>*2</sup>                                      |
| Metastatic Cancer reported on Medicare Claims in past 12 months <sup>*4</sup>                        | Medicare Claims <sup>*3</sup>                                       |
| End-Stage Liver Disease reported on Medicare Claims in past 12 months <sup>*4</sup>                  | Medicare Claims <sup>*3</sup>                                       |
| Coma or Anoxic Brain Damage reported on Medicare Claims in past 12 months <sup>*4</sup>              | Medicare Claims <sup>*3</sup>                                       |

\*1. Multiple data sources include CMS Consolidated Renal Operations in a Web-enabled Network (CROWNWeb), the CMS Annual Facility Survey (Form CMS-2744), Medicare dialysis and hospital payment records, the CMS Medical Evidence Form (Form CMS-2728), transplant data from the Organ Procurement and Transplant Network (OPTN), the Death Notification Form (Form CMS-2746), the Dialysis Facility Compare (DFC) and the Social Security Death Master File.

Unique patients are identified by using a combination of SSN, first name, surname, sex, Medicare claim number and birth date. A matching process is performed to ensure that minor typos and misspellings do not cause a patient record to fall out of their history. The matching process is able to successfully match 99.5% of patients. The remaining patients have incomplete or incorrect data that does not allow them to be matched.

\*2. Hospice information comes from the CMS Hospice file that contains final action claims submitted by Hospice providers. Once a beneficiary elects Hospice, all Hospice related claims will be found in this file, regardless if the beneficiary is in Medicare fee-for-service or in a Medicare managed care plan.

\*3. Medicare claims include Part A claims such as inpatient admissions and Part B claims such as outpatient claims (including dialysis claims) and physician services. Claims from providers, such as laboratories, that report diagnosis codes when testing for the presence of a condition are excluded.

\*4. Exclusion factors: A detailed list of ICD-9 diagnostic codes and HCPCS CPT codes used to identify comorbidities is included in this file (See Tab ICD-9 to 10 Exclusions).

\*5. Comorbidities were identified by combining prevalent comorbidities reported on all Medicare Claims in past 12 month and incident comorbidities reported on the Medical Evidence Form (CMS-2728). A detailed list of ICD-9 diagnostic codes and HCPCS CPT codes used to identify comorbidities from Medicare Claims are listed in Tab ICD-9 to 10 Adjustments)

## ICD-9 to 10 Mapping: Exclusions

| ICD9DX | ICD9::ICD9DX_desc  | ICD10CM | ICD10::ICD10CM_desc   |
|--------|--|---------|---|
| 1960   | Secondary and unspecified malignant neoplasm of lymph nodes of head, f     | C770    | Secondary and unspecified malignant neoplasm of lymph nodes of head, face and neck  |
| 1961   | Secondary and unspecified malignant neoplasm of intrathoracic lymph no     | C771    | Secondary and unspecified malignant neoplasm of intrathoracic lymph nodes           |
| 1962   | Secondary and unspecified malignant neoplasm of intra-abdominal lymph      | C772    | Secondary and unspecified malignant neoplasm of intra-abdominal lymph nodes         |
| 1965   | Secondary and unspecified malignant neoplasm of lymph nodes of inguin      | C774    | Secondary and unspecified malignant neoplasm of inguinal and lower limb lymph nodes |
| 1966   | Secondary and unspecified malignant neoplasm of intrapelvic lymph node     | C775    | Secondary and unspecified malignant neoplasm of intrapelvic lymph nodes             |
| 1968   | Secondary and unspecified malignant neoplasm of lymph nodes of multipl     | C778    | Secondary and unspecified malignant neoplasm of lymph nodes of multiple regions     |
| 1970   | Secondary malignant neoplasm of lung                                       | C7800   | Secondary malignant neoplasm of unspecified lung                                    |
| 1971   | Secondary malignant neoplasm of mediastinum                                | C781    | Secondary malignant neoplasm of mediastinum   |
| 1972   | Secondary malignant neoplasm of pleura                                     | C782    | Secondary malignant neoplasm of pleura  |
| 1973   | Secondary malignant neoplasm of other respiratory organs                   | C7839   | Secondary malignant neoplasm of other respiratory organs                            |
| 1974   | Secondary malignant neoplasm of small intestine including duodenum         | C784    | Secondary malignant neoplasm of small intestine                                     |
| 1975   | Secondary malignant neoplasm of large intestine and rectum                 | C785    | Secondary malignant neoplasm of large intestine and rectum                          |
| 1976   | Secondary malignant neoplasm of retroperitoneum and peritoneum             | C786    | Secondary malignant neoplasm of retroperitoneum and peritoneum                      |
| 1977   | Malignant neoplasm of liver, secondary                                     | C787    | Secondary malignant neoplasm of liver and intrahepatic bile duct                    |
| 1978   | Secondary malignant neoplasm of other digestive organs and spleen          | C787    | Secondary malignant neoplasm of liver and intrahepatic bile duct                    |
| 1978   | Secondary malignant neoplasm of other digestive organs and spleen          | C7889   | Secondary malignant neoplasm of other digestive organs                              |
| 1980   | Secondary malignant neoplasm of kidney                                     | C7900   | Secondary malignant neoplasm of unspecified kidney and renal pelvis                 |
| 1981   | Secondary malignant neoplasm of other urinary organs                       | C7911   | Secondary malignant neoplasm of bladder   |
| 1981   | Secondary malignant neoplasm of other urinary organs                       | C7919   | Secondary malignant neoplasm of other urinary organs                                |
| 1983   | Secondary malignant neoplasm of brain and spinal cord                      | C7931   | Secondary malignant neoplasm of brain   |
| 1984   | Secondary malignant neoplasm of other parts of nervous system              | C7932   | Secondary malignant neoplasm of cerebral meninges                                   |
| 1984   | Secondary malignant neoplasm of other parts of nervous system              | C7949   | Secondary malignant neoplasm of other parts of nervous system                       |
| 1985   | Secondary malignant neoplasm of bone and bone marrow                       | C7951   | Secondary malignant neoplasm of bone  |
| 1985   | Secondary malignant neoplasm of bone and bone marrow                       | C7952   | Secondary malignant neoplasm of bone marrow   |
| 1986   | Secondary malignant neoplasm of ovary                                      | C7960   | Secondary malignant neoplasm of unspecified ovary                                   |
| 1987   | Secondary malignant neoplasm of adrenal gland                              | C7970   | Secondary malignant neoplasm of unspecified adrenal gland                           |
| 19889  | Secondary malignant neoplasm of other specified sites                      | C7989   | Secondary malignant neoplasm of other specified sites                               |
| 1990   | Disseminated malignant neoplasm without specification of site              | C800    | Disseminated malignant neoplasm, unspecified  |
| 20400  | Acute lymphoid leukemia, without mention of having achieved remission      | C9100   | Acute lymphoblastic leukemia not having achieved remission                          |
| 20401  | Acute lymphoid leukemia, in remission                                      | C9101   | Acute lymphoblastic leukemia, in remission  |
| 20402  | Acute lymphoid leukemia, in relapse  | C9102   | Acute lymphoblastic leukemia, in relapse  |
| 20500  | Acute myeloid leukemia, without mention of having achieved remission       | C9200   | Acute myeloblastic leukemia, not having achieved remission                          |
| 20500  | Acute myeloid leukemia, without mention of having achieved remission       | C9240   | Acute promyelocytic leukemia, not having achieved remission                         |
| 20500  | Acute myeloid leukemia, without mention of having achieved remission       | C9250   | Acute myelomonocytic leukemia, not having achieved remission                        |
| 20501  | Acute myeloid leukemia, in remission                                       | C9201   | Acute myeloblastic leukemia, in remission   |
| 20501  | Acute myeloid leukemia, in remission                                       | C9241   | Acute promyelocytic leukemia, in remission  |
| 20501  | Acute myeloid leukemia, in remission                                       | C9251   | Acute myelomonocytic leukemia, in remission   |
| 20502  | Acute myeloid leukemia, in relapse   | C9202   | Acute myeloblastic leukemia, in relapse   |
| 20502  | Acute myeloid leukemia, in relapse   | C9242   | Acute promyelocytic leukemia, in relapse  |
| 20502  | Acute myeloid leukemia, in relapse   | C9252   | Acute myelomonocytic leukemia, in relapse   |
| 20600  | Acute monocytic leukemia, without mention of having achieved remission     | C9300   | Acute monoblastic/monocytic leukemia, not having achieved remission                 |
| 20601  | Acute monocytic leukemia, in remission                                     | C9301   | Acute monoblastic/monocytic leukemia, in remission                                  |
| 20602  | Acute monocytic leukemia, in relapse                                       | C9302   | Acute monoblastic/monocytic leukemia, in relapse                                    |
| 20700  | Acute erythremia and erythroleukemia, without mention of having achiev     | C9400   | Acute erythroid leukemia, not having achieved remission                             |
| 20701  | Acute erythremia and erythroleukemia, in remission                         | C9401   | Acute erythroid leukemia, in remission  |
| 20702  | Acute erythremia and erythroleukemia, in relapse                           | C9402   | Acute erythroid leukemia, in relapse  |
| 20800  | Acute leukemia of unspecified cell type, without mention of having achiev  | C9500   | Acute leukemia of unspecified cell type not having achieved remission               |
| 20801  | Acute leukemia of unspecified cell type, in remission                      | C9501   | Acute leukemia of unspecified cell type, in remission                               |
| 20802  | Acute leukemia of unspecified cell type, in relapse                        | C9502   | Acute leukemia of unspecified cell type, in relapse                                 |
| 20970  | Secondary neuroendocrine tumor, unspecified site                           | C7B00   | Secondary carcinoid tumors, unspecified site  |
| 20971  | Secondary neuroendocrine tumor of distant lymph nodes                      | C7B01   | Secondary carcinoid tumors of distant lymph nodes                                   |
| 20972  | Secondary neuroendocrine tumor of liver                                    | C7B02   | Secondary carcinoid tumors of liver   |
| 20973  | Secondary neuroendocrine tumor of bone                                     | C7B03   | Secondary carcinoid tumors of bone  |
| 20974  | Secondary neuroendocrine tumor of peritoneum                               | C7B04   | Secondary carcinoid tumors of peritoneum  |
| 20975  | Secondary Merkel cell carcinoma  | C7B1    | Secondary Merkel cell carcinoma   |
| 20979  | Secondary neuroendocrine tumor of other sites                              | C7B09   | Secondary carcinoid tumors of other sites   |
| 20979  | Secondary neuroendocrine tumor of other sites                              | C7B8    | Other secondary neuroendocrine tumors   |
| 3481   | Anoxic brain damage  | G931    | Anoxic brain damage, not elsewhere classified                                       |
| 3484   | Compression of brain   | G935    | Compression of brain  |
| 3485   | Cerebral edema   | G936    | Cerebral edema  |
| 4560   | Esophageal varices with bleeding   | I8501   | Esophageal varices with bleeding  |
| 4561   | Esophageal varices without mention of bleeding                             | I8500   | Esophageal varices without bleeding   |
| 45620  | Esophageal varices in diseases classified elsewhere, with bleeding         | I8511   | Secondary esophageal varices with bleeding  |
| 45621  | Esophageal varices in diseases classified elsewhere, without mention of bl | I8510   | Secondary esophageal varices without bleeding                                       |
| 5722   | Hepatic encephalopathy   | K7290   | Hepatic failure, unspecified without coma   |
| 5722   | Hepatic encephalopathy   | K7291   | Hepatic failure, unspecified with coma  |
| 5723   | Portal hypertension  | K766    | Portal hypertension   |
| 5724   | Hepatorenal syndrome   | K767    | Hepatorenal syndrome  |
| 5728   | Other sequelae of chronic liver disease                                    | K7210   | Chronic hepatic failure without coma  |
| 5728   | Other sequelae of chronic liver disease                                    | K7290   | Hepatic failure, unspecified without coma   |
| 5735   | Hepatopulmonary syndrome   | K7681   | Hepatopulmonary syndrome  |
| 78001  | Coma   | R4020   | Unspecified coma  |
| 78003  | Persistent vegetative state  | R403    | Persistent vegetative state   |

ICD-9 to 10 Mapping: Adjustments

| vasc_access_category | ICD9DX | ICD9:ICD9DX_desc  | ICD10CM | ICD10:ICD10CM_desc  |
|----------------------|--------|---|---------|---|
| Infections: Other    | 0010   | Cholera due to vibrio cholerae                                      | A000    | A000 Cholera due to Vibrio cholerae 01, biovar cholerae                   |
| Infections: Other    | 0011   | Cholera due to vibrio cholerae el tor                               | A001    | A001 Cholera due to Vibrio cholerae 01, biovar eltor                      |
| Infections: Other    | 0019   | Cholera, unspecified  | A009    | A009 Cholera, unspecified   |
| Infections: Other    | 0020   | Typhoid fever   | A0100   | A0100 Typhoid fever, unspecified  |
| Infections: Other    | 0021   | Paratyphoid fever A   | A011    | A011 Paratyphoid fever A  |
| Infections: Other    | 0022   | Paratyphoid fever B   | A012    | A012 Paratyphoid fever B  |
| Infections: Other    | 0023   | Paratyphoid fever C   | A013    | A013 Paratyphoid fever C  |
| Infections: Other    | 0029   | Paratyphoid fever, unspecified                                      | A014    | A014 Paratyphoid fever, unspecified                                       |
| Infections: Other    | 0030   | Salmonella gastroenteritis  | A020    | A020 Salmonella enteritis   |
| Infections: Other    | 0031   | Salmonella septicemia   | A021    | A021 Salmonella sepsis  |
| Infections: Other    | 00320  | Localized salmonella infection, unspecified                         | A0220   | A0220 Localized salmonella infection, unspecified                         |
| Infections: Other    | 00321  | Salmonella meningitis   | A0221   | A0221 Salmonella meningitis   |
| Pneumonia            | 00322  | Salmonella pneumonia  | A0222   | A0222 Salmonella pneumonia  |
| Infections: Other    | 00323  | Salmonella arthritis  | A0223   | A0223 Salmonella arthritis  |
| Infections: Other    | 00324  | Salmonella osteomyelitis  | A0224   | A0224 Salmonella osteomyelitis  |
| Infections: Other    | 00329  | Other localized salmonella infections                               | A0229   | A0229 Salmonella with other localized infection                           |
| Infections: Other    | 0038   | Other specified salmonella infections                               | A028    | A028 Other specified salmonella infections                                |
| Infections: Other    | 0039   | Salmonella infection, unspecified                                   | A029    | A029 Salmonella infection, unspecified                                    |
| Infections: Other    | 0040   | Shigella dysenteriae  | A030    | A030 Shigellosis due to Shigella dysenteriae                              |
| Infections: Other    | 0041   | Shigella flexneri   | A031    | A031 Shigellosis due to Shigella flexneri                                 |
| Infections: Other    | 0042   | Shigella boydii   | A032    | A032 Shigellosis due to Shigella boydii                                   |
| Infections: Other    | 0043   | Shigella sonnei   | A033    | A033 Shigellosis due to Shigella sonnei                                   |
| Infections: Other    | 0048   | Other specified shigella infections                                 | A038    | A038 Other shigellosis  |
| Infections: Other    | 0049   | Shigellosis, unspecified  | A039    | A039 Shigellosis, unspecified   |
| Infections: Other    | 0050   | Staphylococcal food poisoning                                       | A050    | A050 Foodborne staphylococcal intoxication                                |
| Infections: Other    | 0051   | Botulism food poisoning   | A051    | A051 Botulism food poisoning  |
| Infections: Other    | 0052   | Food poisoning due to Clostridium perfringens                       | A052    | A052 Foodborne Clostridium perfringens [Clostridium welchii] intoxication |
| Infections: Other    | 0053   | Food poisoning due to other Clostridia                              | A058    | A058 Other specified bacterial foodborne intoxications                    |
| Infections: Other    | 0054   | Food poisoning due to Vibrio parahaemolyticus                       | A053    | A053 Foodborne Vibrio parahaemolyticus intoxication                       |
| Infections: Other    | 00581  | Food poisoning due to Vibrio vulnificus                             | A055    | A055 Foodborne Vibrio vulnificus intoxication                             |
| Infections: Other    | 00589  | Other bacterial food poisoning                                      | A054    | A054 Foodborne Bacillus cereus intoxication                               |
| Infections: Other    | 00589  | Other bacterial food poisoning                                      | A058    | A058 Other specified bacterial foodborne intoxications                    |
| Infections: Other    | 0059   | Food poisoning, unspecified   | A059    | A059 Bacterial foodborne intoxication, unspecified                        |
| Infections: Other    | 0060   | Acute amebic dysentery without mention of                           | A060    | A060 Acute amebic dysentery   |
| Infections: Other    | 0061   | Chronic intestinal amebiasis without mention of                     | A061    | A061 Chronic intestinal amebiasis   |
| Infections: Other    | 0062   | Amebic nondysenteric colitis  | A062    | A062 Amebic nondysenteric colitis   |
| Infections: Other    | 0063   | Amebic liver abscess  | A064    | A064 Amebic liver abscess   |
| Infections: Other    | 0064   | Amebic lung abscess   | A065    | A065 Amebic lung abscess  |
| Infections: Other    | 0065   | Amebic brain abscess  | A066    | A066 Amebic brain abscess   |
| Infections: Other    | 0066   | Amebic skin ulceration  | A067    | A067 Cutaneous amebiasis  |
| Infections: Other    | 0068   | Amebic infection of other sites                                     | A0689   | A0689 Other amebic infections   |
| Infections: Other    | 0069   | Amebiasis, unspecified  | A069    | A069 Amebiasis, unspecified   |
| Infections: Other    | 0070   | Balantidiasis   | A070    | A070 Balantidiasis  |
| Infections: Other    | 0071   | Giardiasis  | A071    | A071 Giardiasis [lambliasis]  |
| Infections: Other    | 0072   | Coccidiosis   | A073    | A073 Isosporiasis   |
| Infections: Other    | 0073   | Intestinal trichomoniasis   | A078    | A078 Other specified protozoal intestinal diseases                        |
| Infections: Other    | 0074   | Cryptosporidiosis   | A072    | A072 Cryptosporidiosis  |
| Infections: Other    | 0075   | Cyclosporiasis  | A074    | A074 Cyclosporiasis   |
| Infections: Other    | 0078   | Other specified protozoal intestinal diseases                       | A078    | A078 Other specified protozoal intestinal diseases                        |
| Infections: Other    | 0079   | Unspecified protozoal intestinal disease                            | A079    | A079 Protozoal intestinal disease, unspecified                            |
| Infections: Other    | 00800  | Intestinal infection due to E. coli, unspecified                    | A044    | A044 Other intestinal Escherichia coli infections                         |
| Infections: Other    | 00801  | Intestinal infection due to enteropathogenic                        | A040    | A040 Enteropathogenic Escherichia coli infection                          |
| Infections: Other    | 00802  | Intestinal infection due to enterotoxigenic E. coli                 | A041    | A041 Enterotoxigenic Escherichia coli infection                           |
| Infections: Other    | 00803  | Intestinal infection due to enteroinvasive E. coli                  | A042    | A042 Enteroinvasive Escherichia coli infection                            |
| Infections: Other    | 00804  | Intestinal infection due to enterohemorrhagic                       | A043    | A043 Enterohemorrhagic Escherichia coli infection                         |
| Infections: Other    | 00809  | Intestinal infection due to other intestinal E. coli                | A044    | A044 Other intestinal Escherichia coli infections                         |
| Infections: Other    | 0081   | Intestinal infection due to arizona group of proteus                | A048    | A048 Other specified bacterial intestinal infections                      |
| Infections: Other    | 0082   | Intestinal infection due to aerobacter aerogenes                    | A048    | A048 Other specified bacterial intestinal infections                      |
| Infections: Other    | 0083   | Intestinal infection due to proteus (mirabilis)                     | A048    | A048 Other specified bacterial intestinal infections                      |
| Infections: Other    | 00841  | Intestinal infection due to staphylococcus aureus                   | A048    | A048 Other specified bacterial intestinal infections                      |
| Infections: Other    | 00842  | Intestinal infection due to pseudomonas aeruginosa                  | A048    | A048 Other specified bacterial intestinal infections                      |
| Infections: Other    | 00843  | Intestinal infection due to campylobacter jejuni                    | A045    | A045 Campylobacter enteritis  |
| Infections: Other    | 00844  | Intestinal infection due to yersinia enterocolitica                 | A046    | A046 Enteritis due to Yersinia enterocolitica                             |
| Infections: Other    | 00845  | Intestinal infection due to Clostridium difficile                   | A047    | A047 Enterocolitis due to Clostridium difficile                           |
| Infections: Other    | 00846  | Intestinal infection due to other anaerobes                         | A048    | A048 Other specified bacterial intestinal infections                      |
| Infections: Other    | 00847  | Intestinal infection due to other gram-negative bacilli             | A048    | A048 Other specified bacterial intestinal infections                      |
| Infections: Other    | 00849  | Intestinal infection due to other organisms                         | A048    | A048 Other specified bacterial intestinal infections                      |
| Infections: Other    | 0085   | Bacterial enteritis, unspecified                                    | A049    | A049 Bacterial intestinal infection, unspecified                          |
| Infections: Other    | 00861  | Enteritis due to rotavirus  | A080    | A080 Rotaviral enteritis  |
| Infections: Other    | 00862  | Enteritis due to adenovirus   | A082    | A082 Adenoviral enteritis   |
| Infections: Other    | 00863  | Enteritis due to norwalk virus                                      | A0811   | A0811 Acute gastroenteropathy due to Norwalk agent                        |
| Infections: Other    | 00864  | Enteritis due to other small round viruses [SRSV]                   | A0819   | A0819 Acute gastroenteropathy due to other small round viruses            |
| Infections: Other    | 00865  | Enteritis due to calicivirus  | A0831   | A0831 Calicivirus enteritis   |
| Infections: Other    | 00866  | Enteritis due to astrovirus   | A0832   | A0832 Astrovirus enteritis  |
| Infections: Other    | 00867  | Enteritis due to enterovirus necrotic                               | A0839   | A0839 Other viral enteritis   |
| Infections: Other    | 00869  | Enteritis due to other viral enteritis                              | A0839   | A0839 Other viral enteritis   |
| Infections: Other    | 0088   | Intestinal infection due to other organism, non-bacterial           | A088    | A088 Other specified intestinal infections                                |
| Infections: Other    | 0090   | Infectious colitis, enteritis, and gastroenteritis                  | A09     | A09 Infectious gastroenteritis and colitis, unspecified                   |
| Infections: Other    | 0091   | Colitis, enteritis, and gastroenteritis of presumed                 | A09     | A09 Infectious gastroenteritis and colitis, unspecified                   |
| Infections: Other    | 0092   | Infectious diarrhea   | A09     | A09 Infectious gastroenteritis and colitis, unspecified                   |
| Infections: Other    | 0093   | Diarrhea of presumed infectious origin                              | A09     | A09 Infectious gastroenteritis and colitis, unspecified                   |
| Tuberculosis         | 01000  | Primary tuberculous infection, unspecified                          | A157    | A157 Primary respiratory tuberculosis                                     |
| Tuberculosis         | 01001  | Primary tuberculous infection, bacteriologically confirmed          | A157    | A157 Primary respiratory tuberculosis                                     |
| Tuberculosis         | 01002  | Primary tuberculous infection, bacteriologically confirmed          | A157    | A157 Primary respiratory tuberculosis                                     |
| Tuberculosis         | 01003  | Primary tuberculous infection, tubercle bacilli                     | A157    | A157 Primary respiratory tuberculosis                                     |
| Tuberculosis         | 01004  | Primary tuberculous infection, tubercle bacilli                     | A157    | A157 Primary respiratory tuberculosis                                     |
| Tuberculosis         | 01005  | Primary tuberculous infection, tubercle bacilli                     | A157    | A157 Primary respiratory tuberculosis                                     |
| Tuberculosis         | 01006  | Primary tuberculous infection, tubercle bacilli                     | A157    | A157 Primary respiratory tuberculosis                                     |
| Tuberculosis         | 01010  | Tuberculous pleurisy in primary progressive                         | A156    | A156 Tuberculous pleurisy   |
| Tuberculosis         | 01011  | Tuberculous pleurisy in primary progressive                         | A156    | A156 Tuberculous pleurisy   |
| Tuberculosis         | 01012  | Tuberculous pleurisy in primary progressive                         | A156    | A156 Tuberculous pleurisy   |
| Tuberculosis         | 01013  | Tuberculous pleurisy in primary progressive                         | A156    | A156 Tuberculous pleurisy   |
| Tuberculosis         | 01014  | Tuberculous pleurisy in primary progressive                         | A156    | A156 Tuberculous pleurisy   |
| Tuberculosis         | 01015  | Tuberculous pleurisy in primary progressive                         | A156    | A156 Tuberculous pleurisy   |
| Tuberculosis         | 01016  | Tuberculous pleurisy in primary progressive                         | A156    | A156 Tuberculous pleurisy   |
| Tuberculosis         | 01080  | Other primary progressive tuberculosis, unspecified                 | A157    | A157 Primary respiratory tuberculosis                                     |
| Tuberculosis         | 01081  | Other primary progressive tuberculosis, bacteriologically confirmed | A157    | A157 Primary respiratory tuberculosis                                     |
| Tuberculosis         | 01082  | Other primary progressive tuberculosis, bacteriologically confirmed | A157    | A157 Primary respiratory tuberculosis                                     |
| Tuberculosis         | 01083  | Other primary progressive tuberculosis, tubercle bacilli            | A157    | A157 Primary respiratory tuberculosis                                     |
| Tuberculosis         | 01084  | Other primary progressive tuberculosis, tubercle bacilli            | A157    | A157 Primary respiratory tuberculosis                                     |
| Tuberculosis         | 01085  | Other primary progressive tuberculosis, tubercle bacilli            | A157    | A157 Primary respiratory tuberculosis                                     |
| Tuberculosis         | 01086  | Other primary progressive tuberculosis, tubercle bacilli            | A157    | A157 Primary respiratory tuberculosis                                     |
| Tuberculosis         | 01090  | Primary tuberculous infection, unspecified, latent                  | A157    | A157 Primary respiratory tuberculosis                                     |
| Tuberculosis         | 01091  | Primary tuberculous infection, unspecified, latent                  | A157    | A157 Primary respiratory tuberculosis                                     |
| Tuberculosis         | 01092  | Primary tuberculous infection, unspecified, latent                  | A157    | A157 Primary respiratory tuberculosis                                     |
| Tuberculosis         | 01093  | Primary tuberculous infection, unspecified, latent                  | A157    | A157 Primary respiratory tuberculosis                                     |
| Tuberculosis         | 01094  | Primary tuberculous infection, unspecified, latent                  | A157    | A157 Primary respiratory tuberculosis                                     |
| Tuberculosis         | 01095  | Primary tuberculous infection, unspecified, latent                  | A157    | A157 Primary respiratory tuberculosis                                     |
| Tuberculosis         | 01096  | Primary tuberculous infection, unspecified, latent                  | A157    | A157 Primary respiratory tuberculosis                                     |
| Tuberculosis         | 01100  | Tuberculosis of lung, infiltrative, unspecified                     | A150    | A150 Tuberculosis of lung   |
| Tuberculosis         | 01101  | Tuberculosis of lung, infiltrative, bacteriologically confirmed     | A150    | A150 Tuberculosis of lung   |
| Tuberculosis         | 01102  | Tuberculosis of lung, infiltrative, bacteriologically confirmed     | A150    | A150 Tuberculosis of lung   |
| Tuberculosis         | 01103  | Tuberculosis of lung, infiltrative, tubercle bacilli                | A150    | A150 Tuberculosis of lung   |
| Tuberculosis         | 01104  | Tuberculosis of lung, infiltrative, tubercle bacilli                | A150    | A150 Tuberculosis of lung   |
| Tuberculosis         | 01105  | Tuberculosis of lung, infiltrative, tubercle bacilli                | A150    | A150 Tuberculosis of lung   |
| Tuberculosis         | 01106  | Tuberculosis of lung, infiltrative, tubercle bacilli                | A150    | A150 Tuberculosis of lung   |
| Tuberculosis         | 01110  | Tuberculosis of lung, nodular, unspecified                          | A150    | A150 Tuberculosis of lung   |
| Tuberculosis         | 01111  | Tuberculosis of lung, nodular, bacteriologically confirmed          | A150    | A150 Tuberculosis of lung   |











