INR for Individuals Taking Warfarin and Interacting Anti-Infective Medications

3a Measure Information Form (MIF)

Data Source

Electronic administrative data/claims; pharmacy data; Part D enrollment data; beneficiary data

Measure Set ID

TBD

Version Number and Effective Date

Version 3

January 1, 2012 – December 31, 2012

CMS Approval Date

TBD

NQF ID

NQF #556

Date Endorsed

August 5, 2009

Care Setting

Ambulatory care

Office

Unit of Measurement

Population: States

Clinicians: Group

Measurement Duration

Numerator time window: 3 to 7 days after the start of an anti-infective medication

Denominator time window: The first 358 days of the measurement period

Measurement Period

Year

Measure Type

Process

Measure Scoring

Rate/Proportion

Payer Source

Prescription Drug Plans (PDPs)

Medicare fee-for-service (FFS)

Improvement Notation

Better quality = higher score

Measure steward

Centers for Medicare & Medicaid Services （CMS)

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Not applicable

Measure Description

Percentage of episodes with an International Normalized Ratio (INR) test performed 3 to 7 days after a newly started interacting anti-infective medication for individuals receiving warfarin

Rationale

Warfarin is frequently used in the elderly to avoid thromboses and embolic events, such as stroke. It inhibits coagulation as an antagonist to vitamin K, which is a key factor in the production of several coagulation factors. However, its narrow range of therapeutic control (Lane & Lip, 2007) along with the likelihood for adverse interactions when taken with other drugs (Krajewski, 2010; Lane & Lip, 2007), necessitate the careful monitoring of patients taking warfarin. A study by White et al. (2007) found that patients with poor international normalized ratio (INR) control experienced higher rates of mortality and major bleeding episodes when compared to those with good or moderate INR control. Schelleman et al. (2008) found that warfarin users taking anti-infectives had increased risk of GI bleeding.

Warfarin has been used for more than 50 years in clinical practice and is the most commonly prescribed anticoagulant in the United States, with more than 31 million prescriptions issued in 2004 (Wysowski, Nourjah, & Swartz, 2007). Despite the extensive use of warfarin, it remains one of the primary drugs responsible for adverse drug events (ADEs), particularly among the elderly. In fact, in a recent publication by Budnitz et al. (2006), among patients aged 65 and older, their analysis suggested that only three drugs (insulin, warfarin, and digoxin) were responsible for one out of every three estimated ADEs treated in emergency departments in the United States. For warfarin, the annual estimate of ADEs treated in emergency departments in the United States overall was 43,401 (Budnitz et al., 2006). In addition, an analysis of the FDA's Adverse Drug Event Reporting System found that warfarin ranked seventh overall in drugs identified to cause disability or other serious outcome, which was defined as "hospitalization, required intervention, or life-threatening or other serious outcome" (Moore, Cohen, & Furberg, 2007). An important consideration for avoiding adverse events is maintaining patients within the therapeutic range through appropriate and timely monitoring. A recent systematic review, which incorporated data from 67 studies, with a goal of describing the effect of study setting on anticoagulation control, found across all patients that the time spent in the therapeutic range was 63.6%, whereas in the community setting, patients spent on average approximately 55% of the time in the therapeutic range (Van Walraven, Jennings, Oake,

Fergusson, & Forster, 2006; Van Walraven, Oake, Wells, & Forster, 2007). Similarly, in an analysis of warfarin safety within the nursing home setting, patients were found to be within the therapeutic range only 49.6% of the time. Further data from the nursing home study identified 720 adverse warfarin-related events among 490 patients on warfarin over one year, with 11% of the events deemed serious and 2% life-threatening or fatal. Twenty-nine percent of all of the events were considered preventable, whereas 57% of the serious and life-threatening events were considered preventable (Gurwitz et al., 2007).

References:

Budnitz, D. S., Pollock, D. A., Weidenbach, K. N., Mendelsohn, A. B., Schroeder, T. J., & Annest, J. L. (2006). National surveillance of emergency department visits for outpatient adverse drug events. *Journal of the American Medical Association, 296*(15), 1858-66.

Gurwitz, J. H., Field, T. S., Radford, M. J., Harrold, L. R., Becker, R., Reed, G., et al. (2007). The safety of warfarin therapy in the nursing home setting. *American Journal of Medicine, 120*(6), 539-44.

Krajewski, K. C. (2010). Inability to achieve a therapeutic INR value while on concurrent warfarin and rifampin. *Journal of Clinical Pharmacology, 7*, 7.

Lane, D. A. & Lip, G. Y. (2007). Maintaining therapeutic anticoagulation: The importance of keeping "within range." *Chest, 131*(5), 1277-1279.

Moore, T. J., Cohen, M. R., & Furberg, C. D. (2007). Serious adverse drug events reported to the Food and Drug Administration, 1998-2005. *Archives of Internal Medicine, 167*(16), 1752-9.

Schelleman, H., Bilker, W. B., Brensinger, C