|                      |       |   |        |   |
|----------------------|-------|---|--------|---|
| Infections: Other    | 0261  | Streptobacillary fever                          | A251   | A251 Streptobacillosis  |
| Infections: Other    | 0269  | Unspecified rat-bite fever                      | A259   | A259 Rat-bite fever, unspecified  |
| Infections: Other    | 0270  | Listeriosis                                     | A3211  | A3211 Listerial meningitis  |
| Infections: Other    | 0270  | Listeriosis                                     | A3212  | A3212 Listerial meningoencephalitis   |
| Infections: Other    | 0270  | Listeriosis                                     | A327   | A327 Listerial sepsis   |
| Infections: Other    | 0270  | Listeriosis                                     | A3281  | A3281 Oculoglandular listeriosis  |
| Infections: Other    | 0270  | Listeriosis                                     | A3289  | A3289 Other forms of listeriosis  |
| Infections: Other    | 0270  | Listeriosis                                     | A329   | A329 Listeriosis, unspecified   |
| Infections: Other    | 0271  | Erysipelothrix infection                        | A267   | A267 Erysipelothrix sepsis  |
| Infections: Other    | 0271  | Erysipelothrix infection                        | A268   | A268 Other forms of erysipeloid   |
| Infections: Other    | 0271  | Erysipelothrix infection                        | A269   | A269 Erysipeloid, unspecified   |
| Infections: Other    | 0272  | Pasteurellosis                                  | A280   | A280 Pasteurellosis   |
| Infections: Other    | 0278  | Other specified zoonotic bacterial diseases     | A288   | A288 Other specified zoonotic bacterial diseases, not elsewhere classified                                  |
| Infections: Other    | 0279  | Unspecified zoonotic bacterial disease          | A289   | A289 Zoonotic bacterial disease, unspecified  |
| Infections: Other    | 0300  | Lepromatous leprosy [type L]                    | A305   | A305 Lepromatous leprosy  |
| Infections: Other    | 0301  | Tuberculoid leprosy [type T]                    | A301   | A301 Tuberculoid leprosy  |
| Infections: Other    | 0302  | Indeterminate leprosy [group I]                 | A300   | A300 Indeterminate leprosy  |
| Infections: Other    | 0303  | Borderline leprosy [group B]                    | A303   | A303 Borderline leprosy   |
| Infections: Other    | 0308  | Other specified leprosy                         | A308   | A308 Other forms of leprosy   |
| Infections: Other    | 0309  | Leprosy, unspecified                            | A309   | A309 Leprosy, unspecified   |
| Infections: Other    | 0310  | Pulmonary diseases due to other mycobacte       | A310   | A310 Pulmonary mycobacterial infection  |
| Infections: Other    | 0311  | Cutaneous diseases due to other mycobacte       | A311   | A311 Cutaneous mycobacterial infection  |
| Infections: Other    | 0312  | Disseminated due to other mycobacteria          | A312   | A312 Disseminated mycobacterium avium-intracellulare complex (DMAC)   |
| Infections: Other    | 0318  | Other specified mycobacterial diseases          | A318   | A318 Other mycobacterial infections   |
| Infections: Other    | 0319  | Unspecified diseases due to mycobacteria        | A319   | A319 Mycobacterial infection, unspecified   |
| Infections: Other    | 0320  | Faucial diphtheria                              | A360   | A360 Pharyngeal diphtheria  |
| Infections: Other    | 0321  | Nasopharyngeal diphtheria                       | A361   | A361 Nasopharyngeal diphtheria  |
| Infections: Other    | 0322  | Anterior nasal diphtheria                       | A3689  | A3689 Other diphtheritic complications  |
| Infections: Other    | 0323  | Laryngeal diphtheria                            | A362   | A362 Laryngeal diphtheria   |
| Infections: Other    | 03281 | Conjunctival diphtheria                         | A3686  | A3686 Diphtheritic conjunctivitis   |
| Infections: Other    | 03282 | Diphtheritic myocarditis                        | A3681  | A3681 Diphtheritic cardiomyopathy   |
| Infections: Other    | 03283 | Diphtheritic peritonitis                        | A3689  | A3689 Other diphtheritic complications  |
| Infections: Other    | 03284 | Diphtheritic cystitis                           | A3685  | A3685 Diphtheritic cystitis   |
| Infections: Other    | 03285 | Cutaneous diphtheria                            | A363   | A363 Cutaneous diphtheria   |
| Infections: Other    | 03289 | Other specified diphtheria                      | A3682  | A3682 Diphtheritic radiculomyelitis   |
| Infections: Other    | 03289 | Other specified diphtheria                      | A3683  | A3683 Diphtheritic polyneuritis   |
| Infections: Other    | 03289 | Other specified diphtheria                      | A3684  | A3684 Diphtheritic tubulo-interstitial nephropathy  |
| Infections: Other    | 03289 | Other specified diphtheria                      | A3689  | A3689 Other diphtheritic complications  |
| Infections: Other    | 0329  | Diphtheria, unspecified                         | A369   | A369 Diphtheria, unspecified  |
| Infections: Other    | 0330  | Whooping cough due to bordetella pertussis      | A3700  | A3700 Whooping cough due to Bordetella pertussis without pneumonia  |
| Infections: Other    | 0331  | Whooping cough due to bordetella parapert       | A3710  | A3710 Whooping cough due to Bordetella parapertussis without pneumonia                                      |
| Infections: Other    | 0338  | Whooping cough due to other specified orga      | A3780  | A3780 Whooping cough due to other Bordetella species without pneumonia                                      |
| Infections: Other    | 0339  | Whooping cough, unspecified organism            | A3790  | A3790 Whooping cough, unspecified species without pneumonia   |
| Infections: Other    | 0340  | Streptococcal sore throat                       | J020   | J020 Streptococcal pharyngitis  |
| Infections: Other    | 0340  | Streptococcal sore throat                       | J0300  | J0300 Acute streptococcal tonsillitis, unspecified  |
| Infections: Other    | 0341  | Scarlet fever                                   | A389   | A389 Scarlet fever, uncomplicated   |
| Infections: Other    | 035   | Erysipelas                                      | A46    | A46 Erysipelas  |
| Infections: Other    | 0360  | Meningococcal meningitis                        | A390   | A390 Meningococcal meningitis   |
| Infections: Other    | 0361  | Meningococcal encephalitis                      | A3981  | A3981 Meningococcal encephalitis  |
| Infections: Other    | 0362  | Meningococcemia                                 | A394   | A394 Meningococcemia, unspecified   |
| Infections: Other    | 0363  | Waterhouse-Friderichsen syndrome, mening        | A391   | A391 Waterhouse-Friderichsen syndrome   |
| Infections: Other    | 03640 | Meningococcal carditis, unspecified             | A3950  | A3950 Meningococcal carditis, unspecified   |
| Infections: Other    | 03641 | Meningococcal pericarditis                      | A3953  | A3953 Meningococcal pericarditis  |
| Infections: Other    | 03642 | Meningococcal endocarditis                      | A3951  | A3951 Meningococcal endocarditis  |
| Infections: Other    | 03643 | Meningococcal myocarditis                       | A3952  | A3952 Meningococcal myocarditis   |
| Infections: Other    | 03681 | Meningococcal optic neuritis                    | A3982  | A3982 Meningococcal retrobulbar neuritis  |
| Infections: Other    | 03682 | Meningococcal arthropathy                       | A3983  | A3983 Meningococcal arthritis   |
| Infections: Other    | 03689 | Other specified meningococcal infections        | A3989  | A3989 Other meningococcal infections  |
| Infections: Other    | 0369  | Meningococcal infection, unspecified            | A399   | A399 Meningococcal infection, unspecified   |
| Infections: Other    | 037   | Tetanus   | A35    | A35 Other tetanus   |
| Infections: Other    | 0390  | Cutaneous actinomycotic infection               | L081   | L081 Erythrasma   |
| Infections: Other    | 0391  | Pulmonary actinomycotic infection               | A420   | A420 Pulmonary actinomycosis  |
| Infections: Other    | 0392  | Abdominal actinomycotic infection               | A421   | A421 Abdominal actinomycosis  |
| Infections: Other    | 0393  | Cervicofacial actinomycotic infection           | A422   | A422 Cervicofacial actinomycosis  |
| Infections: Other    | 0394  | Madura foot                                     | B479   | B479 Mycetoma, unspecified  |
| Infections: Other    | 0398  | Actinomycotic infection of other specified sit  | A4281  | A4281 Actinomycotic meningitis  |
| Infections: Other    | 0398  | Actinomycotic infection of other specified sit  | A4282  | A4282 Actinomycotic encephalitis  |
| Infections: Other    | 0398  | Actinomycotic infection of other specified sit  | A4289  | A4289 Other forms of actinomycosis  |
| Infections: Other    | 0398  | Actinomycotic infection of other specified sit  | A438   | A438 Other forms of nocardiosis   |
| Infections: Other    | 0399  | Actinomycotic infection of unspecified site     | A429   | A429 Actinomycosis, unspecified   |
| Infections: Other    | 0399  | Actinomycotic infection of unspecified site     | A439   | A439 Nocardiosis, unspecified   |
| Infections: Other    | 0399  | Actinomycotic infection of unspecified site     | B471   | B471 Actinomycetoma   |
| Infections: Other    | 0400  | Gas gangrene                                    | A480   | A480 Gas gangrene   |
| Infections: Other    | 0401  | Rhinoscleroma                                   | A488   | A488 Other specified bacterial diseases   |
| Infections: Other    | 0402  | Whipple's disease                               | K9081  | K9081 Whipple's disease   |
| Infections: Other    | 0403  | Necrobacillosis                                 | A488   | A488 Other specified bacterial diseases   |
| Infections: Other    | 04081 | Tropical pyomyositis                            | M60009 | M60009 Infective myositis, unspecified site   |
| Infections: Other    | 04082 | Toxic shock syndrome                            | A483   | A483 Toxic shock syndrome   |
| Infections: Other    | 04089 | Other specified bacterial diseases              | A488   | A488 Other specified bacterial diseases   |
| Infections: Other    | 04100 | Streptococcus infection in conditions classifi  | B955   | B955 Unspecified streptococcus as the cause of diseases classified elsewhere                                |
| Infections: Other    | 04101 | Streptococcus infection in conditions classifi  | B950   | B950 Streptococcus, group A, as the cause of diseases classified elsewhere                                  |
| Infections: Other    | 04102 | Streptococcus infection in conditions classifi  | B951   | B951 Streptococcus, group B, as the cause of diseases classified elsewhere                                  |
| Infections: Other    | 04103 | Streptococcus infection in conditions classifi  | B954   | B954 Other streptococcus as the cause of diseases classified elsewhere                                      |
| Infections: Other    | 04104 | Streptococcus infection in conditions classifi  | B952   | B952 Enterococcus as the cause of diseases classified elsewhere   |
| Infections: Other    | 04105 | Streptococcus infection in conditions classifi  | B954   | B954 Other streptococcus as the cause of diseases classified elsewhere                                      |
| Infections: Other    | 04109 | Streptococcus infection in conditions classifi  | B954   | B954 Other streptococcus as the cause of diseases classified elsewhere                                      |
| Infections: Other    | 04110 | Staphylococcus infection in conditions classif  | B958   | B958 Unspecified staphylococcus as the cause of diseases classified elsewhere                               |
| Infections: Other    | 04111 | Methicillin susceptible Staphylococcus aureus   | B9561  | B9561 Methicillin susceptible Staphylococcus aureus infection as the cause of diseases classified elsewhere |
| Infections: Other    | 04119 | Staphylococcus infection in conditions classif  | B957   | B957 Other staphylococcus as the cause of diseases classified elsewhere                                     |
| Infections: Other    | 0412  | Pneumococcus infection in conditions classif    | B953   | B953 Streptococcus pneumoniae as the cause of diseases classified elsewhere                                 |
| Infections: Other    | 0413  | Friedländer's bacillus infection in conditions  | B961   | B961 Klebsiella pneumoniae [K. pneumoniae] as the cause of diseases classified elsewhere                    |
| Infections: Other    | 0415  | Hemophilus influenzae [H. influenzae] infect    | B963   | B963 Hemophilus influenzae [H. influenzae] as the cause of diseases classified elsewhere                    |
| Infections: Other    | 0416  | Proteus (mirabilis) (morganii) infection in coi | B964   | B964 Proteus (mirabilis) (morganii) as the cause of diseases classified elsewhere                           |
| Infections: Other    | 0417  | Pseudomonas infection in conditions classifi    | B965   | B965 Pseudomonas (aeruginosa) (mallei) (pseudomallei) as the cause of diseases classified elsewhere         |
| Infections: Other    | 04181 | Other specified bacterial infections in conditi | A493   | A493 Mycoplasma infection, unspecified site   |
| Infections: Other    | 04181 | Other specified bacterial infections in conditi | B960   | B960 Mycoplasma pneumoniae [M. pneumoniae] as the cause of diseases classified elsewhere                    |
| Infections: Other    | 04182 | Bacteroides fragilis                            | B966   | B966 Bacteroides fragilis [B. fragilis] as the cause of diseases classified elsewhere                       |
| Infections: Other    | 04183 | Other specified bacterial infections in conditi | B967   | B967 Clostridium perfringens [C. perfringens] as the cause of diseases classified elsewhere                 |
| Infections: Other    | 04184 | Other specified bacterial infections in conditi | B9689  | B9689 Other specified bacterial agents as the cause of diseases classified elsewhere                        |
| Infections: Other    | 04185 | Other specified bacterial infections in conditi | B9689  | B9689 Other specified bacterial agents as the cause of diseases classified elsewhere                        |
| Infections: Other    | 04186 | Helicobacter pylori [H. pylori]                 | B9681  | B9681 Helicobacter pylori [H. pylori] as the cause of diseases classified elsewhere                         |
| Infections: Other    | 04189 | Other specified bacterial infections in conditi | B9689  | B9689 Other specified bacterial agents as the cause of diseases classified elsewhere                        |
| Infections: Other    | 0419  | Bacterial infection, unspecified, in conditions | B9689  | B9689 Other specified bacterial agents as the cause of diseases classified elsewhere                        |
| Infections: HIV/AIDS | 042   | Human immunodeficiency virus [HIV] disease      | B20    | B20 Human immunodeficiency virus [HIV] disease  |
| Infections: Other    | 04500 | Acute paralytic poliomyelitis specified as bull | A8039  | A8039 Other acute paralytic poliomyelitis   |
| Infections: Other    | 04501 | Acute paralytic poliomyelitis specified as bull | A8039  | A8039 Other acute paralytic poliomyelitis   |
| Infections: Other    | 04502 | Acute paralytic poliomyelitis specified as bull | A8039  | A8039 Other acute paralytic poliomyelitis   |
| Infections: Other    | 04503 | Acute paralytic poliomyelitis specified as bull | A8039  | A8039 Other acute paralytic poliomyelitis   |
| Infections: Other    | 04510 | Acute poliomyelitis with other paralysis, poli  | A8039  | A8039 Other acute paralytic poliomyelitis   |
| Infections: Other    | 04511 | Acute poliomyelitis with other paralysis, poli  | A8039  | A8039 Other acute paralytic poliomyelitis   |
| Infections: Other    | 04512 | Acute poliomyelitis with other paralysis, poli  | A8039  | A8039 Other acute paralytic poliomyelitis   |
| Infections: Other    | 04513 | Acute poliomyelitis with other paralysis, poli  | A8039  | A8039 Other acute paralytic poliomyelitis   |
| Infections: Other    | 04520 | Acute nonparalytic poliomyelitis, poliovirus,   | A804   | A804 Acute nonparalytic poliomyelitis   |
| Infections: Other    | 04521 | Acute nonparalytic poliomyelitis, poliovirus t  | A804   | A804 Acute nonparalytic poliomyelitis   |
| Infections: Other    | 04522 | Acute nonparalytic poliomyelitis, poliovirus t  | A804   | A804 Acute nonparalytic poliomyelitis   |
| Infections: Other    | 04523 | Acute nonparalytic poliomyelitis, poliovirus t  | A804   | A804 Acute nonparalytic poliomyelitis   |
| Infections: Other    | 04590 | Acute poliomyelitis, unspecified, poliovirus,   | A809   | A809 Acute poliomyelitis, unspecified   |
| Infections: Other    | 04591 | Acute poliomyelitis, unspecified, poliovirus t  | A809   | A809 Acute poliomyelitis, unspecified   |
| Infections: Other    | 04592 | Acute poliomyelitis, unspecified, poliovirus t  | A809   | A809 Acute poliomyelitis, unspecified   |
| Infections: Other    | 04593 | Acute poliomyelitis, unspecified, poliovirus t  | A809   | A809 Acute poliomyelitis, unspecified   |
| Infections: Other    | 0460  | Kuru  | A8181  | A8181 Kuru  |

|                   |       |  |        |        |  |
|-------------------|-------|--|--------|--------|--|
| Infections: Other | 04611 | Variant Creutzfeldt-Jakob disease              | A8101  | A8101  | Variant Creutzfeldt-Jakob disease  |
| Infections: Other | 04619 | Other and unspecified Creutzfeldt-Jakob dise   | A8100  | A8100  | Creutzfeldt-Jakob disease, unspecified   |
| Infections: Other | 04619 | Other and unspecified Creutzfeldt-Jakob dise   | A8109  | A8109  | Other Creutzfeldt-Jakob disease  |
| Infections: Other | 0462  | Subacute sclerosing panencephalitis            | A811   | A811   | Subacute sclerosing panencephalitis  |
| Infections: Other | 0463  | Progressive multifocal leukoencephalopathy     | A812   | A812   | Progressive multifocal leukoencephalopathy   |
| Infections: Other | 0468  | Other specified slow virus infection of centra | A8189  | A8189  | Other atypical virus infections of central nervous system                          |
| Infections: Other | 0469  | Unspecified slow virus infection of central ne | A819   | A819   | Atypical virus infection of central nervous system, unspecified                    |
| Infections: Other | 0470  | Meningitis due to coxsackie virus              | A870   | A870   | Enteroviral meningitis   |
| Infections: Other | 0471  | Meningitis due to echo virus                   | A870   | A870   | Enteroviral meningitis   |
| Infections: Other | 0478  | Other specified viral meningitis               | A878   | A878   | Other viral meningitis   |
| Infections: Other | 0479  | Unspecified viral meningitis                   | A879   | A879   | Viral meningitis, unspecified  |
| Infections: Other | 048   | Other enterovirus diseases of central nervou   | A880   | A880   | Enteroviral exanthematous fever [Boston exanthem]                                  |
| Infections: Other | 0490  | Lymphocytic choriomeningitis                   | A872   | A872   | Lymphocytic choriomeningitis   |
| Infections: Other | 0491  | Meningitis due to adenovirus                   | A871   | A871   | Adenoviral meningitis  |
| Infections: Other | 0498  | Other specified non-arthropod-borne viral d    | A850   | A850   | Enteroviral encephalitis   |
| Infections: Other | 0498  | Other specified non-arthropod-borne viral d    | A851   | A851   | Adenoviral encephalitis  |
| Infections: Other | 0498  | Other specified non-arthropod-borne viral d    | A858   | A858   | Other specified viral encephalitis   |
| Infections: Other | 0498  | Other specified non-arthropod-borne viral d    | A888   | A888   | Other specified viral infections of central nervous system                         |
| Infections: Other | 0499  | Unspecified non-arthropod-borne viral disea    | A86    | A86    | Unspecified viral encephalitis   |
| Infections: Other | 0499  | Unspecified non-arthropod-borne viral disea    | A89    | A89    | Unspecified viral infection of central nervous system                              |
| Infections: Other | 0500  | Variola major                                  | B03    | B03    | Smallpox   |
| Infections: Other | 0501  | Alastrim                                       | B03    | B03    | Smallpox   |
| Infections: Other | 0502  | Modified smallpox                              | B03    | B03    | Smallpox   |
| Infections: Other | 0509  | Smallpox, unspecified                          | B03    | B03    | Smallpox   |
| Infections: Other | 05101 | Cowpox   | B08010 | B08010 | Cowpox   |
| Infections: Other | 05102 | Vaccinia not from vaccination                  | B08011 | B08011 | Vaccinia not from vaccine  |
| Infections: Other | 0511  | Pseudocowpox                                   | B0803  | B0803  | Pseudocowpox [milker's node]   |
| Infections: Other | 0512  | Contagious pustular dermatitis                 | B0802  | B0802  | Orf virus disease  |
| Infections: Other | 0519  | Paravaccinia, unspecified                      | B0804  | B0804  | Paravaccinia, unspecified  |
| Infections: Other | 0520  | Postvaricella encephalitis                     | B0111  | B0111  | Varicella encephalitis and encephalomyelitis                                       |
| Infections: Other | 0521  | Varicella (hemorrhagic) pneumonitis            | B012   | B012   | Varicella pneumonia  |
| Infections: Other | 0527  | Chickenpox with other specified complicatio    | B010   | B010   | Varicella meningitis   |
| Infections: Other | 0527  | Chickenpox with other specified complicatio    | B0181  | B0181  | Varicella keratitis  |
| Infections: Other | 0527  | Chickenpox with other specified complicatio    | B0189  | B0189  | Other varicella complications  |
| Infections: Other | 0528  | Chickenpox with unspecified complication       | B0189  | B0189  | Other varicella complications  |
| Infections: Other | 0529  | Varicella without mention of complication      | B019   | B019   | Varicella without complication   |
| Infections: Other | 0530  | Herpes zoster with meningitis                  | B021   | B021   | Zoster meningitis  |
| Infections: Other | 05310 | Herpes zoster with unspecified nervous syste   | B0229  | B0229  | Other postherpetic nervous system involvement                                      |
| Infections: Other | 05311 | Geniculate herpes zoster                       | B0221  | B0221  | Postherpetic geniculate ganglionitis   |
| Infections: Other | 05312 | Postherpetic trigeminal neuralgia              | B0222  | B0222  | Postherpetic trigeminal neuralgia  |
| Infections: Other | 05313 | Postherpetic polyneuropathy                    | B0223  | B0223  | Postherpetic polyneuropathy  |
| Infections: Other | 05319 | Herpes zoster with other nervous system coi    | B0229  | B0229  | Other postherpetic nervous system involvement                                      |
| Infections: Other | 05320 | Herpes zoster dermatitis of eyelid             | B0239  | B0239  | Other herpes zoster eye disease  |
| Infections: Other | 05321 | Herpes zoster keratoconjunctivitis             | B0233  | B0233  | Zoster keratitis   |
| Infections: Other | 05322 | Herpes zoster iridocyclitis                    | B0232  | B0232  | Zoster iridocyclitis   |
| Infections: Other | 05329 | Herpes zoster with other ophthalmic compli     | B0239  | B0239  | Other herpes zoster eye disease  |
| Infections: Other | 05371 | Otitis externa due to herpes zoster            | B028   | B028   | Zoster with other complications  |
| Infections: Other | 05379 | Herpes zoster with other specified complicat   | B028   | B028   | Zoster with other complications  |
| Infections: Other | 0538  | Herpes zoster with unspecified complication    | B028   | B028   | Zoster with other complications  |
| Infections: Other | 0539  | Herpes zoster without mention of complicati    | B029   | B029   | Zoster without complications   |
| Infections: Other | 0540  | Eczema herpeticum                              | B000   | B000   | Eczema herpeticum  |
| Infections: Other | 05410 | Genital herpes, unspecified                    | A609   | A609   | Anogenital herpesviral infection, unspecified                                      |
| Infections: Other | 05411 | Herpetic vulvovaginitis                        | A6004  | A6004  | Herpesviral vulvovaginitis   |
| Infections: Other | 05412 | Herpetic ulceration of vulva                   | A6004  | A6004  | Herpesviral vulvovaginitis   |
| Infections: Other | 05413 | Herpetic infection of penis                    | A6001  | A6001  | Herpesviral infection of penis   |
| Infections: Other | 05419 | Other genital herpes                           | A6009  | A6009  | Herpesviral infection of other urogenital tract                                    |
| Infections: Other | 0542  | Herpetic gingivostomatitis                     | B002   | B002   | Herpesviral gingivostomatitis and pharyngotonsillitis                              |
| Infections: Other | 0543  | Herpetic meningoencephalitis                   | B004   | B004   | Herpesviral encephalitis   |
| Infections: Other | 05440 | Herpes simplex with unspecified ophthalmic     | B0050  | B0050  | Herpesviral ocular disease, unspecified  |
| Infections: Other | 05441 | Herpes simplex dermatitis of eyelid            | B0059  | B0059  | Other herpesviral disease of eye   |
| Infections: Other | 05442 | Dendritic keratitis                            | B0052  | B0052  | Herpesviral keratitis  |
| Infections: Other | 05443 | Herpes simplex disciform keratitis             | B0052  | B0052  | Herpesviral keratitis  |
| Infections: Other | 05444 | Herpes simplex iridocyclitis                   | B0051  | B0051  | Herpesviral iridocyclitis  |
| Infections: Other | 05449 | Herpes simplex with other ophthalmic comp      | B0059  | B0059  | Other herpesviral disease of eye   |
| Infections: Other | 0545  | Herpetic septicemia                            | B007   | B007   | Disseminated herpesviral disease   |
| Infections: Other | 0546  | Herpetic whitlow                               | B0089  | B0089  | Other herpesviral infection  |
| Infections: Other | 05471 | Visceral herpes simplex                        | B0081  | B0081  | Herpesviral hepatitis  |
| Infections: Other | 05472 | Herpes simplex meningitis                      | B003   | B003   | Herpesviral meningitis   |
| Infections: Other | 05473 | Herpes simplex otitis externa                  | B001   | B001   | Herpesviral vesicular dermatitis   |
| Infections: Other | 05479 | Herpes simplex with other specified complic    | B0089  | B0089  | Other herpesviral infection  |
| Infections: Other | 0548  | Herpes simplex with unspecified complicatio    | B009   | B009   | Herpesviral infection, unspecified   |
| Infections: Other | 0549  | Herpes simplex without mention of complic      | B009   | B009   | Herpesviral infection, unspecified   |
| Infections: Other | 0550  | Postmeasles encephalitis                       | B050   | B050   | Measles complicated by encephalitis  |
| Infections: Other | 0551  | Postmeasles pneumonia                          | B052   | B052   | Measles complicated by pneumonia   |
| Infections: Other | 0552  | Postmeasles otitis media                       | B053   | B053   | Measles complicated by otitis media  |
| Infections: Other | 05571 | Measles keratoconjunctivitis                   | B0581  | B0581  | Measles keratitis and keratoconjunctivitis   |
| Infections: Other | 05579 | Measles with other specified complications     | B051   | B051   | Measles complicated by meningitis  |
| Infections: Other | 05579 | Measles with other specified complications     | B054   | B054   | Measles with intestinal complications  |
| Infections: Other | 05579 | Measles with other specified complications     | B0589  | B0589  | Other measles complications  |
| Infections: Other | 0558  | Measles with unspecified complication          | B0589  | B0589  | Other measles complications  |
| Infections: Other | 0559  | Measles without mention of complication        | B059   | B059   | Measles without complication   |
| Infections: Other | 05600 | Rubella with unspecified neurological compli   | B0600  | B0600  | Rubella with neurological complication, unspecified                                |
| Infections: Other | 05601 | Encephalomyelitis due to rubella               | B0601  | B0601  | Rubella encephalitis   |
| Infections: Other | 05609 | Rubella with other neurological complicatio    | B0609  | B0609  | Other neurological complications of rubella  |
| Infections: Other | 05671 | Arthritis due to rubella                       | B0682  | B0682  | Rubella arthritis  |
| Infections: Other | 05679 | Rubella with other specified complications     | B0681  | B0681  | Rubella pneumonia  |
| Infections: Other | 05679 | Rubella with other specified complications     | B0689  | B0689  | Other rubella complications  |
| Infections: Other | 0568  | Rubella with unspecified complications         | B0689  | B0689  | Other rubella complications  |
| Infections: Other | 0569  | Rubella without mention of complication        | B069   | B069   | Rubella without complication   |
| Infections: Other | 0570  | Erythema infectiosum (fifth disease)           | B083   | B083   | Erythema infectiosum [fifth disease]   |
| Infections: Other | 0578  | Other specified viral exanthemata              | B09    | B09    | Unspecified viral infection characterized by skin and mucous membrane lesions      |
| Infections: Other | 0578  | Other specified viral exanthemata              | L444   | L444   | Infantile papular acrodermatitis [Gianotti-Crosti]                                 |
| Infections: Other | 0579  | Viral exanthem, unspecified                    | B09    | B09    | Unspecified viral infection characterized by skin and mucous membrane lesions      |
| Infections: Other | 05811 | Roseola infantum due to human herpesvirus      | B0821  | B0821  | Exanthema subitum [sixth disease] due to human herpesvirus 6                       |
| Infections: Other | 05812 | Roseola infantum due to human herpesvirus      | B0822  | B0822  | Exanthema subitum [sixth disease] due to human herpesvirus 7                       |
| Infections: Other | 05821 | Human herpesvirus 6 encephalitis               | B1001  | B1001  | Human herpesvirus 6 encephalitis   |
| Infections: Other | 05829 | Other human herpesvirus encephalitis           | B1009  | B1009  | Other human herpesvirus encephalitis   |
| Infections: Other | 05881 | Human herpesvirus 6 infection                  | B1081  | B1081  | Human herpesvirus 6 infection  |
| Infections: Other | 05882 | Human herpesvirus 7 infection                  | B1082  | B1082  | Human herpesvirus 7 infection  |
| Infections: Other | 05889 | Other human herpesvirus infection              | B1089  | B1089  | Other human herpesvirus infection  |
| Infections: Other | 05901 | Monkeypox                                      | B04    | B04    | Monkeypox  |
| Infections: Other | 05909 | Other orthopoxvirus infections                 | B0809  | B0809  | Other orthopoxvirus infections   |
| Infections: Other | 05911 | Bovine stomatitis                              | B0861  | B0861  | Bovine stomatitis  |
| Infections: Other | 05912 | Sealpox  | B0862  | B0862  | Sealpox  |
| Infections: Other | 05919 | Other parapoxvirus infections                  | B0869  | B0869  | Other parapoxvirus infections  |
| Infections: Other | 05920 | Yatapoxvirus infection, unspecified            | B0870  | B0870  | Yatapoxvirus infection, unspecified  |
| Infections: Other | 05921 | Tanapox  | B0871  | B0871  | Tanapox virus disease  |
| Infections: Other | 05922 | Yaba monkey tumor virus                        | B0872  | B0872  | Yaba pox virus disease   |
| Infections: Other | 0598  | Other poxvirus infections                      | B088   | B088   | Other specified viral infections characterized by skin and mucous membrane lesions |
| Infections: Other | 0599  | Poxvirus infections, unspecified               | B088   | B088   | Other specified viral infections characterized by skin and mucous membrane lesions |
| Infections: Other | 0600  | Sylvatic yellow fever                          | A950   | A950   | Sylvatic yellow fever  |
| Infections: Other | 0601  | Urban yellow fever                             | A951   | A951   | Urban yellow fever   |
| Infections: Other | 0609  | Yellow fever, unspecified                      | A959   | A959   | Yellow fever, unspecified  |
| Infections: Other | 061   | Dengue   | A90    | A90    | Dengue fever [classical dengue]  |
| Infections: Other | 0620  | Japanese encephalitis                          | A830   | A830   | Japanese encephalitis  |
| Infections: Other | 0621  | Western equine encephalitis                    | A831   | A831   | Western equine encephalitis  |
| Infections: Other | 0622  | Eastern equine encephalitis                    | A832   | A832   | Eastern equine encephalitis  |
| Infections: Other | 0623  | St. Louis encephalitis                         | A833   | A833   | St Louis encephalitis  |
| Infections: Other | 0624  | Australian encephalitis                        | A834   | A834   | Australian encephalitis  |
| Infections: Other | 0625  | California virus encephalitis                  | A835   | A835   | California encephalitis  |
| Infections: Other | 0628  | Other specified mosquito-borne viral enceph    | A838   | A838   | Other mosquito-borne viral encephalitis  |

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|-------------------|-------|---|-------|-------|--|
| Infections: Other | 0629  | Mosquito-borne viral encephalitis, unspecified                  | A839  | A839  | Mosquito-borne viral encephalitis, unspecified   |
| Infections: Other | 0630  | Russian spring-summer [taiga] encephalitis                      | A840  | A840  | Far Eastern tick-borne encephalitis [Russian spring-summer encephalitis]                         |
| Infections: Other | 0631  | Louping ill   | A848  | A848  | Other tick-borne viral encephalitis  |
| Infections: Other | 0632  | Central european encephalitis                                   | A841  | A841  | Central European tick-borne encephalitis   |
| Infections: Other | 0638  | Other specified tick-borne viral encephalitis                   | A848  | A848  | Other tick-borne viral encephalitis  |
| Infections: Other | 0639  | Tick-borne viral encephalitis, unspecified                      | A849  | A849  | Tick-borne viral encephalitis, unspecified   |
| Infections: Other | 064   | Viral encephalitis transmitted by other and unspecified         | A852  | A852  | Arthropod-borne viral encephalitis, unspecified  |
| Infections: Other | 0650  | Crimean hemorrhagic fever [CHF Congo virus]                     | A980  | A980  | Crimean-Congo hemorrhagic fever  |
| Infections: Other | 0651  | Omsk hemorrhagic fever  | A981  | A981  | Omsk hemorrhagic fever   |
| Infections: Other | 0652  | Kyasanur forest disease   | A982  | A982  | Kyasanur Forest disease  |
| Infections: Other | 0653  | Other tick-borne hemorrhagic fever                              | A988  | A988  | Other specified viral hemorrhagic fevers   |
| Infections: Other | 0654  | Mosquito-borne hemorrhagic fever                                | A91   | A91   | Dengue hemorrhagic fever   |
| Infections: Other | 0654  | Mosquito-borne hemorrhagic fever                                | A920  | A920  | Chikungunya virus disease  |
| Infections: Other | 0658  | Other specified arthropod-borne hemorrhagic fever               | A988  | A988  | Other specified viral hemorrhagic fevers   |
| Infections: Other | 0659  | Arthropod-borne hemorrhagic fever, unspecified                  | A99   | A99   | Unspecified viral hemorrhagic fever  |
| Infections: Other | 0660  | Phlebotomus fever   | A931  | A931  | Sandfly fever  |
| Infections: Other | 0661  | Tick-borne fever  | A932  | A932  | Colorado tick fever  |
| Infections: Other | 0662  | Venezuelan equine fever   | A922  | A922  | Venezuelan equine fever  |
| Infections: Other | 0663  | Other mosquito-borne fever                                      | A920  | A920  | Chikungunya virus disease  |
| Infections: Other | 0663  | Other mosquito-borne fever                                      | A921  | A921  | O'nyong-nyong fever  |
| Infections: Other | 0663  | Other mosquito-borne fever                                      | A924  | A924  | Rift Valley fever  |
| Infections: Other | 0663  | Other mosquito-borne fever                                      | A928  | A928  | Other specified mosquito-borne viral fevers  |
| Infections: Other | 0663  | Other mosquito-borne fever                                      | A930  | A930  | Oropouche virus disease  |
| Infections: Other | 0663  | Other mosquito-borne fever                                      | B331  | B331  | Ross River disease   |
| Infections: Other | 0668  | Other specified arthropod-borne viral diseases                  | A938  | A938  | Other specified arthropod-borne viral fevers   |
| Infections: Other | 0669  | Arthropod-borne viral disease, unspecified                      | A94   | A94   | Unspecified arthropod-borne viral fever  |
| Hepatitis: Other  | 0700  | Viral hepatitis A with hepatic coma                             | B150  | B150  | Hepatitis A with hepatic coma  |
| Hepatitis: Other  | 0701  | Viral hepatitis A without mention of hepatic coma               | B159  | B159  | Hepatitis A without hepatic coma   |
| Hepatitis B       | 07020 | Viral hepatitis B with hepatic coma, acute or                   | B162  | B162  | Acute hepatitis B without delta-agent with hepatic coma  |
| Hepatitis B       | 07020 | Viral hepatitis B with hepatic coma, acute or                   | B1911 | B1911 | Unspecified viral hepatitis B with hepatic coma  |
| Hepatitis B       | 07021 | Viral hepatitis B with hepatic coma, acute or                   | B160  | B160  | Acute hepatitis B with delta-agent with hepatic coma   |
| Hepatitis B       | 07022 | Chronic viral hepatitis B with hepatic coma without delta-agent | B181  | B181  | Chronic viral hepatitis B without delta-agent  |
| Hepatitis B       | 07023 | Chronic viral hepatitis B with hepatic coma without delta-agent | B180  | B180  | Chronic viral hepatitis B with delta-agent   |
| Hepatitis B       | 07030 | Viral hepatitis B without mention of hepatic coma               | B169  | B169  | Acute hepatitis B without delta-agent and without hepatic coma                                   |
| Hepatitis B       | 07030 | Viral hepatitis B without mention of hepatic coma               | B1910 | B1910 | Unspecified viral hepatitis B without hepatic coma   |
| Hepatitis B       | 07031 | Viral hepatitis B without mention of hepatic coma               | B161  | B161  | Acute hepatitis B with delta-agent without hepatic coma  |
| Hepatitis B       | 07032 | Chronic viral hepatitis B without mention of hepatic coma       | B181  | B181  | Chronic viral hepatitis B without delta-agent  |
| Hepatitis B       | 07033 | Chronic viral hepatitis B without mention of hepatic coma       | B180  | B180  | Chronic viral hepatitis B with delta-agent   |
| Hepatitis: Other  | 07041 | Acute hepatitis C with hepatic coma                             | B1711 | B1711 | Acute hepatitis C with hepatic coma  |
| Hepatitis: Other  | 07042 | Hepatitis delta without mention of active hepatitis             | B170  | B170  | Acute delta-(super) infection of hepatitis B carrier   |
| Hepatitis: Other  | 07043 | Hepatitis E with hepatic coma                                   | B172  | B172  | Acute hepatitis E  |
| Hepatitis: Other  | 07044 | Chronic hepatitis C with hepatic coma                           | B182  | B182  | Chronic viral hepatitis C  |
| Hepatitis: Other  | 07049 | Other specified viral hepatitis with hepatic coma               | B178  | B178  | Other specified acute viral hepatitis  |
| Hepatitis: Other  | 07051 | Acute hepatitis C without mention of hepatic coma               | B1710 | B1710 | Acute hepatitis C without hepatic coma   |
| Hepatitis: Other  | 07052 | Hepatitis delta without mention of active hepatitis             | B170  | B170  | Acute delta-(super) infection of hepatitis B carrier   |
| Hepatitis: Other  | 07053 | Hepatitis E without mention of hepatic coma                     | B172  | B172  | Acute hepatitis E  |
| Hepatitis: Other  | 07054 | Chronic hepatitis C without mention of hepatic coma             | B182  | B182  | Chronic viral hepatitis C  |
| Hepatitis: Other  | 07059 | Other specified viral hepatitis without mention of hepatic coma | B178  | B178  | Other specified acute viral hepatitis  |
| Hepatitis: Other  | 07059 | Other specified viral hepatitis without mention of hepatic coma | B188  | B188  | Other chronic viral hepatitis  |
| Hepatitis: Other  | 07059 | Other specified viral hepatitis without mention of hepatic coma | B189  | B189  | Chronic viral hepatitis, unspecified   |
| Hepatitis: Other  | 0706  | Unspecified viral hepatitis with hepatic coma                   | B190  | B190  | Unspecified viral hepatitis with hepatic coma  |
| Hepatitis: Other  | 07070 | Unspecified viral hepatitis C without hepatic coma              | B1920 | B1920 | Unspecified viral hepatitis C without hepatic coma   |
| Hepatitis: Other  | 07071 | Unspecified viral hepatitis C with hepatic coma                 | B1921 | B1921 | Unspecified viral hepatitis C with hepatic coma  |
| Hepatitis: Other  | 0709  | Unspecified viral hepatitis without mention of hepatic coma     | B199  | B199  | Unspecified viral hepatitis without hepatic coma   |
| Infections: Other | 071   | Rabies  | A829  | A829  | Rabies, unspecified  |
| Infections: Other | 0720  | Mumps orchitis  | B260  | B260  | Mumps orchitis   |
| Infections: Other | 0721  | Mumps meningitis  | B261  | B261  | Mumps meningitis   |
| Infections: Other | 0722  | Mumps encephalitis  | B262  | B262  | Mumps encephalitis   |
| Infections: Other | 0723  | Mumps pancreatitis  | B263  | B263  | Mumps pancreatitis   |
| Infections: Other | 07271 | Mumps hepatitis   | B2681 | B2681 | Mumps hepatitis  |
| Infections: Other | 07272 | Mumps polyneuropathy  | B2684 | B2684 | Mumps polyneuropathy   |
| Infections: Other | 07279 | Other mumps with other specified complications                  | B2682 | B2682 | Mumps myocarditis  |
| Infections: Other | 07279 | Other mumps with other specified complications                  | B2683 | B2683 | Mumps nephritis  |
| Infections: Other | 07279 | Other mumps with other specified complications                  | B2685 | B2685 | Mumps arthritis  |
| Infections: Other | 07279 | Other mumps with other specified complications                  | B2689 | B2689 | Other mumps complications  |
| Infections: Other | 0728  | Mumps with unspecified complication                             | B2689 | B2689 | Other mumps complications  |
| Infections: Other | 0729  | Mumps without mention of complication                           | B269  | B269  | Mumps without complication   |
| Infections: Other | 0730  | Ornithosis with pneumonia                                       | A70   | A70   | Chlamydia psittaci infections  |
| Infections: Other | 0730  | Ornithosis with pneumonia                                       | J17   | J17   | Pneumonia in diseases classified elsewhere   |
| Infections: Other | 0737  | Ornithosis with other specified complication                    | A70   | A70   | Chlamydia psittaci infections  |
| Infections: Other | 0738  | Ornithosis with unspecified complication                        | A70   | A70   | Chlamydia psittaci infections  |
| Infections: Other | 0739  | Ornithosis, unspecified   | A70   | A70   | Chlamydia psittaci infections  |
| Infections: Other | 0740  | Herpangina  | B085  | B085  | Enteroviral vesicular pharyngitis  |
| Infections: Other | 0741  | Epidemic pleurodynia  | B330  | B330  | Epidemic myalgia   |
| Infections: Other | 07420 | Coxsackie carditis, unspecified                                 | B3320 | B3320 | Viral carditis, unspecified  |
| Infections: Other | 07421 | Coxsackie pericarditis  | B3323 | B3323 | Viral pericarditis   |
| Infections: Other | 07422 | Coxsackie endocarditis  | B3321 | B3321 | Viral endocarditis   |
| Infections: Other | 07423 | Coxsackie myocarditis   | B3322 | B3322 | Viral myocarditis  |
| Infections: Other | 0743  | Hand, foot, and mouth disease                                   | B084  | B084  | Enteroviral vesicular stomatitis with exanthem   |
| Infections: Other | 0748  | Other specified diseases due to Coxsackie virus                 | B341  | B341  | Enterovirus infection, unspecified   |
| Infections: Other | 075   | Infectious mononucleosis  | B2790 | B2790 | Infectious mononucleosis, unspecified without complication                                       |
| Infections: Other | 0760  | Trachoma, initial stage   | A710  | A710  | Initial stage of trachoma  |
| Infections: Other | 0761  | Trachoma, active stage  | A711  | A711  | Active stage of trachoma   |
| Infections: Other | 0769  | Trachoma, unspecified   | A719  | A719  | Trachoma, unspecified  |
| Infections: Other | 0770  | Inclusion conjunctivitis  | A740  | A740  | Chlamydial conjunctivitis  |
| Infections: Other | 0771  | Epidemic keratoconjunctivitis                                   | B300  | B300  | Keratoconjunctivitis due to adenovirus   |
| Infections: Other | 0772  | Pharyngoconjunctival fever                                      | B302  | B302  | Viral pharyngoconjunctivitis   |
| Infections: Other | 0773  | Other adenoviral conjunctivitis                                 | B301  | B301  | Conjunctivitis due to adenovirus   |
| Infections: Other | 0774  | Epidemic hemorrhagic conjunctivitis                             | B303  | B303  | Acute epidemic hemorrhagic conjunctivitis (enteroviral)  |
| Infections: Other | 0778  | Other viral conjunctivitis                                      | B308  | B308  | Other viral conjunctivitis   |
| Infections: Other | 07798 | Unspecified diseases of conjunctiva due to chlamydiae           | A740  | A740  | Chlamydial conjunctivitis  |
| Infections: Other | 07798 | Unspecified diseases of conjunctiva due to chlamydiae           | A7489 | A7489 | Other chlamydial diseases  |
| Infections: Other | 07799 | Unspecified diseases of conjunctiva due to viruses              | B309  | B309  | Viral conjunctivitis, unspecified  |
| Infections: Other | 0780  | Molluscum contagiosum   | B081  | B081  | Molluscum contagiosum  |
| Infections: Other | 07810 | Viral warts, unspecified  | B079  | B079  | Viral wart, unspecified  |
| Infections: Other | 07811 | Condyloma acuminatum  | A630  | A630  | Anogenital (venereal) warts  |
| Infections: Other | 07819 | Other specified viral warts                                     | B078  | B078  | Other viral warts  |
| Infections: Other | 0782  | Sweating fever  | B338  | B338  | Other specified viral diseases   |
| Infections: Other | 0783  | Cat-scratch disease   | A281  | A281  | Cat-scratch disease  |
| Infections: Other | 0784  | Foot and mouth disease  | B088  | B088  | Other specified viral infections characterized by skin and mucous membrane lesions               |
| Infections: Other | 0785  | Cytomegaloviral disease   | B259  | B259  | Cytomegaloviral disease, unspecified   |
| Infections: Other | 0786  | Hemorrhagic nephrosonephritis                                   | A985  | A985  | Hemorrhagic fever with renal syndrome  |
| Infections: Other | 0787  | Arenaviral hemorrhagic fever                                    | A960  | A960  | Junin hemorrhagic fever  |
| Infections: Other | 0787  | Arenaviral hemorrhagic fever                                    | A961  | A961  | Machupo hemorrhagic fever  |
| Infections: Other | 0787  | Arenaviral hemorrhagic fever                                    | A968  | A968  | Other arenaviral hemorrhagic fevers  |
| Infections: Other | 07881 | Epidemic vertigo  | A881  | A881  | Epidemic vertigo   |
| Infections: Other | 07882 | Epidemic vomiting syndrome                                      | R1111 | R1111 | Vomiting without nausea  |
| Infections: Other | 07888 | Other specified diseases due to chlamydiae                      | A7489 | A7489 | Other chlamydial diseases  |
| Infections: Other | 07889 | Other specified diseases due to viruses                         | A983  | A983  | Marburg virus disease  |
| Infections: Other | 07889 | Other specified diseases due to viruses                         | A984  | A984  | Ebola virus disease  |
| Infections: Other | 07889 | Other specified diseases due to viruses                         | B338  | B338  | Other specified viral diseases   |
| Infections: Other | 0790  | Adenovirus infection in conditions classified elsewhere         | B970  | B970  | Adenovirus as the cause of diseases classified elsewhere   |
| Infections: Other | 0791  | Echo virus infection in conditions classified elsewhere         | B9712 | B9712 | Echovirus as the cause of diseases classified elsewhere  |
| Infections: Other | 0792  | Coxsackie virus infection in conditions classified elsewhere    | B9711 | B9711 | Coxsackievirus as the cause of diseases classified elsewhere                                     |
| Infections: Other | 0793  | Rhinovirus infection in conditions classified elsewhere         | B9789 | B9789 | Other viral agents as the cause of diseases classified elsewhere                                 |
| Infections: Other | 0794  | Human papillomavirus in conditions classified elsewhere         | B977  | B977  | Papillomavirus as the cause of diseases classified elsewhere                                     |
| Infections: Other | 07950 | Retrovirus, unspecified   | B9730 | B9730 | Unspecified retrovirus as the cause of diseases classified elsewhere                             |
| Infections: Other | 07951 | Human T-cell lymphotropic virus, type I [HTLV-I]                | B9733 | B9733 | Human T-cell lymphotropic virus, type I [HTLV-I] as the cause of diseases classified elsewhere   |
| Infections: Other | 07952 | Human T-cell lymphotropic virus, type II [HTLV-II]              | B9734 | B9734 | Human T-cell lymphotropic virus, type II [HTLV-II] as the cause of diseases classified elsewhere |
| HIV/AIDS          | 07953 | Human immunodeficiency virus, type 2 [HIV-2]                    | B9735 | B9735 | Human immunodeficiency virus, type 2 [HIV-2] as the cause of diseases classified elsewhere       |
| Infections: Other | 07959 | Other specified retrovirus                                      | B333  | B333  | Retrovirus infections, not elsewhere classified  |

|                   |       |  |       |       |   |
|-------------------|-------|--|-------|-------|---|
| Infections: Other | 07959 | Other specified retrovirus                           | B9739 | B9739 | Other retrovirus as the cause of diseases classified elsewhere            |
| Infections: Other | 0796  | Respiratory syncytial virus (RSV)                    | B974  | B974  | Respiratory syncytial virus as the cause of diseases classified elsewhere |
| Infections: Other | 07981 | Hantavirus infection                                 | B334  | B334  | Hantavirus (cardio)-pulmonary syndrome [HPS] [HCPS]                       |
| Infections: Other | 07982 | SARS-associated coronavirus                          | B9721 | B9721 | SARS-associated coronavirus as the cause of diseases classified elsewhere |
| Infections: Other | 07988 | Other specified chlamydial infection                 | A7489 | A7489 | Other chlamydial diseases   |
| Infections: Other | 07989 | Other specified viral infection                      | B338  | B338  | Other specified viral diseases  |
| Infections: Other | 07989 | Other specified viral infection                      | B341  | B341  | Enterovirus infection, unspecified  |
| Infections: Other | 07989 | Other specified viral infection                      | B342  | B342  | Coronavirus infection, unspecified  |
| Infections: Other | 07989 | Other specified viral infection                      | B344  | B344  | Papovavirus infection, unspecified  |
| Infections: Other | 07989 | Other specified viral infection                      | B348  | B348  | Other viral infections of unspecified site                                |
| Infections: Other | 07989 | Other specified viral infection                      | B9719 | B9719 | Other enterovirus as the cause of diseases classified elsewhere           |
| Infections: Other | 07989 | Other specified viral infection                      | B9729 | B9729 | Other coronavirus as the cause of diseases classified elsewhere           |
| Infections: Other | 07989 | Other specified viral infection                      | B9789 | B9789 | Other viral agents as the cause of diseases classified elsewhere          |
| Infections: Other | 07998 | Unspecified chlamydial infection                     | A749  | A749  | Chlamydial infection, unspecified   |
| Infections: Other | 07999 | Unspecified viral infection                          | B9789 | B9789 | Other viral agents as the cause of diseases classified elsewhere          |
| Infections: Other | 080   | Louse-borne (epidemic) typhus                        | A750  | A750  | Epidemic louse-borne typhus fever due to Rickettsia prowazekii            |
| Infections: Other | 0810  | Murine (endemic) typhus                              | A752  | A752  | Typhus fever due to Rickettsia typhi                                      |
| Infections: Other | 0811  | Brill's disease                                      | A751  | A751  | Recrudescence typhus [Brill's disease]                                    |
| Infections: Other | 0812  | Scrub typhus   | A753  | A753  | Typhus fever due to Rickettsia tsutsugamushi                              |
| Infections: Other | 0819  | Typhus, unspecified                                  | A759  | A759  | Typhus fever, unspecified   |
| Infections: Other | 0820  | Spotted fevers                                       | A770  | A770  | Spotted fever due to Rickettsia rickettsii                                |
| Infections: Other | 0821  | Boutonneuse fever                                    | A771  | A771  | Spotted fever due to Rickettsia conorii                                   |
| Infections: Other | 0822  | North Asian tick fever                               | A772  | A772  | Spotted fever due to Rickettsia siberica                                  |
| Infections: Other | 0823  | Queensland tick typhus                               | A773  | A773  | Spotted fever due to Rickettsia australis                                 |
| Infections: Other | 08240 | Ehrlichiosis, unspecified                            | A7740 | A7740 | Ehrlichiosis, unspecified   |
| Infections: Other | 08241 | Ehrlichiosis chafeensis [E. chafeensis]              | A7741 | A7741 | Ehrlichiosis chafeensis [E. chafeensis]                                   |
| Infections: Other | 08249 | Other ehrlichiosis                                   | A7749 | A7749 | Other ehrlichiosis  |
| Infections: Other | 0828  | Other specified tick-borne rickettsioses             | A778  | A778  | Other spotted fevers  |
| Infections: Other | 0829  | Tick-borne rickettsiosis, unspecified                | A799  | A799  | Rickettsiosis, unspecified  |
| Infections: Other | 0830  | Q fever  | A78   | A78   | Q fever   |
| Infections: Other | 0831  | Trench fever   | A790  | A790  | Trench fever  |
| Infections: Other | 0832  | Rickettsialpox                                       | A791  | A791  | Rickettsialpox due to Rickettsia akari                                    |
| Infections: Other | 0838  | Other specified rickettsioses                        | A7981 | A7981 | Rickettsiosis due to Ehrlichia sennetsu                                   |
| Infections: Other | 0838  | Other specified rickettsioses                        | A7989 | A7989 | Other specified rickettsioses   |
| Infections: Other | 0839  | Rickettsiosis, unspecified                           | A799  | A799  | Rickettsiosis, unspecified  |
| Infections: Other | 0840  | Falci-parum malaria [malignant tertian]              | B508  | B508  | Other severe and complicated Plasmodium falci-parum malaria               |
| Infections: Other | 0840  | Falci-parum malaria [malignant tertian]              | B509  | B509  | Plasmodium falci-parum malaria, unspecified                               |
| Infections: Other | 0841  | Vivax malaria [benign tertian]                       | B519  | B519  | Plasmodium vivax malaria without complication                             |
| Infections: Other | 0842  | Quartan malaria                                      | B529  | B529  | Plasmodium malariae malaria without complication                          |
| Infections: Other | 0843  | Ovale malaria  | B530  | B530  | Plasmodium ovale malaria  |
| Infections: Other | 0844  | Other malaria  | B531  | B531  | Malaria due to simian plasmodia   |
| Infections: Other | 0844  | Other malaria  | B538  | B538  | Other malaria, not elsewhere classified                                   |
| Infections: Other | 0845  | Mixed malaria  | B509  | B509  | Plasmodium falci-parum malaria, unspecified                               |
| Infections: Other | 0845  | Mixed malaria  | B519  | B519  | Plasmodium vivax malaria without complication                             |
| Infections: Other | 0845  | Mixed malaria  | B529  | B529  | Plasmodium malariae malaria without complication                          |
| Infections: Other | 0846  | Malaria, unspecified                                 | B54   | B54   | Unspecified malaria   |
| Infections: Other | 0847  | Induced malaria                                      | B538  | B538  | Other malaria, not elsewhere classified                                   |
| Infections: Other | 0848  | Blackwater fever                                     | B508  | B508  | Other severe and complicated Plasmodium falci-parum malaria               |
| Infections: Other | 0849  | Other pernicious complications of malaria            | B500  | B500  | Plasmodium falci-parum malaria with cerebral complications                |
| Infections: Other | 0849  | Other pernicious complications of malaria            | B508  | B508  | Other severe and complicated Plasmodium falci-parum malaria               |
| Infections: Other | 0849  | Other pernicious complications of malaria            | B510  | B510  | Plasmodium vivax malaria with rupture of spleen                           |
| Infections: Other | 0849  | Other pernicious complications of malaria            | B518  | B518  | Plasmodium vivax malaria with other complications                         |
| Infections: Other | 0849  | Other pernicious complications of malaria            | B520  | B520  | Plasmodium malariae malaria with nephropathy                              |
| Infections: Other | 0849  | Other pernicious complications of malaria            | B528  | B528  | Plasmodium malariae malaria with other complications                      |
| Infections: Other | 0850  | Visceral [kala-azar] leishmaniasis                   | B550  | B550  | Visceral leishmaniasis  |
| Infections: Other | 0851  | Cutaneous leishmaniasis, urban                       | B551  | B551  | Cutaneous leishmaniasis   |
| Infections: Other | 0852  | Cutaneous leishmaniasis, Asian desert                | B551  | B551  | Cutaneous leishmaniasis   |
| Infections: Other | 0853  | Cutaneous leishmaniasis, Ethiopian                   | B551  | B551  | Cutaneous leishmaniasis   |
| Infections: Other | 0854  | Cutaneous leishmaniasis, American                    | B551  | B551  | Cutaneous leishmaniasis   |
| Infections: Other | 0855  | Mucocutaneous leishmaniasis, (American)              | B552  | B552  | Mucocutaneous leishmaniasis   |
| Infections: Other | 0859  | Leishmaniasis, unspecified                           | B559  | B559  | Leishmaniasis, unspecified  |
| Infections: Other | 0860  | Chagas' disease with heart involvement               | B570  | B570  | Acute Chagas' disease with heart involvement                              |
| Infections: Other | 0860  | Chagas' disease with heart involvement               | B572  | B572  | Chagas' disease (chronic) with heart involvement                          |
| Infections: Other | 0861  | Chagas' disease with other organ involvement         | B575  | B575  | Chagas' disease (chronic) with other organ involvement                    |
| Infections: Other | 0862  | Chagas' disease without mention of organ involvement | B571  | B571  | Acute Chagas' disease without heart involvement                           |
| Infections: Other | 0863  | Gambian trypanosomiasis                              | B560  | B560  | Gambiense trypanosomiasis   |
| Infections: Other | 0864  | Rhodesian trypanosomiasis                            | B561  | B561  | Rhodesiense trypanosomiasis   |
| Infections: Other | 0865  | African trypanosomiasis, unspecified                 | B569  | B569  | African trypanosomiasis, unspecified                                      |
| Infections: Other | 0869  | Trypanosomiasis, unspecified                         | B569  | B569  | African trypanosomiasis, unspecified                                      |
| Infections: Other | 0870  | Relapsing fever, louse-borne                         | A680  | A680  | Louse-borne relapsing fever   |
| Infections: Other | 0871  | Relapsing fever, tick-borne                          | A681  | A681  | Tick-borne relapsing fever  |
| Infections: Other | 0879  | Relapsing fever, unspecified                         | A689  | A689  | Relapsing fever, unspecified  |
| Infections: Other | 0880  | Bartonellosis  | A449  | A449  | Bartonellosis, unspecified  |
| Infections: Other | 08881 | Lyme Disease   | A6920 | A6920 | Lyme disease, unspecified   |
| Infections: Other | 08882 | Babesiosis   | B600  | B600  | Babesiosis  |
| Infections: Other | 08889 | Other specified arthropod-borne diseases, other      | B608  | B608  | Other specified protozoal diseases  |
| Infections: Other | 0889  | Arthropod-borne disease, unspecified                 | B64   | B64   | Unspecified protozoal disease   |
| Infections: Other | 0900  | Early congenital syphilis, symptomatic               | A5009 | A5009 | Other early congenital syphilis, symptomatic                              |
| Infections: Other | 0901  | Early congenital syphilis, latent                    | A501  | A501  | Early congenital syphilis, latent   |
| Infections: Other | 0902  | Early congenital syphilis, unspecified               | A502  | A502  | Early congenital syphilis, unspecified                                    |
| Infections: Other | 0903  | Syphilitic interstitial keratitis                    | A5031 | A5031 | Late congenital syphilitic interstitial keratitis                         |
| Infections: Other | 09040 | Juvenile neurosyphilis, unspecified                  | A5040 | A5040 | Late congenital neurosyphilis, unspecified                                |
| Infections: Other | 09040 | Juvenile neurosyphilis, unspecified                  | A5045 | A5045 | Juvenile general paresis  |
| Infections: Other | 09041 | Congenital syphilitic encephalitis                   | A5042 | A5042 | Late congenital syphilitic encephalitis                                   |
| Infections: Other | 09042 | Congenital syphilitic meningitis                     | A5041 | A5041 | Late congenital syphilitic meningitis                                     |
| Infections: Other | 09049 | Other juvenile neurosyphilis                         | A5049 | A5049 | Other late congenital neurosyphilis                                       |
| Infections: Other | 0905  | Other late congenital syphilis, symptomatic          | A5052 | A5052 | Hutchinson's teeth  |
| Infections: Other | 0905  | Other late congenital syphilis, symptomatic          | A5057 | A5057 | Syphilitic saddle nose  |
| Infections: Other | 0905  | Other late congenital syphilis, symptomatic          | A5059 | A5059 | Other late congenital syphilis, symptomatic                               |
| Infections: Other | 0906  | Late congenital syphilis, latent                     | A506  | A506  | Late congenital syphilis, latent  |
| Infections: Other | 0907  | Late congenital syphilis, unspecified                | A507  | A507  | Late congenital syphilis, unspecified                                     |
| Infections: Other | 0909  | Congenital syphilis, unspecified                     | A509  | A509  | Congenital syphilis, unspecified  |
| Infections: Other | 0910  | Genital syphilis (primary)                           | A510  | A510  | Primary genital syphilis  |
| Infections: Other | 0911  | Primary anal syphilis                                | A511  | A511  | Primary anal syphilis   |
| Infections: Other | 0912  | Other primary syphilis                               | A512  | A512  | Primary syphilis of other sites   |
| Infections: Other | 0913  | Secondary syphilis of skin or mucous membrane        | A5131 | A5131 | Condyloma latum   |
| Infections: Other | 0913  | Secondary syphilis of skin or mucous membrane        | A5139 | A5139 | Other secondary syphilis of skin  |
| Infections: Other | 0914  | Adenopathy due to secondary syphilis                 | A5149 | A5149 | Other secondary syphilitic conditions                                     |
| Infections: Other | 09150 | Syphilitic uveitis, unspecified                      | A5143 | A5143 | Secondary syphilitic ophthalmopathy                                       |
| Infections: Other | 09151 | Syphilitic chorioretinitis (secondary)               | A5143 | A5143 | Secondary syphilitic ophthalmopathy                                       |
| Infections: Other | 09152 | Syphilitic iridocyclitis (secondary)                 | A5143 | A5143 | Secondary syphilitic ophthalmopathy                                       |
| Infections: Other | 09161 | Secondary syphilitic periostitis                     | A5146 | A5146 | Secondary syphilitic osteopathy   |
| Infections: Other | 09162 | Secondary syphilitic hepatitis                       | A5145 | A5145 | Secondary syphilitic hepatitis  |
| Infections: Other | 09169 | Secondary syphilis of other viscera                  | A5149 | A5149 | Other secondary syphilitic conditions                                     |
| Infections: Other | 0917  | Secondary syphilis, relapse                          | A5149 | A5149 | Other secondary syphilitic conditions                                     |
| Infections: Other | 09181 | Acute syphilitic meningitis (secondary)              | A5141 | A5141 | Secondary syphilitic meningitis   |
| Infections: Other | 09182 | Syphilitic alopecia                                  | A5132 | A5132 | Syphilitic alopecia   |
| Infections: Other | 09189 | Other forms of secondary syphilis                    | A5149 | A5149 | Other secondary syphilitic conditions                                     |
| Infections: Other | 0919  | Unspecified secondary syphilis                       | A5149 | A5149 | Other secondary syphilitic conditions                                     |
| Infections: Other | 0920  | Early syphilis, latent, serological relapse after    | A515  | A515  | Early syphilis, latent  |
| Infections: Other | 0929  | Early syphilis, latent, unspecified                  | A515  | A515  | Early syphilis, latent  |
| Infections: Other | 0930  | Aneurysm of aorta, specified as syphilitic           | A5201 | A5201 | Syphilitic aneurysm of aorta  |
| Infections: Other | 0931  | Syphilitic aortitis                                  | A5202 | A5202 | Syphilitic aortitis   |
| Infections: Other | 09320 | Syphilitic endocarditis of valve, unspecified        | A5203 | A5203 | Syphilitic endocarditis   |
| Infections: Other | 09321 | Syphilitic endocarditis of mitral valve              | A5203 | A5203 | Syphilitic endocarditis   |
| Infections: Other | 09322 | Syphilitic endocarditis of aortic valve              | A5203 | A5203 | Syphilitic endocarditis   |
| Infections: Other | 09323 | Syphilitic endocarditis of tricuspid valve           | A5203 | A5203 | Syphilitic endocarditis   |
| Infections: Other | 09324 | Syphilitic endocarditis of pulmonary valve           | A5203 | A5203 | Syphilitic endocarditis   |
| Infections: Other | 09381 | Syphilitic pericarditis                              | A5206 | A5206 | Other syphilitic heart involvement  |
| Infections: Other | 09382 | Syphilitic myocarditis                               | A5206 | A5206 | Other syphilitic heart involvement  |
| Infections: Other | 09389 | Other specified cardiovascular syphilis              | A5209 | A5209 | Other cardiovascular syphilis   |

|                   |       |   |       |  |
|-------------------|-------|---|-------|--|
| Infections: Other | 0939  | Cardiovascular syphilis, unspecified          | A5200 | A5200 Cardiovascular syphilis, unspecified                           |
| Infections: Other | 0940  | Tabes dorsalis                                | A5211 | A5211 Tabes dorsalis   |
| Infections: Other | 0941  | General paresis                               | A5217 | A5217 General paresis  |
| Infections: Other | 0942  | Syphilitic meningitis                         | A5213 | A5213 Late syphilitic meningitis                                     |
| Infections: Other | 0943  | Asymptomatic neurosyphilis                    | A522  | A522 Asymptomatic neurosyphilis                                      |
| Infections: Other | 09481 | Syphilitic encephalitis                       | A5214 | A5214 Late syphilitic encephalitis                                   |
| Infections: Other | 09482 | Syphilitic parkinsonism                       | A5219 | A5219 Other symptomatic neurosyphilis                                |
| Infections: Other | 09483 | Syphilitic disseminated retinochoroiditis     | A5219 | A5219 Other symptomatic neurosyphilis                                |
| Infections: Other | 09484 | Syphilitic optic atrophy                      | A5215 | A5215 Late syphilitic neuropathy                                     |
| Infections: Other | 09485 | Syphilitic retrobulbar neuritis               | A5215 | A5215 Late syphilitic neuropathy                                     |
| Infections: Other | 09486 | Syphilitic acoustic neuritis                  | A5215 | A5215 Late syphilitic neuropathy                                     |
| Infections: Other | 09487 | Syphilitic ruptured cerebral aneurysm         | A5219 | A5219 Other symptomatic neurosyphilis                                |
| Infections: Other | 09489 | Other specified neurosyphilis                 | A5219 | A5219 Other symptomatic neurosyphilis                                |
| Infections: Other | 0949  | Neurosyphilis, unspecified                    | A523  | A523 Neurosyphilis, unspecified                                      |
| Infections: Other | 0950  | Syphilitic episcleritis                       | A5271 | A5271 Late syphilitic oculopathy                                     |
| Infections: Other | 0951  | Syphilis of lung                              | A5272 | A5272 Syphilis of lung and bronchus                                  |
| Infections: Other | 0952  | Syphilitic peritonitis                        | A5274 | A5274 Syphilis of liver and other viscera                            |
| Infections: Other | 0953  | Syphilis of liver                             | A5274 | A5274 Syphilis of liver and other viscera                            |
| Infections: Other | 0954  | Syphilis of kidney                            | A5275 | A5275 Syphilis of kidney and ureter                                  |
| Infections: Other | 0955  | Syphilis of bone                              | A5277 | A5277 Syphilis of bone and joint                                     |
| Infections: Other | 0956  | Syphilis of muscle                            | A5278 | A5278 Syphilis of other musculoskeletal tissue                       |
| Infections: Other | 0957  | Syphilis of synovium, tendon, and bursa       | A5278 | A5278 Syphilis of other musculoskeletal tissue                       |
| Infections: Other | 0958  | Other specified forms of late symptomatic sy  | A5273 | A5273 Symptomatic late syphilis of other respiratory organs          |
| Infections: Other | 0958  | Other specified forms of late symptomatic sy  | A5276 | A5276 Other genitourinary symptomatic late syphilis                  |
| Infections: Other | 0958  | Other specified forms of late symptomatic sy  | A5279 | A5279 Other symptomatic late syphilis                                |
| Infections: Other | 0959  | Late symptomatic syphilis, unspecified        | A5279 | A5279 Other symptomatic late syphilis                                |
| Infections: Other | 096   | Late syphilis, latent                         | A528  | A528 Late syphilis, latent   |
| Infections: Other | 0970  | Late syphilis, unspecified                    | A529  | A529 Late syphilis, unspecified                                      |
| Infections: Other | 0971  | Latent syphilis, unspecified                  | A530  | A530 Latent syphilis, unspecified as early or late                   |
| Infections: Other | 0979  | Syphilis, unspecified                         | A539  | A539 Syphilis, unspecified   |
| Infections: Other | 0980  | Gonococcal infection (acute) of lower genito  | A5400 | A5400 Gonococcal infection of lower genitourinary tract, unspecified |
| Infections: Other | 09810 | Gonococcal infection (acute) of upper genito  | A5429 | A5429 Other gonococcal genitourinary infections                      |
| Infections: Other | 09811 | Gonococcal cystitis (acute)                   | A5401 | A5401 Gonococcal cystitis and urethritis, unspecified                |
| Infections: Other | 09812 | Gonococcal prostatitis (acute)                | A5422 | A5422 Gonococcal prostatitis   |
| Infections: Other | 09813 | Gonococcal epididymo-orchitis (acute)         | A5423 | A5423 Gonococcal infection of other male genital organs              |
| Infections: Other | 09814 | Gonococcal seminal vesiculitis (acute)        | A5423 | A5423 Gonococcal infection of other male genital organs              |
| Infections: Other | 09815 | Gonococcal cervicitis (acute)                 | A5403 | A5403 Gonococcal cervicitis, unspecified                             |
| Infections: Other | 09816 | Gonococcal endometritis (acute)               | A5424 | A5424 Gonococcal female pelvic inflammatory disease                  |
| Infections: Other | 09817 | Gonococcal salpingitis, specified as acute    | A5429 | A5429 Other gonococcal genitourinary infections                      |
| Infections: Other | 09819 | Other gonococcal infection (acute) of upper   | A5421 | A5421 Gonococcal infection of kidney and ureter                      |
| Infections: Other | 0982  | Gonococcal infection, chronic, of lower genit | A5400 | A5400 Gonococcal infection of lower genitourinary tract, unspecified |
| Infections: Other | 09830 | Chronic gonococcal infection of upper genit   | A5429 | A5429 Other gonococcal genitourinary infections                      |
| Infections: Other | 09831 | Gonococcal cystitis, chronic                  | A5401 | A5401 Gonococcal cystitis and urethritis, unspecified                |
| Infections: Other | 09832 | Gonococcal prostatitis, chronic               | A5422 | A5422 Gonococcal prostatitis   |
| Infections: Other | 09833 | Gonococcal epididymo-orchitis, chronic        | A5423 | A5423 Gonococcal infection of other male genital organs              |
| Infections: Other | 09834 | Gonococcal seminal vesiculitis, chronic       | A5423 | A5423 Gonococcal infection of other male genital organs              |
| Infections: Other | 09835 | Gonococcal cervicitis, chronic                | A5403 | A5403 Gonococcal cervicitis, unspecified                             |
| Infections: Other | 09836 | Gonococcal endometritis, chronic              | A5424 | A5424 Gonococcal female pelvic inflammatory disease                  |
| Infections: Other | 09837 | Gonococcal salpingitis (chronic)              | A5429 | A5429 Other gonococcal genitourinary infections                      |
| Infections: Other | 09839 | Other chronic gonococcal infection of upper   | A5429 | A5429 Other gonococcal genitourinary infections                      |
| Infections: Other | 09840 | Gonococcal conjunctivitis (neonatorum)        | A5431 | A5431 Gonococcal conjunctivitis                                      |
| Infections: Other | 09841 | Gonococcal iridocyclitis                      | A5432 | A5432 Gonococcal iridocyclitis                                       |
| Infections: Other | 09842 | Gonococcal endophthalmitis                    | A5439 | A5439 Other gonococcal eye infection                                 |
| Infections: Other | 09843 | Gonococcal keratitis                          | A5433 | A5433 Gonococcal keratitis   |
| Infections: Other | 09849 | Other gonococcal infection of eye             | A5439 | A5439 Other gonococcal eye infection                                 |
| Infections: Other | 09850 | Gonococcal arthritis                          | A5442 | A5442 Gonococcal arthritis   |
| Infections: Other | 09851 | Gonococcal synovitis and tenosynovitis        | A5449 | A5449 Gonococcal infection of other musculoskeletal tissue           |
| Infections: Other | 09852 | Gonococcal bursitis                           | A5449 | A5449 Gonococcal infection of other musculoskeletal tissue           |
| Infections: Other | 09853 | Gonococcal spondylitis                        | A5441 | A5441 Gonococcal spondylopathy                                       |
| Infections: Other | 09859 | Other gonococcal infection of joint           | A5440 | A5440 Gonococcal infection of musculoskeletal system, unspecified    |
| Infections: Other | 0986  | Gonococcal infection of pharynx               | A545  | A545 Gonococcal pharyngitis  |
| Infections: Other | 0987  | Gonococcal infection of anus and rectum       | A546  | A546 Gonococcal infection of anus and rectum                         |
| Infections: Other | 09881 | Gonococcal keratitis (blepharorrhagica)       | A5489 | A5489 Other gonococcal infections                                    |
| Infections: Other | 09882 | Gonococcal meningitis                         | A5481 | A5481 Gonococcal meningitis  |
| Infections: Other | 09883 | Gonococcal pericarditis                       | A5483 | A5483 Gonococcal heart infection                                     |
| Infections: Other | 09884 | Gonococcal endocarditis                       | A5483 | A5483 Gonococcal heart infection                                     |
| Infections: Other | 09885 | Other gonococcal heart disease                | A5483 | A5483 Gonococcal heart infection                                     |
| Infections: Other | 09886 | Gonococcal peritonitis                        | A5485 | A5485 Gonococcal peritonitis   |
| Infections: Other | 09889 | Gonococcal infection of other specified sites | A5486 | A5486 Gonococcal sepsis  |
| Infections: Other | 09889 | Gonococcal infection of other specified sites | A5489 | A5489 Other gonococcal infections                                    |
| Infections: Other | 0990  | Chancroid                                     | A57   | A57 Chancroid  |
| Infections: Other | 0991  | Lymphogranuloma venereum                      | A55   | A55 Chlamydial lymphogranuloma (venereum)                            |
| Infections: Other | 0992  | Granuloma inguinale                           | A58   | A58 Granuloma inguinale  |
| Infections: Other | 09940 | Other nongonococcal urethritis, unspecified   | N341  | N341 Nonspecific urethritis  |
| Infections: Other | 09941 | Other nongonococcal urethritis, chlamydia tr  | N341  | N341 Nonspecific urethritis  |
| Infections: Other | 09949 | Other nongonococcal urethritis, other specif  | N341  | N341 Nonspecific urethritis  |
| Infections: Other | 09950 | Other venereal diseases due to chlamydia tr:  | A5619 | A5619 Other chlamydial genitourinary infection                       |
| Infections: Other | 09951 | Other venereal diseases due to chlamydia tr:  | A564  | A564 Chlamydial infection of pharynx                                 |
| Infections: Other | 09952 | Other venereal diseases due to chlamydia tr:  | A563  | A563 Chlamydial infection of anus and rectum                         |
| Infections: Other | 09953 | Other venereal diseases due to chlamydia tr:  | A5600 | A5600 Chlamydial infection of lower genitourinary tract, unspecified |
| Infections: Other | 09954 | Other venereal diseases due to chlamydia tr:  | A5619 | A5619 Other chlamydial genitourinary infection                       |
| Infections: Other | 09955 | Other venereal diseases due to chlamydia tr:  | A562  | A562 Chlamydial infection of genitourinary tract, unspecified        |
| Infections: Other | 09956 | Other venereal diseases due to chlamydia tr:  | A568  | A568 Sexually transmitted chlamydial infection of other sites        |
| Infections: Other | 09959 | Other venereal diseases due to chlamydia tr:  | A568  | A568 Sexually transmitted chlamydial infection of other sites        |
| Infections: Other | 0998  | Other specified venereal diseases             | A638  | A638 Other specified predominantly sexually transmitted diseases     |
| Infections: Other | 0999  | Venereal disease, unspecified                 | A64   | A64 Unspecified sexually transmitted disease                         |
| Infections: Other | 1000  | Leptospirosis icterohemorrhagica              | A270  | A270 Leptospirosis icterohemorrhagica                                |
| Infections: Other | 10081 | Leptospiral meningitis (aseptic)              | A2781 | A2781 Aseptic meningitis in leptospirosis                            |
| Infections: Other | 10089 | Other specified leptospiral infections        | A2789 | A2789 Other forms of leptospirosis                                   |
| Infections: Other | 1009  | Leptospirosis, unspecified                    | A279  | A279 Leptospirosis, unspecified                                      |
| Infections: Other | 101   | Vincent's angina                              | A690  | A690 Necrotizing ulcerative stomatitis                               |
| Infections: Other | 101   | Vincent's angina                              | A691  | A691 Other Vincent's infections                                      |
| Infections: Other | 1020  | Initial lesions of yaws                       | A660  | A660 Initial lesions of yaws   |
| Infections: Other | 1021  | Multiple papillomata due to yaws and wet cr   | A661  | A661 Multiple papillomata and wet crab yaws                          |
| Infections: Other | 1022  | Other early skin lesions of yaws              | A662  | A662 Other early skin lesions of yaws                                |
| Infections: Other | 1023  | Hyperkeratosis due to yaws                    | A663  | A663 Hyperkeratosis of yaws  |
| Infections: Other | 1024  | Gummata and ulcers due to yaws                | A664  | A664 Gummata and ulcers of yaws                                      |
| Infections: Other | 1025  | Gangosa                                       | A665  | A665 Gangosa   |
| Infections: Other | 1026  | Bone and joint lesions due to yaws            | A666  | A666 Bone and joint lesions of yaws                                  |
| Infections: Other | 1027  | Other manifestations of yaws                  | A667  | A667 Other manifestations of yaws                                    |
| Infections: Other | 1028  | Latent yaws                                   | A668  | A668 Latent yaws   |
| Infections: Other | 1029  | Yaws, unspecified                             | A669  | A669 Yaws, unspecified   |
| Infections: Other | 1030  | Primary lesions of pinta                      | A670  | A670 Primary lesions of pinta  |
| Infections: Other | 1031  | Intermediate lesions of pinta                 | A671  | A671 Intermediate lesions of pinta                                   |
| Infections: Other | 1032  | Late lesions of pinta                         | A672  | A672 Late lesions of pinta   |
| Infections: Other | 1033  | Mixed lesions of pinta                        | A673  | A673 Mixed lesions of pinta  |
| Infections: Other | 1039  | Pinta, unspecified                            | A679  | A679 Pinta, unspecified  |
| Infections: Other | 1040  | Nonvenereal endemic syphilis                  | A65   | A65 Nonvenereal syphilis   |
| Infections: Other | 1048  | Other specified spirochetal infections        | A698  | A698 Other specified spirochetal infections                          |
| Infections: Other | 1049  | Spirochetal infection, unspecified            | A699  | A699 Spirochetal infection, unspecified                              |
| Infections: Other | 1110  | Pityriasis versicolor                         | B360  | B360 Pityriasis versicolor   |
| Infections: Other | 1111  | Tinea nigra                                   | B361  | B361 Tinea nigra   |
| Infections: Other | 1112  | Tinea blanca                                  | B362  | B362 White piedra  |
| Infections: Other | 1113  | Black piedra                                  | B363  | B363 Black piedra  |
| Infections: Other | 1118  | Other specified dermatomycoses                | B368  | B368 Other specified superficial mycoses                             |
| Infections: Other | 1119  | Dermatomycosis, unspecified                   | B369  | B369 Superficial mycosis, unspecified                                |
| Infections: Other | 1120  | Candidiasis of mouth                          | B370  | B370 Candidal stomatitis   |
| Infections: Other | 1120  | Candidiasis of mouth                          | B3783 | B3783 Candidal cheilitis   |
| Infections: Other | 1121  | Candidiasis of vulva and vagina               | B373  | B373 Candidiasis of vulva and vagina                                 |
| Infections: Other | 1122  | Candidiasis of other urogenital sites         | B3742 | B3742 Candidal balanitis   |
| Infections: Other | 1122  | Candidiasis of other urogenital sites         | B3749 | B3749 Other urogenital candidiasis                                   |



|                   |       |   |       |       |  |
|-------------------|-------|---|-------|-------|--|
| Infections: Other | 1123  | Candidiasis of skin and nails                           | B372  | B372  | Candidiasis of skin and nail   |
| Infections: Other | 1124  | Candidiasis of lung                                     | B371  | B371  | Pulmonary candidiasis  |
| Infections: Other | 1125  | Disseminated candidiasis                                | B377  | B377  | Candidal sepsis  |
| Infections: Other | 11282 | Candidal otitis externa                                 | B3784 | B3784 | Candidal otitis externa  |
| Infections: Other | 11283 | Candidal meningitis                                     | B375  | B375  | Candidal meningitis  |
| Infections: Other | 11284 | Candidal esophagitis                                    | B3781 | B3781 | Candidal esophagitis   |
| Infections: Other | 11285 | Candidal enteritis                                      | B3782 | B3782 | Candidal enteritis   |
| Infections: Other | 11289 | Other candidiasis of other specified sites              | B3789 | B3789 | Other sites of candidiasis   |
| Infections: Other | 1129  | Candidiasis of unspecified site                         | B379  | B379  | Candidiasis, unspecified   |
| Infections: Other | 1140  | Primary coccidioidomycosis (pulmonary)                  | B380  | B380  | Acute pulmonary coccidioidomycosis   |
| Infections: Other | 1141  | Primary extrapulmonary coccidioidomycosis               | B383  | B383  | Cutaneous coccidioidomycosis   |
| Infections: Other | 1142  | Coccidioidal meningitis                                 | B384  | B384  | Coccidioidomycosis meningitis  |
| Infections: Other | 1143  | Other forms of progressive coccidioidomycosis           | B3889 | B3889 | Other forms of coccidioidomycosis  |
| Infections: Other | 1144  | Chronic pulmonary coccidioidomycosis                    | B381  | B381  | Chronic pulmonary coccidioidomycosis                                       |
| Infections: Other | 1145  | Pulmonary coccidioidomycosis, unspecified               | B382  | B382  | Pulmonary coccidioidomycosis, unspecified                                  |
| Infections: Other | 1149  | Coccidioidomycosis, unspecified                         | B389  | B389  | Coccidioidomycosis, unspecified  |
| Infections: Other | 11500 | Infection by Histoplasma capsulatum, without meningitis | B394  | B394  | Histoplasmosis capsulati, unspecified                                      |
| Infections: Other | 11501 | Infection by Histoplasma capsulatum, meningitis         | B394  | B394  | Histoplasmosis capsulati, unspecified                                      |
| Infections: Other | 11501 | Infection by Histoplasma capsulatum, meningitis         | G02   | G02   | Meningitis in other infectious and parasitic diseases classified elsewhere |
| Infections: Other | 11502 | Infection by Histoplasma capsulatum, retinitis          | B394  | B394  | Histoplasmosis capsulati, unspecified                                      |
| Infections: Other | 11502 | Infection by Histoplasma capsulatum, retinitis          | H32   | H32   | Chorioretinal disorders in diseases classified elsewhere                   |
| Infections: Other | 11503 | Infection by Histoplasma capsulatum, pericarditis       | B394  | B394  | Histoplasmosis capsulati, unspecified                                      |
| Infections: Other | 11503 | Infection by Histoplasma capsulatum, pericarditis       | I32   | I32   | Pericarditis in diseases classified elsewhere                              |
| Infections: Other | 11504 | Infection by Histoplasma capsulatum, endocarditis       | B394  | B394  | Histoplasmosis capsulati, unspecified                                      |
| Infections: Other | 11504 | Infection by Histoplasma capsulatum, endocarditis       | I39   | I39   | Endocarditis and heart valve disorders in diseases classified elsewhere    |
| Infections: Other | 11505 | Infection by Histoplasma capsulatum, pneumonia          | B392  | B392  | Pulmonary histoplasmosis capsulati, unspecified                            |
| Infections: Other | 11509 | Infection by Histoplasma capsulatum, other              | B393  | B393  | Disseminated histoplasmosis capsulati                                      |
| Infections: Other | 11510 | Infection by Histoplasma duboisii, without meningitis   | B395  | B395  | Histoplasmosis duboisii  |
| Infections: Other | 11511 | Infection by Histoplasma duboisii, meningitis           | B395  | B395  | Histoplasmosis duboisii  |
| Infections: Other | 11511 | Infection by Histoplasma duboisii, meningitis           | G02   | G02   | Meningitis in other infectious and parasitic diseases classified elsewhere |
| Infections: Other | 11512 | Infection by Histoplasma duboisii, retinitis            | B395  | B395  | Histoplasmosis duboisii  |
| Infections: Other | 11512 | Infection by Histoplasma duboisii, retinitis            | H32   | H32   | Chorioretinal disorders in diseases classified elsewhere                   |
| Infections: Other | 11513 | Infection by Histoplasma duboisii, pericarditis         | B395  | B395  | Histoplasmosis duboisii  |
| Infections: Other | 11513 | Infection by Histoplasma duboisii, pericarditis         | I32   | I32   | Pericarditis in diseases classified elsewhere                              |
| Infections: Other | 11514 | Infection by Histoplasma duboisii, endocarditis         | B395  | B395  | Histoplasmosis duboisii  |
| Infections: Other | 11514 | Infection by Histoplasma duboisii, endocarditis         | I39   | I39   | Endocarditis and heart valve disorders in diseases classified elsewhere    |
| Infections: Other | 11515 | Infection by Histoplasma duboisii, pneumonia            | B395  | B395  | Histoplasmosis duboisii  |
| Infections: Other | 11515 | Infection by Histoplasma duboisii, pneumonia            | J17   | J17   | Pneumonia in diseases classified elsewhere                                 |
| Infections: Other | 11519 | Infection by Histoplasma duboisii, other                | B395  | B395  | Histoplasmosis duboisii  |
| Infections: Other | 11590 | Histoplasmosis, unspecified, without meningitis         | B399  | B399  | Histoplasmosis, unspecified  |
| Infections: Other | 11591 | Histoplasmosis, unspecified, meningitis                 | B399  | B399  | Histoplasmosis, unspecified  |
| Infections: Other | 11591 | Histoplasmosis, unspecified, meningitis                 | G02   | G02   | Meningitis in other infectious and parasitic diseases classified elsewhere |
| Infections: Other | 11592 | Histoplasmosis, unspecified, retinitis                  | B399  | B399  | Histoplasmosis, unspecified  |
| Infections: Other | 11592 | Histoplasmosis, unspecified, retinitis                  | H32   | H32   | Chorioretinal disorders in diseases classified elsewhere                   |
| Infections: Other | 11593 | Histoplasmosis, unspecified, pericarditis               | B399  | B399  | Histoplasmosis, unspecified  |
| Infections: Other | 11593 | Histoplasmosis, unspecified, pericarditis               | I32   | I32   | Pericarditis in diseases classified elsewhere                              |
| Infections: Other | 11594 | Histoplasmosis, unspecified, endocarditis               | B399  | B399  | Histoplasmosis, unspecified  |
| Infections: Other | 11594 | Histoplasmosis, unspecified, endocarditis               | I39   | I39   | Endocarditis and heart valve disorders in diseases classified elsewhere    |
| Infections: Other | 11595 | Histoplasmosis, unspecified, pneumonia                  | B399  | B399  | Histoplasmosis, unspecified  |
| Infections: Other | 11595 | Histoplasmosis, unspecified, pneumonia                  | J17   | J17   | Pneumonia in diseases classified elsewhere                                 |
| Infections: Other | 11599 | Histoplasmosis, unspecified, other                      | B399  | B399  | Histoplasmosis, unspecified  |
| Infections: Other | 1160  | Blastomycosis   | B409  | B409  | Blastomycosis, unspecified   |
| Infections: Other | 1161  | Paracoccidioidomycosis                                  | B410  | B410  | Pulmonary paracoccidioidomycosis   |
| Infections: Other | 1161  | Paracoccidioidomycosis                                  | B419  | B419  | Paracoccidioidomycosis, unspecified  |
| Infections: Other | 1162  | Lobomycosis   | B480  | B480  | Lobomycosis  |
| Infections: Other | 1170  | Rhinosporeidiosis                                       | B481  | B481  | Rhinosporeidiosis  |
| Infections: Other | 1171  | Sporotrichosis  | B420  | B420  | Pulmonary sporotrichosis   |
| Infections: Other | 1171  | Sporotrichosis  | B421  | B421  | Lymphocutaneous sporotrichosis   |
| Infections: Other | 1171  | Sporotrichosis  | B427  | B427  | Disseminated sporotrichosis  |
| Infections: Other | 1171  | Sporotrichosis  | B429  | B429  | Sporotrichosis, unspecified  |
| Infections: Other | 1172  | Chromoblastomycosis                                     | B439  | B439  | Chromomycosis, unspecified   |
| Infections: Other | 1173  | Aspergillosis   | B449  | B449  | Aspergillosis, unspecified   |
| Infections: Other | 1174  | Mycotic mycetomas                                       | B470  | B470  | Eumycetoma   |
| Infections: Other | 1175  | Cryptococcosis  | B450  | B450  | Pulmonary cryptococcosis   |
| Infections: Other | 1175  | Cryptococcosis  | B457  | B457  | Disseminated cryptococcosis  |
| Infections: Other | 1175  | Cryptococcosis  | B459  | B459  | Cryptococcosis, unspecified  |
| Infections: Other | 1176  | Allescheriosis [Petriellidiosis]                        | B482  | B482  | Allescheriosis   |
| Infections: Other | 1177  | Zygomycosis [Phycomycosis or Mucormycosis]              | B469  | B469  | Zygomycosis, unspecified   |
| Infections: Other | 1178  | Infection by dematiaceous fungi [Phaeohyphomycosis]     | B488  | B488  | Other specified mycoses  |
| Infections: Other | 1179  | Other and unspecified mycoses                           | B488  | B488  | Other specified mycoses  |
| Infections: Other | 1179  | Other and unspecified mycoses                           | B49   | B49   | Unspecified mycosis  |
| Infections: Other | 118   | Opportunistic mycoses                                   | B488  | B488  | Other specified mycoses  |
| Infections: Other | 1200  | Schistosomiasis due to schistosoma haematobium          | B650  | B650  | Schistosomiasis due to Schistosoma haematobium [urinary schistosomiasis]   |
| Infections: Other | 1201  | Schistosomiasis due to schistosoma mansoni              | B651  | B651  | Schistosomiasis due to Schistosoma mansoni [intestinal schistosomiasis]    |
| Infections: Other | 1202  | Schistosomiasis due to schistosoma japonicum            | B652  | B652  | Schistosomiasis due to Schistosoma japonicum                               |
| Infections: Other | 1203  | Cutaneous schistosomiasis                               | B653  | B653  | Cercarial dermatitis   |
| Infections: Other | 1208  | Other specified schistosomiasis                         | B658  | B658  | Other schistosomiasis  |
| Infections: Other | 1209  | Schistosomiasis, unspecified                            | B659  | B659  | Schistosomiasis, unspecified   |
| Infections: Other | 1210  | Opisthorchiasis   | B660  | B660  | Opisthorchiasis  |
| Infections: Other | 1211  | Clonorchiasis   | B661  | B661  | Clonorchiasis  |
| Infections: Other | 1212  | Paragonimiasis  | B664  | B664  | Paragonimiasis   |
| Infections: Other | 1213  | Fascioliasis  | B663  | B663  | Fascioliasis   |
| Infections: Other | 1214  | Fasciolopsiasis   | B665  | B665  | Fasciolopsiasis  |
| Infections: Other | 1215  | Metagonimiasis  | B668  | B668  | Other specified fluke infections   |
| Infections: Other | 1216  | Heterophyiasis  | B668  | B668  | Other specified fluke infections   |
| Infections: Other | 1218  | Other specified trematode infections                    | B662  | B662  | Dicrocoeliasis   |
| Infections: Other | 1218  | Other specified trematode infections                    | B668  | B668  | Other specified fluke infections   |
| Infections: Other | 1219  | Trematode infection, unspecified                        | B669  | B669  | Fluke infection, unspecified   |
| Infections: Other | 1220  | Echinococcus granulosus infection of liver              | B670  | B670  | Echinococcus granulosus infection of liver                                 |
| Infections: Other | 1221  | Echinococcus granulosus infection of lung               | B671  | B671  | Echinococcus granulosus infection of lung                                  |
| Infections: Other | 1222  | Echinococcus granulosus infection of thyroid gland      | B6731 | B6731 | Echinococcus granulosus infection, thyroid gland                           |
| Infections: Other | 1223  | Echinococcus granulosus infection, other sites          | B6739 | B6739 | Echinococcus granulosus infection, other sites                             |
| Infections: Other | 1224  | Echinococcus granulosus infection, unspecified          | B674  | B674  | Echinococcus granulosus infection, unspecified                             |
| Infections: Other | 1225  | Echinococcus multilocularis infection of liver          | B675  | B675  | Echinococcus multilocularis infection of liver                             |
| Infections: Other | 1226  | Echinococcus multilocularis infection, other sites      | B6769 | B6769 | Echinococcus multilocularis infection, other sites                         |
| Infections: Other | 1227  | Echinococcus multilocularis infection, unspecified      | B677  | B677  | Echinococcus multilocularis infection, unspecified                         |
| Infections: Other | 1228  | Echinococcosis, unspecified, of liver                   | B678  | B678  | Echinococcosis, unspecified, of liver                                      |
| Infections: Other | 1229  | Echinococcosis, other and unspecified                   | B6790 | B6790 | Echinococcosis, unspecified  |
| Infections: Other | 1229  | Echinococcosis, other and unspecified                   | B6799 | B6799 | Other echinococcosis   |
| Infections: Other | 1230  | Taenia solium infection, intestinal form                | B680  | B680  | Taenia solium taeniasis  |
| Infections: Other | 1231  | Cysticercosis   | B699  | B699  | Cysticercosis, unspecified   |
| Infections: Other | 1232  | Taenia saginata infection                               | B681  | B681  | Taenia saginata taeniasis  |
| Infections: Other | 1233  | Taeniasis, unspecified                                  | B689  | B689  | Taeniasis, unspecified   |
| Infections: Other | 1234  | Diphyllobothriasis, intestinal                          | B700  | B700  | Diphyllobothriasis   |
| Infections: Other | 1235  | Sparganosis [larval diphyllobothriasis]                 | B701  | B701  | Sparganosis  |
| Infections: Other | 1236  | Hymenolepiasis  | B710  | B710  | Hymenolepiasis   |
| Infections: Other | 1238  | Other specified cestode infection                       | B711  | B711  | Dipylidiasis   |
| Infections: Other | 1238  | Other specified cestode infection                       | B718  | B718  | Other specified cestode infections   |
| Infections: Other | 1239  | Cestode infection, unspecified                          | B719  | B719  | Cestode infection, unspecified   |
| Infections: Other | 124   | Trichinosis   | B75   | B75   | Trichinellosis   |
| Infections: Other | 1250  | Bancroftian filariasis                                  | B740  | B740  | Filariasis due to Wuchereria bancrofti                                     |
| Infections: Other | 1251  | Malayan filariasis                                      | B741  | B741  | Filariasis due to Brugia malayi  |
| Infections: Other | 1252  | Loiasis   | B743  | B743  | Loiasis  |
| Infections: Other | 1253  | Onchocerciasis  | B731  | B731  | Onchocerciasis without eye disease   |
| Infections: Other | 1254  | Dipetalonemiasis  | B748  | B748  | Other filariases   |
| Infections: Other | 1255  | Mansonella ozzardi infection                            | B744  | B744  | Mansonelliasis   |
| Infections: Other | 1256  | Other specified filariasis                              | B748  | B748  | Other filariases   |
| Infections: Other | 1257  | Dracontiasis  | B72   | B72   | Dracunculiasis   |
| Infections: Other | 1259  | Unspecified filariasis                                  | B749  | B749  | Filariasis, unspecified  |
| Infections: Other | 1260  | Ancylostomiasis due to ancylostoma duodenale            | B760  | B760  | Ancylostomiasis  |
| Infections: Other | 1261  | Necatoriasis due to necator americanus                  | B761  | B761  | Necatoriasis   |

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| Infections: Other | 1262  | Ancylostomiasis due to ancylostoma braziliense B760              | B760 Ancylostomiasis   |
| Infections: Other | 1263  | Ancylostomiasis due to ancylostoma ceylanicum B760               | B760 Ancylostomiasis   |
| Infections: Other | 1268  | Other specified ancylostoma B760                                 | B760 Ancylostomiasis   |
| Infections: Other | 1269  | Ancylostomiasis and necatoriasis, unspecified B768               | B768 Other hookworm diseases   |
| Infections: Other | 1269  | Ancylostomiasis and necatoriasis, unspecified B769               | B769 Hookworm disease, unspecified   |
| Infections: Other | 1270  | Ascariasis B7781   | B7781 Ascariasis pneumonia   |
| Infections: Other | 1270  | Ascariasis B779  | B779 Ascariasis, unspecified   |
| Infections: Other | 1271  | Anisakiasis B810   | B810 Anisakiasis   |
| Infections: Other | 1272  | Strongyloidiasis B789  | B789 Strongyloidiasis, unspecified   |
| Infections: Other | 1273  | Trichuriasis B79   | B79 Trichuriasis   |
| Infections: Other | 1274  | Enterobiasis B80   | B80 Enterobiasis   |
| Infections: Other | 1275  | Capillariasis B811   | B811 Intestinal capillariasis  |
| Infections: Other | 1276  | Trichostrongyliasis B812   | B812 Trichostrongyliasis   |
| Infections: Other | 1277  | Other specified intestinal helminthiasis B818                    | B818 Other specified intestinal helminthiasis  |
| Infections: Other | 1278  | Mixed intestinal helminthiasis B814                              | B814 Mixed intestinal helminthiasis  |
| Infections: Other | 1279  | Intestinal helminthiasis, unspecified B820                       | B820 Intestinal helminthiasis, unspecified   |
| Infections: Other | 1280  | Toxocarosis B830   | B830 Visceral larva migrans  |
| Infections: Other | 1281  | Gnathostomiasis B831   | B831 Gnathostomiasis   |
| Infections: Other | 1288  | Other specified helminthiasis B832                               | B832 Angiostrongyliasis due to Parastrongylus cantonensis  |
| Infections: Other | 1288  | Other specified helminthiasis B838                               | B838 Other specified helminthiasis   |
| Infections: Other | 1289  | Helminth infection, unspecified B839                             | B839 Helminthiasis, unspecified  |
| Infections: Other | 129   | Intestinal parasitism, unspecified B829                          | B829 Intestinal parasitism, unspecified  |
| Infections: Other | 1300  | Meningoencephalitis due to toxoplasmosis B582                    | B582 Toxoplasma meningoencephalitis  |
| Infections: Other | 1301  | Conjunctivitis due to toxoplasmosis B5809                        | B5809 Other toxoplasma oculopathy  |
| Infections: Other | 1302  | Chorioretinitis due to toxoplasmosis B5801                       | B5801 Toxoplasma chorioretinitis   |
| Infections: Other | 1303  | Myocarditis due to toxoplasmosis B5881                           | B5881 Toxoplasma myocarditis   |
| Infections: Other | 1304  | Pneumonitis due to toxoplasmosis B583                            | B583 Pulmonary toxoplasmosis   |
| Infections: Other | 1305  | Hepatitis due to toxoplasmosis B581                              | B581 Toxoplasma hepatitis  |
| Infections: Other | 1307  | Toxoplasmosis of other specified sites B5889                     | B5889 Toxoplasmosis with other organ involvement   |
| Infections: Other | 1308  | Multisystemic disseminated toxoplasmosis B5889                   | B5889 Toxoplasmosis with other organ involvement   |
| Infections: Other | 1309  | Toxoplasmosis, unspecified B589                                  | B589 Toxoplasmosis, unspecified  |
| Infections: Other | 13100 | Urogenital trichomoniasis, unspecified A5900                     | A5900 Urogenital trichomoniasis, unspecified   |
| Infections: Other | 13101 | Trichomonal vulvovaginitis A5901                                 | A5901 Trichomonal vulvovaginitis   |
| Infections: Other | 13102 | Trichomonal urethritis A5903                                     | A5903 Trichomonal cystitis and urethritis  |
| Infections: Other | 13103 | Trichomonal prostatitis A5902                                    | A5902 Trichomonal prostatitis  |
| Infections: Other | 13109 | Other urogenital trichomoniasis A5909                            | A5909 Other urogenital trichomoniasis  |
| Infections: Other | 1318  | Trichomoniasis of other specified sites A598                     | A598 Trichomoniasis of other sites   |
| Infections: Other | 1319  | Trichomoniasis, unspecified A599                                 | A599 Trichomoniasis, unspecified   |
| Infections: Other | 1320  | Pediculus capitis [head louse] B850                              | B850 Pediculosis due to Pediculus humanus capitis  |
| Infections: Other | 1321  | Pediculus corporis [body louse] B851                             | B851 Pediculosis due to Pediculus humanus corporis   |
| Infections: Other | 1322  | Phthirus pubis [pubic louse] B853                                | B853 Phthiriasis   |
| Infections: Other | 1323  | Mixed pediculosis infestation B854                               | B854 Mixed pediculosis and phthiriasis   |
| Infections: Other | 1329  | Pediculosis, unspecified B852                                    | B852 Pediculosis, unspecified  |
| Infections: Other | 1330  | Scabies B86  | B86 Scabies  |
| Infections: Other | 1338  | Other acariasis B880   | B880 Other acariasis   |
| Infections: Other | 1339  | Acariasis, unspecified B889                                      | B889 Infestation, unspecified  |
| Infections: Other | 1340  | Myiasis B879   | B879 Myiasis, unspecified  |
| Infections: Other | 1341  | Other arthropod infestation B882                                 | B882 Other arthropod infestations  |
| Infections: Other | 1342  | Hirudiniasis B834  | B834 Internal hirudiniasis   |
| Infections: Other | 1342  | Hirudiniasis B883  | B883 External hirudiniasis   |
| Infections: Other | 1348  | Other specified infestations B888                                | B888 Other specified infestations  |
| Infections: Other | 1349  | Infestation, unspecified B889                                    | B889 Infestation, unspecified  |
| Infections: Other | 1360  | Ainhum L946  | L946 Ainhum  |
| Infections: Other | 13621 | Specific infection due to acanthamoeba B6011                     | B6011 Meningoencephalitis due to Acanthamoeba (culbertsoni)  |
| Infections: Other | 13629 | Other specific infections by free-living amebae B6019            | B6019 Other acanthamoebic disease  |
| Infections: Other | 13629 | Other specific infections by free-living amebae B602             | B602 Naegleriasis  |
| Infections: Other | 1363  | Pneumocystosis B59   | B59 Pneumocystosis   |
| Infections: Other | 1364  | Psorospermiasis B608   | B608 Other specified protozoal diseases  |
| Infections: Other | 1365  | Sarcosporidiosis A078  | A078 Other specified protozoal intestinal diseases   |
| Infections: Other | 1368  | Other specified infectious and parasitic diseases B608           | B608 Other specified protozoal diseases  |
| Infections: Other | 1368  | Other specified infectious and parasitic diseases B998           | B998 Other infectious disease  |
| Infections: Other | 1369  | Unspecified infectious and parasitic diseases B89                | B89 Unspecified parasitic disease  |
| Infections: Other | 1369  | Unspecified infectious and parasitic diseases B999               | B999 Unspecified infectious disease  |
| Infections: Other | 1370  | Late effects of respiratory or unspecified tuberculosis B909     | B909 Sequelae of respiratory and unspecified tuberculosis  |
| Infections: Other | 1371  | Late effects of central nervous system tuberculosis B900         | B900 Sequelae of central nervous system tuberculosis   |
| Infections: Other | 1372  | Late effects of genitourinary tuberculosis B901                  | B901 Sequelae of genitourinary tuberculosis  |
| Infections: Other | 1373  | Late effects of tuberculosis of bones and joints B902            | B902 Sequelae of tuberculosis of bones and joints  |
| Infections: Other | 1374  | Late effects of tuberculosis of other specified sites B908       | B908 Sequelae of tuberculosis of other organs  |
| Infections: Other | 1390  | Late effects of viral encephalitis B941                          | B941 Sequelae of viral encephalitis  |
| Infections: Other | 1391  | Late effects of trachoma B940                                    | B940 Sequelae of trachoma  |
| Diabetes          | 25000 | Diabetes mellitus without mention of complications E119          | E119 Type 2 diabetes mellitus without complications  |
| Diabetes          | 25001 | Diabetes mellitus without mention of complications E109          | E109 Type 1 diabetes mellitus without complications  |
| Diabetes          | 25002 | Diabetes mellitus without mention of complications E1165         | E1165 Type 2 diabetes mellitus with hyperglycemia  |
| Diabetes          | 25003 | Diabetes mellitus without mention of complications E1065         | E1065 Type 1 diabetes mellitus with hyperglycemia  |
| Diabetes          | 25010 | Diabetes with ketoacidosis, type II or unspecified E1169         | E1169 Type 2 diabetes mellitus with other specified complication   |
| Diabetes          | 25010 | Diabetes with ketoacidosis, type II or unspecified E1310         | E1310 Other specified diabetes mellitus with ketoacidosis without coma   |
| Diabetes          | 25011 | Diabetes with ketoacidosis, type I [juvenile type] E1010         | E1010 Type 1 diabetes mellitus with ketoacidosis without coma  |
| Diabetes          | 25012 | Diabetes with ketoacidosis, type II or unspecified E1165         | E1165 Type 2 diabetes mellitus with hyperglycemia  |
| Diabetes          | 25012 | Diabetes with ketoacidosis, type II or unspecified E1169         | E1169 Type 2 diabetes mellitus with other specified complication   |
| Diabetes          | 25012 | Diabetes with ketoacidosis, type II or unspecified E1310         | E1310 Other specified diabetes mellitus with ketoacidosis without coma   |
| Diabetes          | 25013 | Diabetes with ketoacidosis, type I [juvenile type] E1010         | E1010 Type 1 diabetes mellitus with ketoacidosis without coma  |
| Diabetes          | 25013 | Diabetes with ketoacidosis, type I [juvenile type] E1065         | E1065 Type 1 diabetes mellitus with hyperglycemia  |
| Diabetes          | 25020 | Diabetes with hyperosmolarity, type II or unspecified E1100      | E1100 Type 2 diabetes mellitus with hyperosmolarity without nonketotic hyperglycemic-hyperosmolar coma (NKHHC) |
| Diabetes          | 25020 | Diabetes with hyperosmolarity, type II or unspecified E1101      | E1101 Type 2 diabetes mellitus with hyperosmolarity with coma  |
| Diabetes          | 25021 | Diabetes with hyperosmolarity, type I [juvenile type] E1069      | E1069 Type 1 diabetes mellitus with other specified complication   |
| Diabetes          | 25022 | Diabetes with hyperosmolarity, type II or unspecified E1100      | E1100 Type 2 diabetes mellitus with hyperosmolarity without nonketotic hyperglycemic-hyperosmolar coma (NKHHC) |
| Diabetes          | 25022 | Diabetes with hyperosmolarity, type II or unspecified E1165      | E1165 Type 2 diabetes mellitus with hyperglycemia  |
| Diabetes          | 25023 | Diabetes with hyperosmolarity, type I [juvenile type] E1065      | E1065 Type 1 diabetes mellitus with hyperglycemia  |
| Diabetes          | 25023 | Diabetes with hyperosmolarity, type I [juvenile type] E1069      | E1069 Type 1 diabetes mellitus with other specified complication   |
| Diabetes          | 25030 | Diabetes with other coma, type II or unspecified E11641          | E11641 Type 2 diabetes mellitus with hypoglycemia with coma  |
| Diabetes          | 25031 | Diabetes with other coma, type I [juvenile type] E1011           | E1011 Type 1 diabetes mellitus with ketoacidosis with coma   |
| Diabetes          | 25031 | Diabetes with other coma, type I [juvenile type] E10641          | E10641 Type 1 diabetes mellitus with hypoglycemia with coma  |
| Diabetes          | 25032 | Diabetes with other coma, type II or unspecified E1101           | E1101 Type 2 diabetes mellitus with hyperosmolarity with coma  |
| Diabetes          | 25032 | Diabetes with other coma, type II or unspecified E1165           | E1165 Type 2 diabetes mellitus with hyperglycemia  |
| Diabetes          | 25033 | Diabetes with other coma, type I [juvenile type] E1011           | E1011 Type 1 diabetes mellitus with ketoacidosis with coma   |
| Diabetes          | 25033 | Diabetes with other coma, type I [juvenile type] E1065           | E1065 Type 1 diabetes mellitus with hyperglycemia  |
| Diabetes          | 25040 | Diabetes with renal manifestations, type II or unspecified E1129 | E1129 Type 2 diabetes mellitus with other diabetic kidney complication   |
| Diabetes          | 25041 | Diabetes with renal manifestations, type I [juvenile type] E1029 | E1029 Type 1 diabetes mellitus with other diabetic kidney complication   |
| Diabetes          | 25042 | Diabetes with renal manifestations, type II or unspecified E1121 | E1121 Type 2 diabetes mellitus with diabetic nephropathy   |
| Diabetes          | 25042 | Diabetes with renal manifestations, type II or unspecified E1165 | E1165 Type 2 diabetes mellitus with hyperglycemia  |
| Diabetes          | 25043 | Diabetes with renal manifestations, type I [juvenile type] E1021 | E1021 Type 1 diabetes mellitus with diabetic nephropathy   |
| Diabetes          | 25043 | Diabetes with renal manifestations, type I [juvenile type] E1065 | E1065 Type 1 diabetes mellitus with hyperglycemia  |
| Diabetes          | 25050 | Diabetes with ophthalmic manifestations, type I E11311           | E11311 Type 2 diabetes mellitus with unspecified diabetic retinopathy with macular edema                       |
| Diabetes          | 25050 | Diabetes with ophthalmic manifestations, type I E11319           | E11319 Type 2 diabetes mellitus with unspecified diabetic retinopathy without macular edema                    |
| Diabetes          | 25050 | Diabetes with ophthalmic manifestations, type I E1136            | E1136 Type 2 diabetes mellitus with diabetic cataract  |
| Diabetes          | 25050 | Diabetes with ophthalmic manifestations, type I E1139            | E1139 Type 2 diabetes mellitus with other diabetic ophthalmic complication                                     |
| Diabetes          | 25051 | Diabetes with ophthalmic manifestations, type I E10311           | E10311 Type 1 diabetes mellitus with unspecified diabetic retinopathy with macular edema                       |
| Diabetes          | 25051 | Diabetes with ophthalmic manifestations, type I E10319           | E10319 Type 1 diabetes mellitus with unspecified diabetic retinopathy without macular edema                    |
| Diabetes          | 25051 | Diabetes with ophthalmic manifestations, type I E1036            | E1036 Type 1 diabetes mellitus with diabetic cataract  |
| Diabetes          | 25051 | Diabetes with ophthalmic manifestations, type I E1039            | E1039 Type 1 diabetes mellitus with other diabetic ophthalmic complication                                     |
| Diabetes          | 25052 | Diabetes with ophthalmic manifestations, type I E11311           | E11311 Type 2 diabetes mellitus with unspecified diabetic retinopathy with macular edema                       |
| Diabetes          | 25052 | Diabetes with ophthalmic manifestations, type I E11319           | E11319 Type 2 diabetes mellitus with unspecified diabetic retinopathy without macular edema                    |
| Diabetes          | 25052 | Diabetes with ophthalmic manifestations, type I E1136            | E1136 Type 2 diabetes mellitus with diabetic cataract  |
| Diabetes          | 25052 | Diabetes with ophthalmic manifestations, type I E1139            | E1139 Type 2 diabetes mellitus with other diabetic ophthalmic complication                                     |
| Diabetes          | 25052 | Diabetes with ophthalmic manifestations, type I E1165            | E1165 Type 2 diabetes mellitus with hyperglycemia  |
| Diabetes          | 25053 | Diabetes with ophthalmic manifestations, type I E10311           | E10311 Type 1 diabetes mellitus with unspecified diabetic retinopathy with macular edema                       |
| Diabetes          | 25053 | Diabetes with ophthalmic manifestations, type I E10319           | E10319 Type 1 diabetes mellitus with unspecified diabetic retinopathy without macular edema                    |
| Diabetes          | 25053 | Diabetes with ophthalmic manifestations, type I E1036            | E1036 Type 1 diabetes mellitus with diabetic cataract  |
| Diabetes          | 25053 | Diabetes with ophthalmic manifestations, type I E1039            | E1039 Type 1 diabetes mellitus with other diabetic ophthalmic complication                                     |
| Diabetes          | 25053 | Diabetes with ophthalmic manifestations, type I E1065            | E1065 Type 1 diabetes mellitus with hyperglycemia  |
| Diabetes          | 25060 | Diabetes with neurological manifestations, type I E1140          | E1140 Type 2 diabetes mellitus with diabetic neuropathy, unspecified   |

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| Diabetes        | 25061 | Diabetes with neurological manifestations, type 1               | E1040  | Type 1 diabetes mellitus with diabetic neuropathy, unspecified   |
| Diabetes        | 25062 | Diabetes with neurological manifestations, type 1               | E1140  | Type 2 diabetes mellitus with diabetic neuropathy, unspecified   |
| Diabetes        | 25062 | Diabetes with neurological manifestations, type 1               | E1165  | Type 2 diabetes mellitus with hyperglycemia  |
| Diabetes        | 25063 | Diabetes with neurological manifestations, type 1               | E1040  | Type 1 diabetes mellitus with diabetic neuropathy, unspecified   |
| Diabetes        | 25063 | Diabetes with neurological manifestations, type 1               | E1065  | Type 1 diabetes mellitus with hyperglycemia  |
| Diabetes        | 25070 | Diabetes with peripheral circulatory disorder                   | E1151  | Type 2 diabetes mellitus with diabetic peripheral angiopathy without gangrene  |
| Diabetes        | 25071 | Diabetes with peripheral circulatory disorder                   | E1051  | Type 1 diabetes mellitus with diabetic peripheral angiopathy without gangrene  |
| Diabetes        | 25072 | Diabetes with peripheral circulatory disorder                   | E1151  | Type 2 diabetes mellitus with diabetic peripheral angiopathy without gangrene  |
| Diabetes        | 25072 | Diabetes with peripheral circulatory disorder                   | E1165  | Type 2 diabetes mellitus with hyperglycemia  |
| Diabetes        | 25073 | Diabetes with peripheral circulatory disorder                   | E1051  | Type 1 diabetes mellitus with diabetic peripheral angiopathy without gangrene  |
| Diabetes        | 25073 | Diabetes with peripheral circulatory disorder                   | E1065  | Type 1 diabetes mellitus with hyperglycemia  |
| Diabetes        | 25080 | Diabetes with other specified manifestations                    | E11618 | Type 2 diabetes mellitus with other diabetic arthropathy   |
| Diabetes        | 25080 | Diabetes with other specified manifestations                    | E11620 | Type 2 diabetes mellitus with diabetic dermatitis  |
| Diabetes        | 25080 | Diabetes with other specified manifestations                    | E11621 | Type 2 diabetes mellitus with foot ulcer   |
| Diabetes        | 25080 | Diabetes with other specified manifestations                    | E11622 | Type 2 diabetes mellitus with other skin ulcer   |
| Diabetes        | 25080 | Diabetes with other specified manifestations                    | E11628 | Type 2 diabetes mellitus with other skin complications   |
| Diabetes        | 25080 | Diabetes with other specified manifestations                    | E11630 | Type 2 diabetes mellitus with periodontal disease  |
| Diabetes        | 25080 | Diabetes with other specified manifestations                    | E11638 | Type 2 diabetes mellitus with other oral complications   |
| Diabetes        | 25080 | Diabetes with other specified manifestations                    | E11649 | Type 2 diabetes mellitus with hypoglycemia without coma  |
| Diabetes        | 25080 | Diabetes with other specified manifestations                    | E1165  | Type 2 diabetes mellitus with hyperglycemia  |
| Diabetes        | 25080 | Diabetes with other specified manifestations                    | E1169  | Type 2 diabetes mellitus with other specified complication   |
| Diabetes        | 25081 | Diabetes with other specified manifestations                    | E10618 | Type 1 diabetes mellitus with other diabetic arthropathy   |
| Diabetes        | 25081 | Diabetes with other specified manifestations                    | E10620 | Type 1 diabetes mellitus with diabetic dermatitis  |
| Diabetes        | 25081 | Diabetes with other specified manifestations                    | E10621 | Type 1 diabetes mellitus with foot ulcer   |
| Diabetes        | 25081 | Diabetes with other specified manifestations                    | E10622 | Type 1 diabetes mellitus with other skin ulcer   |
| Diabetes        | 25081 | Diabetes with other specified manifestations                    | E10628 | Type 1 diabetes mellitus with other skin complications   |
| Diabetes        | 25081 | Diabetes with other specified manifestations                    | E10630 | Type 1 diabetes mellitus with periodontal disease  |
| Diabetes        | 25081 | Diabetes with other specified manifestations                    | E10638 | Type 1 diabetes mellitus with other oral complications   |
| Diabetes        | 25081 | Diabetes with other specified manifestations                    | E10649 | Type 1 diabetes mellitus with hypoglycemia without coma  |
| Diabetes        | 25081 | Diabetes with other specified manifestations                    | E1065  | Type 1 diabetes mellitus with hyperglycemia  |
| Diabetes        | 25081 | Diabetes with other specified manifestations                    | E1069  | Type 1 diabetes mellitus with other specified complication   |
| Diabetes        | 25082 | Diabetes with other specified manifestations                    | E1165  | Type 2 diabetes mellitus with hyperglycemia  |
| Diabetes        | 25082 | Diabetes with other specified manifestations                    | E1169  | Type 2 diabetes mellitus with other specified complication   |
| Diabetes        | 25083 | Diabetes with other specified manifestations                    | E1065  | Type 1 diabetes mellitus with hyperglycemia  |
| Diabetes        | 25083 | Diabetes with other specified manifestations                    | E1069  | Type 1 diabetes mellitus with other specified complication   |
| Diabetes        | 25090 | Diabetes with unspecified complication, type                    | E118   | Type 2 diabetes mellitus with unspecified complications  |
| Diabetes        | 25091 | Diabetes with unspecified complication, type                    | E108   | Type 1 diabetes mellitus with unspecified complications  |
| Diabetes        | 25092 | Diabetes with unspecified complication, type                    | E1165  | Type 2 diabetes mellitus with hyperglycemia  |
| Diabetes        | 25092 | Diabetes with unspecified complication, type                    | E118   | Type 2 diabetes mellitus with unspecified complications  |
| Diabetes        | 25093 | Diabetes with unspecified complication, type                    | E1065  | Type 1 diabetes mellitus with hyperglycemia  |
| Diabetes        | 25093 | Diabetes with unspecified complication, type                    | E108   | Type 1 diabetes mellitus with unspecified complications  |
| Anemias         | 2810  | Pernicious anemia   | D510   | Vitamin B12 deficiency anemia due to intrinsic factor deficiency   |
| Anemias         | 2811  | Other vitamin B12 deficiency anemia                             | D511   | Vitamin B12 deficiency anemia due to selective vitamin B12 malabsorption with proteinuria                                |
| Anemias         | 2811  | Other vitamin B12 deficiency anemia                             | D513   | Other dietary vitamin B12 deficiency anemia  |
| Anemias         | 2811  | Other vitamin B12 deficiency anemia                             | D518   | Other vitamin B12 deficiency anemias   |
| Anemias         | 2812  | Folate-deficiency anemia  | D520   | Dietary folate deficiency anemia   |
| Anemias         | 2812  | Folate-deficiency anemia  | D521   | Drug-induced folate deficiency anemia  |
| Anemias         | 2812  | Folate-deficiency anemia  | D528   | Other folate deficiency anemias  |
| Anemias         | 2812  | Folate-deficiency anemia  | D529   | Folate deficiency anemia, unspecified  |
| Anemias         | 2813  | Other specified megaloblastic anemias not elsewhere classified  | D531   | Other megaloblastic anemias, not elsewhere classified  |
| Anemias         | 2814  | Protein-deficiency anemia                                       | D530   | Protein deficiency anemia  |
| Anemias         | 2818  | Anemia associated with other specified nutritional deficiencies | D532   | Scorbutic anemia   |
| Anemias         | 2818  | Anemia associated with other specified nutritional deficiencies | D538   | Other specified nutritional anemias  |
| Anemias         | 2819  | Unspecified deficiency anemia                                   | D539   | Nutritional anemia, unspecified  |
| Anemias         | 2820  | Hereditary spherocytosis  | D580   | Hereditary spherocytosis   |
| Anemias         | 2821  | Hereditary elliptocytosis                                       | D581   | Hereditary elliptocytosis  |
| Anemias         | 2822  | Anemias due to disorders of glutathione metabolism              | D550   | Anemia due to glucose-6-phosphate dehydrogenase [G6PD] deficiency  |
| Anemias         | 2822  | Anemias due to disorders of glutathione metabolism              | D551   | Anemia due to other disorders of glutathione metabolism  |
| Anemias         | 2823  | Other hemolytic anemias due to enzyme deficiencies              | D558   | Other anemias due to enzyme disorders  |
| Anemias         | 28241 | Sickle-cell thalassemia without crisis                          | D5740  | Sickle-cell thalassemia without crisis   |
| Anemias         | 28242 | Sickle-cell thalassemia with crisis                             | D57419 | Sickle-cell thalassemia with crisis, unspecified   |
| Anemias         | 28249 | Other thalassemias  | D568   | Other thalassemias   |
| Anemias         | 2825  | Sickle-cell trait   | D573   | Sickle-cell trait  |
| Anemias         | 28260 | Sickle-cell disease, unspecified                                | D571   | Sickle-cell disease without crisis   |
| Anemias         | 28261 | Hb-SS disease without crisis                                    | D571   | Sickle-cell disease without crisis   |
| Anemias         | 28262 | Hb-SS disease with crisis                                       | D5700  | Hb-SS disease with crisis, unspecified   |
| Anemias         | 28263 | Sickle-cell/Hb-C disease without crisis                         | D5720  | Sickle-cell/Hb-C disease without crisis  |
| Anemias         | 28264 | Sickle-cell/Hb-C disease with crisis                            | D57219 | Sickle-cell/Hb-C disease with crisis, unspecified  |
| Anemias         | 28268 | Other sickle-cell disease without crisis                        | D5780  | Other sickle-cell disorders without crisis   |
| Anemias         | 28269 | Other sickle-cell disease with crisis                           | D57819 | Other sickle-cell disorders with crisis, unspecified   |
| Anemias         | 2827  | Other hemoglobinopathies  | D564   | Hereditary persistence of fetal hemoglobin [HPFH]  |
| Anemias         | 2827  | Other hemoglobinopathies  | D582   | Other hemoglobinopathies   |
| Anemias         | 2828  | Other specified hereditary hemolytic anemias                    | D588   | Other specified hereditary hemolytic anemias   |
| Anemias         | 2829  | Hereditary hemolytic anemia, unspecified                        | D589   | Hereditary hemolytic anemia, unspecified   |
| Anemias         | 2830  | Autoimmune hemolytic anemias                                    | D590   | Drug-induced autoimmune hemolytic anemia   |
| Anemias         | 2830  | Autoimmune hemolytic anemias                                    | D591   | Other autoimmune hemolytic anemias   |
| Anemias         | 28310 | Non-autoimmune hemolytic anemia, unspecified                    | D594   | Other nonautoimmune hemolytic anemias  |
| Anemias         | 28311 | Hemolytic-uremic syndrome                                       | D593   | Hemolytic-uremic syndrome  |
| Anemias         | 28319 | Other non-autoimmune hemolytic anemias                          | D594   | Other nonautoimmune hemolytic anemias  |
| Anemias         | 2832  | Hemoglobinuria due to hemolysis from external causes            | D595   | Paroxysmal nocturnal hemoglobinuria [Marchiafava-Micheli]  |
| Anemias         | 2832  | Hemoglobinuria due to hemolysis from external causes            | D596   | Hemoglobinuria due to hemolysis from other external causes   |
| Anemias         | 2832  | Hemoglobinuria due to hemolysis from external causes            | D598   | Other acquired hemolytic anemias   |
| Anemias         | 2839  | Acquired hemolytic anemia, unspecified                          | D599   | Acquired hemolytic anemia, unspecified   |
| Anemias         | 28401 | Constitutional red blood cell aplasia                           | D6101  | Constitutional (pure) red blood cell aplasia   |
| Anemias         | 28409 | Other constitutional aplastic anemia                            | D6109  | Other constitutional aplastic anemia   |
| Anemias         | 28481 | Red cell aplasia (acquired)(adult)(with thymic involution)      | D600   | Chronic acquired pure red cell aplasia   |
| Anemias         | 28481 | Red cell aplasia (acquired)(adult)(with thymic involution)      | D601   | Transient acquired pure red cell aplasia   |
| Anemias         | 28481 | Red cell aplasia (acquired)(adult)(with thymic involution)      | D608   | Other acquired pure red cell aplasias  |
| Anemias         | 28481 | Red cell aplasia (acquired)(adult)(with thymic involution)      | D609   | Acquired pure red cell aplasia, unspecified  |
| Anemias         | 28489 | Other specified aplastic anemias                                | D611   | Drug-induced aplastic anemia   |
| Anemias         | 28489 | Other specified aplastic anemias                                | D612   | Aplastic anemia due to other external agents   |
| Anemias         | 28489 | Other specified aplastic anemias                                | D6189  | Other specified aplastic anemias and other bone marrow failure syndromes   |
| Anemias         | 2849  | Aplastic anemia, unspecified                                    | D619   | Aplastic anemia, unspecified   |
| Drug Dependence | 2920  | Drug withdrawal   | F19939 | F19939 Other psychoactive substance use, unspecified with withdrawal, unspecified  |
| Drug Dependence | 29211 | Drug-induced psychotic disorder with delusions                  | F19950 | Other psychoactive substance use, unspecified with psychoactive substance-induced psychotic disorder with delusions      |
| Drug Dependence | 29212 | Drug-induced psychotic disorder with hallucinations             | F19951 | Other psychoactive substance use, unspecified with psychoactive substance-induced psychotic disorder with hallucinations |
| Drug Dependence | 2922  | Pathological drug intoxication                                  | F15920 | Other stimulant use, unspecified with intoxication, uncomplicated  |
| Drug Dependence | 29281 | Drug-induced delirium   | F19921 | Other psychoactive substance use, unspecified with intoxication with delirium  |
| Drug Dependence | 29282 | Drug-induced persisting dementia                                | F1997  | Other psychoactive substance use, unspecified with psychoactive substance-induced persisting dementia                    |
| Drug Dependence | 29283 | Drug-induced persisting amnesic disorder                        | F1996  | Other psychoactive substance use, unspecified with psychoactive substance-induced persisting amnesic disorder            |
| Drug Dependence | 29284 | Drug-induced mood disorder                                      | F1994  | Other psychoactive substance use, unspecified with psychoactive substance-induced mood disorder                          |
| Drug Dependence | 29289 | Other specified drug-induced mental disorders                   | F11159 | F11159 Opioid abuse with opioid-induced psychotic disorder, unspecified  |
| Drug Dependence | 29289 | Other specified drug-induced mental disorders                   | F11181 | F11181 Opioid abuse with opioid-induced sexual dysfunction   |
| Drug Dependence | 29289 | Other specified drug-induced mental disorders                   | F11188 | F11188 Opioid abuse with other opioid-induced disorder   |
| Drug Dependence | 29289 | Other specified drug-induced mental disorders                   | F11222 | F11222 Opioid dependence with intoxication with perceptual disturbance   |
| Drug Dependence | 29289 | Other specified drug-induced mental disorders                   | F11259 | F11259 Opioid dependence with opioid-induced psychotic disorder, unspecified   |
| Drug Dependence | 29289 | Other specified drug-induced mental disorders                   | F11281 | F11281 Opioid dependence with opioid-induced sexual dysfunction  |
| Drug Dependence | 29289 | Other specified drug-induced mental disorders                   | F11288 | F11288 Opioid dependence with other opioid-induced disorder  |
| Drug Dependence | 29289 | Other specified drug-induced mental disorders                   | F11922 | F11922 Opioid use, unspecified with intoxication with perceptual disturbance   |
| Drug Dependence | 29289 | Other specified drug-induced mental disorders                   | F11959 | F11959 Opioid use, unspecified with opioid-induced psychotic disorder, unspecified                                       |
| Drug Dependence | 29289 | Other specified drug-induced mental disorders                   | F11981 | F11981 Opioid use, unspecified with opioid-induced sexual dysfunction  |
| Drug Dependence | 29289 | Other specified drug-induced mental disorders                   | F11988 | F11988 Opioid use, unspecified with other opioid-induced disorder  |
| Drug Dependence | 29289 | Other specified drug-induced mental disorders                   | F12122 | F12122 Cannabis abuse with intoxication with perceptual disturbance  |
| Drug Dependence | 29289 | Other specified drug-induced mental disorders                   | F12159 | F12159 Cannabis abuse with psychotic disorder, unspecified   |
| Drug Dependence | 29289 | Other specified drug-induced mental disorders                   | F12180 | F12180 Cannabis abuse with cannabis-induced anxiety disorder   |
| Drug Dependence | 29289 | Other specified drug-induced mental disorders                   | F12188 | F12188 Cannabis abuse with other cannabis-induced disorder   |
| Drug Dependence | 29289 | Other specified drug-induced mental disorders                   | F12222 | F12222 Cannabis dependence with intoxication with perceptual disturbance   |
| Drug Dependence | 29289 | Other specified drug-induced mental disorders                   | F12259 | F12259 Cannabis dependence with psychotic disorder, unspecified  |
| Drug Dependence | 29289 | Other specified drug-induced mental disorders                   | F12280 | F12280 Cannabis dependence with cannabis-induced anxiety disorder  |
| Drug Dependence | 29289 | Other specified drug-induced mental disorders                   | F12288 | F12288 Cannabis dependence with other cannabis-induced disorder  |
| Drug Dependence | 29289 | Other specified drug-induced mental disorders                   | F12922 | F12922 Cannabis use, unspecified with intoxication with perceptual disturbance   |



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|-----------------------------|-------|---|---|
| Drug Dependence             | 30482 | Combinations of drug dependence excluding F1920 | F1920 Other psychoactive substance dependence, uncomplicated  |
| Drug Dependence             | 30483 | Combinations of drug dependence excluding F1921 | F1921 Other psychoactive substance dependence, in remission   |
| Drug Dependence             | 30490 | Unspecified drug dependence, unspecified        | F1920 Other psychoactive substance dependence, uncomplicated  |
| Drug Dependence             | 30491 | Unspecified drug dependence, continuous         | F1920 Other psychoactive substance dependence, uncomplicated  |
| Drug Dependence             | 30492 | Unspecified drug dependence, episodic           | F1920 Other psychoactive substance dependence, uncomplicated  |
| Drug Dependence             | 30493 | Unspecified drug dependence, in remission       | F1921 Other psychoactive substance dependence, in remission   |
| Congestive Heart Failure    | 40201 | Malignant hypertensive heart disease with h     | I110 Hypertensive heart disease with heart failure  |
| Congestive Heart Failure    | 40211 | Benign hypertensive heart disease with hear     | I110 Hypertensive heart disease with heart failure  |
| Congestive Heart Failure    | 40291 | Unspecified hypertensive heart disease with     | I110 Hypertensive heart disease with heart failure  |
| Congestive Heart Failure    | 40401 | Hypertensive heart and chronic kidney disea     | I130 Hypertensive heart and chronic kidney disease with heart failure and stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease |
| Congestive Heart Failure    | 40403 | Hypertensive heart and chronic kidney disea     | I132 Hypertensive heart and chronic kidney disease with heart failure and with stage 5 chronic kidney disease, or end stage renal disease                       |
| Congestive Heart Failure    | 40411 | Hypertensive heart and chronic kidney disea     | I130 Hypertensive heart and chronic kidney disease with heart failure and stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease |
| Congestive Heart Failure    | 40413 | Hypertensive heart and chronic kidney disea     | I132 Hypertensive heart and chronic kidney disease with heart failure and with stage 5 chronic kidney disease, or end stage renal disease                       |
| Congestive Heart Failure    | 40491 | Hypertensive heart and chronic kidney disea     | I130 Hypertensive heart and chronic kidney disease with heart failure and stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease |
| Congestive Heart Failure    | 40493 | Hypertensive heart and chronic kidney disea     | I132 Hypertensive heart and chronic kidney disease with heart failure and with stage 5 chronic kidney disease, or end stage renal disease                       |
| Myocardial Infarction       | 41000 | Acute myocardial infarction of anterolateral    | I2109 ST elevation (STEMI) myocardial infarction involving other coronary artery of anterior wall   |
| Myocardial Infarction       | 41001 | Acute myocardial infarction of anterolateral    | I2109 ST elevation (STEMI) myocardial infarction involving other coronary artery of anterior wall   |
| Myocardial Infarction       | 41002 | Acute myocardial infarction of anterolateral    | I2109 ST elevation (STEMI) myocardial infarction involving other coronary artery of anterior wall   |
| Myocardial Infarction       | 41010 | Acute myocardial infarction of other anterior   | I2109 ST elevation (STEMI) myocardial infarction involving other coronary artery of anterior wall   |
| Myocardial Infarction       | 41011 | Acute myocardial infarction of other anterior   | I2109 ST elevation (STEMI) myocardial infarction involving other coronary artery of anterior wall   |
| Myocardial Infarction       | 41012 | Acute myocardial infarction of other anterior   | I2109 ST elevation (STEMI) myocardial infarction involving other coronary artery of anterior wall   |
| Myocardial Infarction       | 41020 | Acute myocardial infarction of inferolateral v  | I2119 ST elevation (STEMI) myocardial infarction involving other coronary artery of inferior wall   |
| Myocardial Infarction       | 41021 | Acute myocardial infarction of inferolateral v  | I2119 ST elevation (STEMI) myocardial infarction involving other coronary artery of inferior wall   |
| Myocardial Infarction       | 41022 | Acute myocardial infarction of inferolateral v  | I2119 ST elevation (STEMI) myocardial infarction involving other coronary artery of inferior wall   |
| Myocardial Infarction       | 41030 | Acute myocardial infarction of inferoposteric   | I2111 ST elevation (STEMI) myocardial infarction involving right coronary artery  |
| Myocardial Infarction       | 41031 | Acute myocardial infarction of inferoposteric   | I2111 ST elevation (STEMI) myocardial infarction involving right coronary artery  |
| Myocardial Infarction       | 41032 | Acute myocardial infarction of inferoposteric   | I2111 ST elevation (STEMI) myocardial infarction involving right coronary artery  |
| Myocardial Infarction       | 41040 | Acute myocardial infarction of other inferior   | I2119 ST elevation (STEMI) myocardial infarction involving other coronary artery of inferior wall   |
| Myocardial Infarction       | 41041 | Acute myocardial infarction of other inferior   | I2119 ST elevation (STEMI) myocardial infarction involving other coronary artery of inferior wall   |
| Myocardial Infarction       | 41042 | Acute myocardial infarction of other inferior   | I2119 ST elevation (STEMI) myocardial infarction involving other coronary artery of inferior wall   |
| Myocardial Infarction       | 41050 | Acute myocardial infarction of other lateral v  | I2129 ST elevation (STEMI) myocardial infarction involving other sites  |
| Myocardial Infarction       | 41051 | Acute myocardial infarction of other lateral v  | I2129 ST elevation (STEMI) myocardial infarction involving other sites  |
| Myocardial Infarction       | 41052 | Acute myocardial infarction of other lateral v  | I2129 ST elevation (STEMI) myocardial infarction involving other sites  |
| Myocardial Infarction       | 41060 | True posterior wall infarction, episode of car  | I2129 ST elevation (STEMI) myocardial infarction involving other sites  |
| Myocardial Infarction       | 41061 | True posterior wall infarction, initial episode | I2129 ST elevation (STEMI) myocardial infarction involving other sites  |
| Myocardial Infarction       | 41062 | True posterior wall infarction, subsequent ep   | I2129 ST elevation (STEMI) myocardial infarction involving other sites  |
| Myocardial Infarction       | 41070 | Subendocardial infarction, episode of care u    | I214 Non-ST elevation (NSTEMI) myocardial infarction  |
| Myocardial Infarction       | 41071 | Subendocardial infarction, initial episode of   | I214 Non-ST elevation (NSTEMI) myocardial infarction  |
| Myocardial Infarction       | 41072 | Subendocardial infarction, subsequent episo     | I214 Non-ST elevation (NSTEMI) myocardial infarction  |
| Myocardial Infarction       | 41080 | Acute myocardial infarction of other specific   | I2129 ST elevation (STEMI) myocardial infarction involving other sites  |
| Myocardial Infarction       | 41081 | Acute myocardial infarction of other specific   | I2129 ST elevation (STEMI) myocardial infarction involving other sites  |
| Myocardial Infarction       | 41082 | Acute myocardial infarction of other specific   | I2129 ST elevation (STEMI) myocardial infarction involving other sites  |
| Myocardial Infarction       | 41090 | Acute myocardial infarction of unspecified si   | I213 ST elevation (STEMI) myocardial infarction of unspecified site   |
| Myocardial Infarction       | 41091 | Acute myocardial infarction of unspecified si   | I213 ST elevation (STEMI) myocardial infarction of unspecified site   |
| Myocardial Infarction       | 41092 | Acute myocardial infarction of unspecified si   | I213 ST elevation (STEMI) myocardial infarction of unspecified site   |
| Ischemic Heart Disease      | 4110  | Postmyocardial infarction syndrome              | I241 Dressler's syndrome  |
| Ischemic Heart Disease      | 4111  | Intermediate coronary syndrome                  | I200 Unstable angina  |
| Ischemic Heart Disease      | 41181 | Acute coronary occlusion without myocardia      | I240 Acute coronary thrombosis not resulting in myocardial infarction   |
| Ischemic Heart Disease      | 41189 | Other acute and subacute forms of ischemic      | I248 Other forms of acute ischemic heart disease  |
| Ischemic Heart Disease      | 412   | Old myocardial infarction                       | I252 Old myocardial infarction  |
| Ischemic Heart Disease      | 4130  | Angina decubitus                                | I208 Other forms of angina pectoris   |
| Ischemic Heart Disease      | 4131  | Prinzmetal angina                               | I201 Angina pectoris with documented spasm  |
| Ischemic Heart Disease      | 4139  | Other and unspecified angina pectoris           | I208 Other forms of angina pectoris   |
| Ischemic Heart Disease      | 4139  | Other and unspecified angina pectoris           | I209 Angina pectoris, unspecified   |
| Ischemic Heart Disease      | 41400 | Coronary atherosclerosis of unspecified type    | I2510 Atherosclerotic heart disease of native coronary artery without angina pectoris   |
| Ischemic Heart Disease      | 41401 | Coronary atherosclerosis of native coronary     | I2510 Atherosclerotic heart disease of native coronary artery without angina pectoris   |
| Ischemic Heart Disease      | 41402 | Coronary atherosclerosis of autologous vein     | I25810 Atherosclerosis of coronary artery bypass graft(s) without angina pectoris   |
| Ischemic Heart Disease      | 41403 | Coronary atherosclerosis of nonautologous t     | I25810 Atherosclerosis of coronary artery bypass graft(s) without angina pectoris   |
| Ischemic Heart Disease      | 41404 | Coronary atherosclerosis of artery bypass gr    | I25810 Atherosclerosis of coronary artery bypass graft(s) without angina pectoris   |
| Ischemic Heart Disease      | 41405 | Coronary atherosclerosis of unspecified byp     | I25810 Atherosclerosis of coronary artery bypass graft(s) without angina pectoris   |
| Ischemic Heart Disease      | 41406 | Coronary atherosclerosis of native coronary     | I25811 Atherosclerosis of native coronary artery of transplanted heart without angina pectoris  |
| Ischemic Heart Disease      | 41407 | Coronary atherosclerosis of bypass graft (art   | I25812 Atherosclerosis of bypass graft of coronary artery of transplanted heart without angina pectoris   |
| Ischemic Heart Disease      | 4142  | Chronic total occlusion of coronary artery      | I2582 Chronic total occlusion of coronary artery  |
| Ischemic Heart Disease      | 4143  | Coronary atherosclerosis due to lipid rich pla  | I2583 Coronary atherosclerosis due to lipid rich plaque   |
| Ischemic Heart Disease      | 4148  | Other specified forms of chronic ischemic he    | I255 Ischemic cardiomyopathy  |
| Ischemic Heart Disease      | 4148  | Other specified forms of chronic ischemic he    | I2589 Other forms of chronic ischemic heart disease   |
| Ischemic Heart Disease      | 4148  | Other specified forms of chronic ischemic he    | I259 Chronic ischemic heart disease, unspecified  |
| Ischemic Heart Disease      | 4149  | Chronic ischemic heart disease, unspecified     | I259 Chronic ischemic heart disease, unspecified  |
| Congestive Heart Failure    | 4150  | Acute cor pulmonale                             | I2609 Other pulmonary embolism with acute cor pulmonale   |
| Peripheral Vascular Disease | 41511 | iatrogenic pulmonary embolism and infarcti      | I2690 Septic pulmonary embolism without acute cor pulmonale   |
| Peripheral Vascular Disease | 41511 | iatrogenic pulmonary embolism and infarcti      | I2699 Other pulmonary embolism without acute cor pulmonale  |
| Peripheral Vascular Disease | 41511 | iatrogenic pulmonary embolism and infarcti      | T800XXA Air embolism following infusion, transfusion and therapeutic injection, initial encounter   |
| Peripheral Vascular Disease | 41511 | iatrogenic pulmonary embolism and infarcti      | T81718A Complication of other artery following a procedure, not elsewhere classified, initial encounter   |
| Peripheral Vascular Disease | 41511 | iatrogenic pulmonary embolism and infarcti      | T8172XA Complication of vein following a procedure, not elsewhere classified, initial encounter   |
| Peripheral Vascular Disease | 41511 | iatrogenic pulmonary embolism and infarcti      | T82817A Embolism of cardiac prosthetic devices, implants and grafts, initial encounter  |
| Peripheral Vascular Disease | 41511 | iatrogenic pulmonary embolism and infarcti      | T82818A Embolism of vascular prosthetic devices, implants and grafts, initial encounter   |
| Congestive Heart Failure    | 4160  | Primary pulmonary hypertension                  | I270 Primary pulmonary hypertension   |
| Congestive Heart Failure    | 4161  | Kyphoscoliotic heart disease                    | I271 Kyphoscoliotic heart disease   |
| Congestive Heart Failure    | 4168  | Other chronic pulmonary heart diseases          | I272 Other secondary pulmonary hypertension   |
| Congestive Heart Failure    | 4168  | Other chronic pulmonary heart diseases          | I2789 Other specified pulmonary heart diseases  |
| Congestive Heart Failure    | 4169  | Chronic pulmonary heart disease, unspecifi      | I2781 Cor pulmonale (chronic)   |
| Congestive Heart Failure    | 4169  | Chronic pulmonary heart disease, unspecifi      | I279 Pulmonary heart disease, unspecified   |
| Congestive Heart Failure    | 4170  | Arteriovenous fistula of pulmonary vessels      | I280 Arteriovenous fistula of pulmonary vessels   |
| Congestive Heart Failure    | 4171  | Aneurysm of pulmonary artery                    | I281 Aneurysm of pulmonary artery   |
| Congestive Heart Failure    | 4178  | Other specified diseases of pulmonary circuli   | I288 Other diseases of pulmonary vessels  |
| Congestive Heart Failure    | 4179  | Unspecified disease of pulmonary circulation    | I289 Disease of pulmonary vessels, unspecified  |
| Congestive Heart Failure    | 4250  | Endomyocardial fibrosis                         | I423 Endomyocardial (eosinophilic) disease  |
| Congestive Heart Failure    | 4252  | Obscure cardiomyopathy of Africa                | I428 Other cardiomyopathies   |
| Congestive Heart Failure    | 4253  | Endocardial fibroelastosis                      | I424 Endocardial fibroelastosis   |
| Congestive Heart Failure    | 4254  | Other primary cardiomyopathies                  | I425 Other restrictive cardiomyopathy   |
| Congestive Heart Failure    | 4254  | Other primary cardiomyopathies                  | I428 Other cardiomyopathies   |
| Congestive Heart Failure    | 4255  | Alcoholic cardiomyopathy                        | I426 Alcoholic cardiomyopathy   |
| Congestive Heart Failure    | 4257  | Nutritional and metabolic cardiomyopathy        | I43 Cardiomyopathy in diseases classified elsewhere   |
| Congestive Heart Failure    | 4258  | Cardiomyopathy in other diseases classified     | I43 Cardiomyopathy in diseases classified elsewhere   |
| Congestive Heart Failure    | 4259  | Secondary cardiomyopathy, unspecified           | I427 Cardiomyopathy due to drug and external agent  |
| Cardiac Dysrhythmias        | 4260  | Atrioventricular block, complete                | I442 Atrioventricular block, complete   |
| Cardiac Dysrhythmias        | 4270  | Paroxysmal supraventricular tachycardia         | I471 Supraventricular tachycardia   |
| Cardiac Dysrhythmias        | 4271  | Paroxysmal ventricular tachycardia              | I472 Ventricular tachycardia  |
| Cardiac Dysrhythmias        | 4272  | Paroxysmal tachycardia, unspecified             | I479 Paroxysmal tachycardia, unspecified  |
| Cardiac Dysrhythmias        | 42731 | Atrial fibrillation                             | I4891 Unspecified atrial fibrillation   |
| Cardiac Dysrhythmias        | 42732 | Atrial flutter                                  | I4892 Unspecified atrial flutter  |
| Cardiac Dysrhythmias        | 42741 | Ventricular fibrillation                        | I4901 Ventricular fibrillation  |
| Cardiac Dysrhythmias        | 42742 | Ventricular flutter                             | I4902 Ventricular flutter   |
| Cardiac Dysrhythmias        | 4275  | Cardiac arrest                                  | I469 Cardiac arrest, cause unspecified  |
| Cardiac Dysrhythmias        | 42760 | Premature beats, unspecified                    | I4940 Unspecified premature depolarization  |
| Cardiac Dysrhythmias        | 42761 | Supraventricular premature beats                | I491 Atrial premature depolarization  |
| Cardiac Dysrhythmias        | 42769 | Other premature beats                           | I493 Ventricular premature depolarization   |
| Cardiac Dysrhythmias        | 42769 | Other premature beats                           | I4949 Other premature depolarization  |
| Cardiac Dysrhythmias        | 42781 | Sinoatrial node dysfunction                     | I495 Sick sinus syndrome  |
| Cardiac Dysrhythmias        | 42781 | Sinoatrial node dysfunction                     | R001 Bradycardia, unspecified   |
| Cardiac Dysrhythmias        | 42789 | Other specified cardiac dysrhythmias            | I498 Other specified cardiac arrhythmias  |
| Cardiac Dysrhythmias        | 42789 | Other specified cardiac dysrhythmias            | R001 Bradycardia, unspecified   |
| Cardiac Dysrhythmias        | 4279  | Cardiac dysrhythmia, unspecified                | I499 Cardiac arrhythmia, unspecified  |
| Congestive Heart Failure    | 4290  | Myocarditis, unspecified                        | I514 Myocarditis, unspecified   |
| Congestive Heart Failure    | 4291  | Myocardial degeneration                         | I515 Myocardial degeneration  |
| Cerebrovascular Disease     | 430   | Subarachnoid hemorrhage                         | I609 Nontraumatic subarachnoid hemorrhage, unspecified  |
| Cerebrovascular Disease     | 431   | Intracerebral hemorrhage                        | I619 Nontraumatic intracerebral hemorrhage, unspecified   |
| Cerebrovascular Disease     | 4320  | Nontraumatic extradural hemorrhage              | I621 Nontraumatic extradural hemorrhage   |
| Cerebrovascular Disease     | 4321  | Subdural hemorrhage                             | I6200 Nontraumatic subdural hemorrhage, unspecified   |
| Cerebrovascular Disease     | 4329  | Unspecified intracranial hemorrhage             | I629 Nontraumatic intracranial hemorrhage, unspecified  |
| Cerebrovascular Disease     | 43300 | Occlusion and stenosis of basilar artery with   | I651 Occlusion and stenosis of basilar artery   |

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|-----------------------------|-------|--|--------|---|--------|
| Cerebrovascular Disease     | 43301 | Occlusion and stenosis of basilar artery with  | I6322  | Cerebral infarction due to unspecified occlusion or stenosis of basilar arteries                            | I6322  |
| Cerebrovascular Disease     | 43310 | Occlusion and stenosis of carotid artery with  | I6529  | Occlusion and stenosis of unspecified carotid artery  | I6529  |
| Cerebrovascular Disease     | 43311 | Occlusion and stenosis of carotid artery with  | I63139 | Cerebral infarction due to embolism of unspecified carotid artery   | I63139 |
| Cerebrovascular Disease     | 43311 | Occlusion and stenosis of carotid artery with  | I63239 | Cerebral infarction due to unspecified occlusion or stenosis of unspecified carotid arteries                | I63239 |
| Cerebrovascular Disease     | 43320 | Occlusion and stenosis of vertebral artery wi  | I6509  | Occlusion and stenosis of unspecified vertebral artery  | I6509  |
| Cerebrovascular Disease     | 43321 | Occlusion and stenosis of vertebral artery wi  | I63019 | Cerebral infarction due to thrombosis of unspecified vertebral artery                                       | I63019 |
| Cerebrovascular Disease     | 43321 | Occlusion and stenosis of vertebral artery wi  | I63119 | Cerebral infarction due to embolism of unspecified vertebral artery   | I63119 |
| Cerebrovascular Disease     | 43321 | Occlusion and stenosis of vertebral artery wi  | I63219 | Cerebral infarction due to unspecified occlusion or stenosis of unspecified vertebral arteries              | I63219 |
| Cerebrovascular Disease     | 43330 | Occlusion and stenosis of multiple and bilate  | I658   | Occlusion and stenosis of other precerebral arteries  | I658   |
| Cerebrovascular Disease     | 43331 | Occlusion and stenosis of multiple and bilate  | I6359  | Cerebral infarction due to unspecified occlusion or stenosis of other cerebral artery                       | I6359  |
| Cerebrovascular Disease     | 43380 | Occlusion and stenosis of other specified pre  | I658   | Occlusion and stenosis of other precerebral arteries  | I658   |
| Cerebrovascular Disease     | 43381 | Occlusion and stenosis of other specified pre  | I6359  | Cerebral infarction due to unspecified occlusion or stenosis of other cerebral artery                       | I6359  |
| Cerebrovascular Disease     | 43390 | Occlusion and stenosis of unspecified precer   | I659   | Occlusion and stenosis of unspecified precerebral artery  | I659   |
| Cerebrovascular Disease     | 43391 | Occlusion and stenosis of unspecified precer   | I6320  | Cerebral infarction due to unspecified occlusion or stenosis of unspecified precerebral arteries            | I6320  |
| Cerebrovascular Disease     | 43400 | Cerebral thrombosis without mention of cer     | I6609  | Occlusion and stenosis of unspecified middle cerebral artery  | I6609  |
| Cerebrovascular Disease     | 43400 | Cerebral thrombosis without mention of cer     | I6619  | Occlusion and stenosis of unspecified anterior cerebral artery  | I6619  |
| Cerebrovascular Disease     | 43400 | Cerebral thrombosis without mention of cer     | I6629  | Occlusion and stenosis of unspecified posterior cerebral artery   | I6629  |
| Cerebrovascular Disease     | 43401 | Cerebral thrombosis with cerebral infarction   | I6330  | Cerebral infarction due to thrombosis of unspecified cerebral artery  | I6330  |
| Cerebrovascular Disease     | 43410 | Cerebral embolism without mention of cerel     | I6609  | Occlusion and stenosis of unspecified middle cerebral artery  | I6609  |
| Cerebrovascular Disease     | 43410 | Cerebral embolism without mention of cerel     | I6619  | Occlusion and stenosis of unspecified anterior cerebral artery  | I6619  |
| Cerebrovascular Disease     | 43410 | Cerebral embolism without mention of cerel     | I6629  | Occlusion and stenosis of unspecified posterior cerebral artery   | I6629  |
| Cerebrovascular Disease     | 43410 | Cerebral embolism without mention of cerel     | I669   | Occlusion and stenosis of unspecified cerebral artery   | I669   |
| Cerebrovascular Disease     | 43411 | Cerebral embolism with cerebral infarction     | I6340  | Cerebral infarction due to embolism of unspecified cerebral artery  | I6340  |
| Cerebrovascular Disease     | 43490 | Cerebral artery occlusion, unspecified witho   | I669   | Occlusion and stenosis of unspecified cerebral artery   | I669   |
| Cerebrovascular Disease     | 43491 | Cerebral artery occlusion, unspecified with c  | I6350  | Cerebral infarction due to unspecified occlusion or stenosis of unspecified cerebral artery                 | I6350  |
| Cerebrovascular Disease     | 4350  | Basilar artery syndrome                        | G450   | Vertebro-basilar artery syndrome  | G450   |
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| Cerebrovascular Disease     | 4371  | Other generalized ischemic cerebrovascular     | I6781  | Acute cerebrovascular insufficiency   | I6781  |
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Interstitial emphysema J982  
Compensatory emphysema J983  
Staphylococcal arthritis, unspecified joint M0000  
Pneumococcal arthritis, unspecified joint M0010  
Other streptococcal arthritis, unspecified joint M0020  
Arthritis due to other bacteria, unspecified joint M0080  
Pyogenic arthritis, unspecified M009  
Staphylococcal arthritis, unspecified shoulder M00019  
Pneumococcal arthritis, unspecified shoulder M00119  
Other streptococcal arthritis, unspecified shoulder M00219  
Arthritis due to other bacteria, unspecified shoulder M00819  
Staphylococcal arthritis, unspecified elbow M00029  
Pneumococcal arthritis, unspecified elbow M00129  
Other streptococcal arthritis, unspecified elbow M00229  
Arthritis due to other bacteria, unspecified elbow M00829  
Staphylococcal arthritis, unspecified wrist M00039  
Pneumococcal arthritis, unspecified wrist M00139  
Other streptococcal arthritis, unspecified wrist M00239  
Arthritis due to other bacteria, unspecified wrist M00839  
Staphylococcal arthritis, unspecified hand M00049  
Pneumococcal arthritis, unspecified hand M00149  
Other streptococcal arthritis, unspecified hand M00249  
Arthritis due to other bacteria, unspecified hand M00849  
Staphylococcal arthritis, unspecified hip M00059  
Pneumococcal arthritis, unspecified hip M00159  
Other streptococcal arthritis, unspecified hip M00259  
Arthritis due to other bacteria, unspecified hip M00859  
Staphylococcal arthritis, unspecified knee M00069  
Pneumococcal arthritis, unspecified knee M00169  
Other streptococcal arthritis, unspecified knee M00269  
Arthritis due to other bacteria, unspecified knee M00869  
Staphylococcal arthritis, unspecified ankle and foot M00079  
Pneumococcal arthritis, unspecified ankle and foot M00179  
Other streptococcal arthritis, unspecified ankle and foot M00279  
Arthritis due to other bacteria, unspecified ankle and foot M00879  
Staphylococcal arthritis, vertebrae M0008  
Pneumococcal arthritis, vertebrae M0018  
Other streptococcal arthritis, vertebrae M0028  
Arthritis due to other bacteria, vertebrae M0088  
Pyogenic arthritis, unspecified M009

|                      |       |   |         |   |
|----------------------|-------|---|---------|---|
| Metastatic Infection | 71109 | Pyogenic arthritis, multiple sites  | M0009   | M0009 Staphylococcal polyarthritis  |
| Metastatic Infection | 71109 | Pyogenic arthritis, multiple sites  | M0019   | M0019 Pneumococcal polyarthritis  |
| Metastatic Infection | 71109 | Pyogenic arthritis, multiple sites  | M0029   | M0029 Other streptococcal polyarthritis   |
| Metastatic Infection | 71109 | Pyogenic arthritis, multiple sites  | M0089   | M0089 Polyarthritis due to other bacteria   |
| Metastatic Infection | 71190 | Unspecified infective arthritis, site unspecified   | M01X0   | M01X0 Direct infection of unspecified joint in infectious and parasitic diseases classified elsewhere                                   |
| Metastatic Infection | 71191 | Unspecified infective arthritis, shoulder region  | M01X19  | M01X19 Direct infection of unspecified shoulder in infectious and parasitic diseases classified elsewhere                               |
| Metastatic Infection | 71192 | Unspecified infective arthritis, upper arm  | M01X29  | M01X29 Direct infection of unspecified elbow in infectious and parasitic diseases classified elsewhere                                  |
| Metastatic Infection | 71193 | Unspecified infective arthritis, forearm  | M01X39  | M01X39 Direct infection of unspecified wrist in infectious and parasitic diseases classified elsewhere                                  |
| Metastatic Infection | 71194 | Unspecified infective arthritis, hand   | M01X49  | M01X49 Direct infection of unspecified hand in infectious and parasitic diseases classified elsewhere                                   |
| Metastatic Infection | 71195 | Unspecified infective arthritis, pelvic region  | M01X59  | M01X59 Direct infection of unspecified hip in infectious and parasitic diseases classified elsewhere                                    |
| Metastatic Infection | 71196 | Unspecified infective arthritis, lower leg  | M01X69  | M01X69 Direct infection of unspecified knee in infectious and parasitic diseases classified elsewhere                                   |
| Metastatic Infection | 71197 | Unspecified infective arthritis, ankle and foot   | M01X79  | M01X79 Direct infection of unspecified ankle and foot in infectious and parasitic diseases classified elsewhere                         |
| Metastatic Infection | 71198 | Unspecified infective arthritis, other specified  | M01X8   | M01X8 Direct infection of vertebrae in infectious and parasitic diseases classified elsewhere   |
| Metastatic Infection | 71199 | Unspecified infective arthritis, multiple sites   | M01X9   | M01X9 Direct infection of multiple joints in infectious and parasitic diseases classified elsewhere                                     |
| Metastatic Infection | 7280  | Infective myositis  | M60009  | M60009 Infective myositis, unspecified site   |
| HIV/AIDS             | 79571 | Nonspecific serologic evidence of human immunodeficiency virus  | R75     | R75 Inconclusive laboratory evidence of human immunodeficiency virus [HIV]  |
| Metastatic Infection | 99661 | Infection and inflammatory reaction due to cardiac valve prosthesis, initial encounter  | T826XXA | T826XXA Infection and inflammatory reaction due to cardiac valve prosthesis, initial encounter  |
| Metastatic Infection | 99661 | Infection and inflammatory reaction due to other cardiac and vascular devices, implants and grafts, initial encounter           | T827XXA | T827XXA Infection and inflammatory reaction due to other cardiac and vascular devices, implants and grafts, initial encounter           |
| Metastatic Infection | 99663 | Infection and inflammatory reaction due to other internal prosthetic devices, implants and grafts, initial encounter            | T8579XA | T8579XA Infection and inflammatory reaction due to other internal prosthetic devices, implants and grafts, initial encounter            |
| Metastatic Infection | 99664 | Infection and inflammatory reaction due to indwelling urinary catheter, initial encounter                                       | T8351XA | T8351XA Infection and inflammatory reaction due to indwelling urinary catheter, initial encounter                                       |
| Metastatic Infection | 99665 | Infection and inflammatory reaction due to prosthetic device, implant and graft in urinary system, initial encounter            | T8359XA | T8359XA Infection and inflammatory reaction due to prosthetic device, implant and graft in urinary system, initial encounter            |
| Metastatic Infection | 99665 | Infection and inflammatory reaction due to prosthetic device, implant and graft in genital tract, initial encounter             | T836XXA | T836XXA Infection and inflammatory reaction due to prosthetic device, implant and graft in genital tract, initial encounter             |
| Metastatic Infection | 99667 | Infection and inflammatory reaction due to internal fixation device of unspecified site, initial encounter                      | T8460XA | T8460XA Infection and inflammatory reaction due to internal fixation device of unspecified site, initial encounter                      |
| Metastatic Infection | 99667 | Infection and inflammatory reaction due to other internal orthopedic prosthetic devices, implants and grafts, initial encounter | T847XXA | T847XXA Infection and inflammatory reaction due to other internal orthopedic prosthetic devices, implants and grafts, initial encounter |
| Metastatic Infection | 99669 | Infection and inflammatory reaction due to other internal prosthetic devices, implants and grafts, initial encounter            | T8579XA | T8579XA Infection and inflammatory reaction due to other internal prosthetic devices, implants and grafts, initial encounter            |
| HIV/AIDS             | V08   | Asymptomatic human immunodeficiency virus infection status  | Z21     | Z21 Asymptomatic human immunodeficiency virus [HIV] infection status  |



## S.15. Detailed risk model specifications

### Model Coefficients

| Covariate   | Coefficient | Odds Ratio | P-value |
|---|-------------|------------|---------|
| <b>Age</b>  |             |            |         |
| 18-<25  | 0.073       | 1.076      | 0.53    |
| 25-<59  | 0.087       | 1.091      | <.0001  |
| 60-<75  | reference   |            |         |
| 75+   | -0.202      | 0.817      | <.0001  |
| <b>BMI</b>  |             |            |         |
| underweight(< 18.5)   | -0.215      | 0.806      | 0.001   |
| normal(18.5 - 24.9)   | reference   |            |         |
| overweight(>24.9 )  | 0.054       | 1.055      | 0.026   |
| <b>Nursing home status*</b>   | -0.321      | 0.726      | <.0001  |
| <b>Nephrologist's Care prior to ESRD*</b>                                       | 0.257       | 1.293      | <.0001  |
| <b>Duration of ESRD</b>   |             |            |         |
| <1 year   | -1.171      | 0.31       | <.0001  |
| 1-<5 years  | reference   |            |         |
| 5-<9 years  | -0.234      | 0.792      | <.0001  |
| 9+  | -0.602      | 0.548      | <.0001  |
| <b>Primary Cause of ESRD</b>  |             |            |         |
| Diabetes  | -0.053      | 0.948      | 0.034   |
| Other   | reference   |            |         |
| <b>Comorbidities*</b>   |             |            |         |
| Diabetes (NOT as primary cause of ESRD)   | -0.121      | 0.886      | <.0001  |
| Heart Failure   | -0.046      | 0.955      | 0.038   |
| Other Heart Diseases  | -0.037      | 0.963      | 0.114   |
| Peripheral Vascular Disease   | -0.34       | 0.712      | <.0001  |
| Cerebrovascular Disease   | -0.113      | 0.893      | <.0001  |
| Chronic Obstructive Pulmonary Disease   | -0.083      | 0.921      | 0.001   |
| Drug Dependence   | -0.207      | 0.813      | <.0001  |
| Inability to ambulate/transfer  | -0.497      | 0.609      | <.0001  |
| Anemia (unrelated to ESRD/CKD)  | -0.049      | 0.952      | 0.228   |
| <br>  |             |            |         |
| Non-Vascular Access-Related Infections:<br>Pneumonia/Hepatitis/HIV/Tuberculosis | -0.286      | 0.751      | <.0001  |
| <br>  |             |            |         |
| Less than 6-months of eligible Medicare<br>claims in past 12 months             | -0.447      | 0.64       | <.0001  |

\* 'No reported comorbidity' was used as the reference.

## S.15. Detailed risk model specifications

Let  $n_i$  be the number of patients treated at the  $i^{\text{th}}$  facility (for  $i = 1, \dots, F$ ),  $x_{ijm}$  be a vector of the patient characteristics, and  $p_{ijm}$  be the probability of dialyzing with an AVF for the  $j^{\text{th}}$  patient in the  $i^{\text{th}}$  facility (for  $j = 1, \dots, n_i$ ) in the  $m^{\text{th}}$  month. To estimate facility effects, we use the following logistic regression model

$$\text{logit}(p_{ijm}) = \alpha_i + \beta'x_{ijm},$$

and denote the resulting estimates of facility effects ( $\alpha_1, \dots, \alpha_F$ ) by  $(a_1, \dots, a_F)$  and the estimates of the risk effects  $\beta$  by  $b$ .

The model is fitted using Generalized Estimating Equations (GEE; Liang and Zeger, 1986) in order to account for the correlation within-patient across months. With 6,000 facilities, it is difficult to estimate all parameters (i.e., including the facility indicators) simultaneously. Therefore, we break the fitting process into two stages. At the first stage, we estimate the  $\beta$  vector by averaging 10 random subgroups of approximately 600 facilities each. At the second stage, we then estimate the  $\alpha_i$  ( $i=1, \dots, 6000$ ) by fitting facility-specific intercept-only GEE models, with the linear predictor from the first stage,  $\beta'x_{ijm}$ , serving as an offset. Per well-established GEE results (e.g., Liang and Zeger, 1986), the estimator of  $\alpha_i$  is consistent for its target value, and follows a normal distribution with standard error given by the robust 'sandwich' estimator computed via GEE. We can then compute  $SFR_i$  for each facility  $i$  as follows:

$$SFR_k = \sum_i \sum_j \sum_m \exp(a_k + b'x_{ijm}) / \{1 + \exp(a_k + b'x_{ijm})\} / n,$$

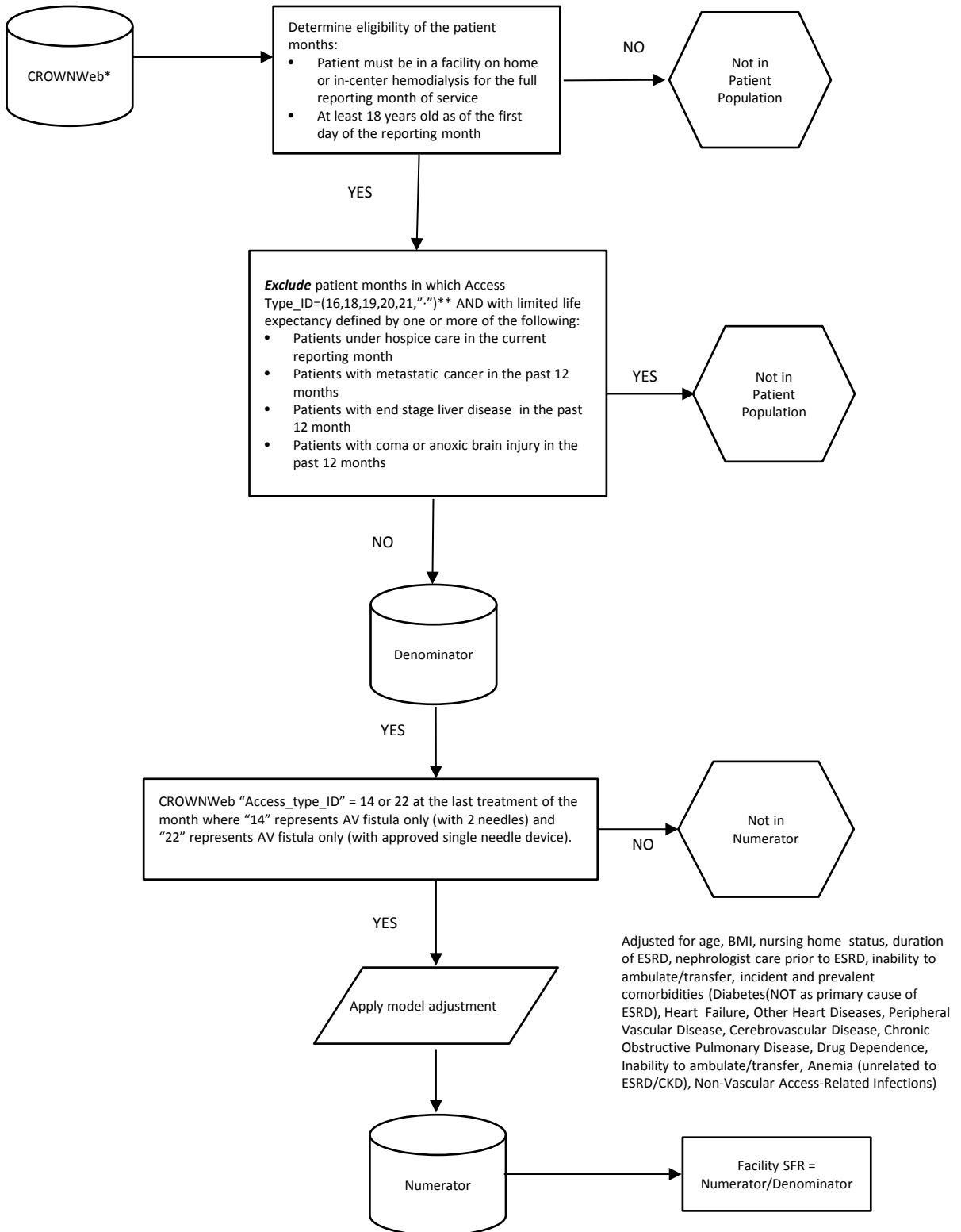
where  $n$  = total number of patient-months included in the overall study sample.

# **APPENDIX**

## **Hemodialysis Vascular Access: Standardized Fistula Rate**

# S.19: Calculation Flow Chart

## Hemodialysis Vascular Access: Standardized Fistula Rate



\*Multiple data sources include CMS Consolidated Renal Operations in a Web-enabled Network (CROWNWeb), the CMS Annual Facility Survey (Form CMS-2744), Medicare dialysis and hospital payment records, the CMS Medical Evidence Form (Form CMS-2728), transplant data from the Organ Procurement and Transplant Network (OPTN), the Death Notification Form (Form CMS-2746), the Dialysis Facility Compare (DFC) and the Social Security Death Master File.

\*\*Access\_Type\_ID "16" represents AV Fistula combined with a Catheter, "18" represents AV Graft combined with a Catheter, "19" represents Catheter only, "20" represents Port access only, "21" represents other/unknown, and "." represents missing.

### 2b4.3. Conceptual, Clinical, and Statistical Methods

Using data from January 2014 we compared to the final model analysis results of two alternative risk adjustment models that included: 1) no comorbidity adjustment at all (denoted as Model 0), and 2) comorbidities reported on the CMS-2728 only (denoted as Model 1).

Table A1: Comparison of C-statistics adjusted and not adjusted for comorbidities

|                    | <b>Adjustments</b>  | <b>C-statistic</b> |
|--------------------|---|--------------------|
| <b>Model 0</b>     | Age, BMI, nursing home status, nephrologist's care prior to ESRD, duration of ESRD, primary cause of ESRD     | 0.688              |
| <b>Model 1</b>     | All adjustors in Model 0 + <b>comorbidities in CMS-2728 only</b>  | 0.691              |
| <b>Final Model</b> | All adjustors in Model 0 + <b>comorbidities in either CMS-2728 or Medicare claims filed in past 12 months</b> | 0.700              |

Table A2: Multivariate analysis results from the models with and without the respective comorbidity adjustments.

| <b>Covariate</b>                          | <b>Model 0</b> |        | <b>Model 1</b> |        | <b>Final Model</b> |        |
|---|----------------|--------|----------------|--------|--------------------|--------|
|   | Coefficient    | P      | Coefficient    | P      | Coefficient        | P      |
| <b>Age</b>                                |                |        |                |        |                    |        |
| 18-<25                                    | 0.146          | 0.001  | 0.069          | 0.131  | 0.073              | 0.530  |
| 25-<59                                    | 0.131          | <.0001 | 0.102          | <.0001 | 0.087              | 0.000  |
| 60-<75                                    | reference      |        | reference      |        | reference          |        |
| 75+                                       | -0.209         | <.0001 | -0.202         | <.0001 | -0.202             | <.0001 |
| <b>BMI</b>                                |                |        |                |        |                    |        |
| underweight(< 18.5)                       | -0.222         | <.0001 | -0.214         | <.0001 | -0.215             | 0.001  |
| normal(18.5 - 24.9)                       | reference      |        | reference      |        | reference          |        |
| overweight(>24.9 )                        | 0.038          | <.0001 | 0.049          | <.0001 | 0.054              | 0.026  |
| <b>Nursing home status*</b>               | -0.578         | <.0001 | -0.511         | <.0001 | -0.321             | <.0001 |
| <b>Nephrologist's Care prior to ESRD*</b> | 0.268          | <.0001 | 0.259          | <.0001 | 0.257              | <.0001 |
| <b>Duration of ESRD</b>                   |                |        |                |        |                    |        |
| <1 year                                   | -1.157         | <.0001 | -1.151         | <.0001 | -1.171             | 0.000  |
| 1-<5 years                                | reference      |        | reference      |        | reference          |        |
| 5-< 9 years                               | -0.202         | <.0001 | -0.226         | <.0001 | -0.234             | 0.000  |

|   |           |        |           |        |           |        |
|---|-----------|--------|-----------|--------|-----------|--------|
| 9+  | -0.547    | <.0001 | -0.609    | <.0001 | -0.602    | 0.000  |
| <b>Primary cause of ESRD</b>  |           |        |           |        |           |        |
| Diabetes  | -0.058    | <.0001 | -0.069    | <.0001 | -0.053    | 0.034  |
| Other   | reference |        | reference |        | reference |        |
| <b>Comorbidities*</b>   |           |        |           |        |           |        |
| Diabetes (NOT as primary cause of ESRD)   |           |        | -0.128    | <.0001 | -0.121    | <.0001 |
| Heart Failure   |           |        | -0.093    | <.0001 | -0.046    | 0.038  |
| Other Heart Diseases  |           |        | -0.013    | 0.191  | -0.037    | 0.114  |
| Peripheral Vascular Disease   |           |        | -0.068    | <.0001 | -0.340    | <.0001 |
| Cerebrovascular Disease   |           |        | -0.144    | <.0001 | -0.113    | <.0001 |
| Chronic Obstructive Pulmonary Disease   |           |        | -0.110    | <.0001 | -0.083    | 0.001  |
| Drug Dependence   |           |        | -0.198    | <.0001 | -0.207    | <.0001 |
| Inability to ambulate/transfer  |           |        | -0.494    | <.0001 | -0.497    | <.0001 |
| Anemia (unrelated to ESRD/CKD)  |           |        | N/A       |        | -0.049    | 0.228  |
| Non-Vascular Access-Related Infections:<br>Pneumonias/Hepatitis/HIV/AIDS/Tuberculosis |           |        | N/A       |        | -0.286    | <.0001 |
| Less than 6-months of Medicare coverage in<br>past 12 months                          |           |        | N/A       |        | -0.447    | <.0001 |
| <b>* 'No' reported comorbidity used as<br/>reference.</b>                             |           |        |           |        |           |        |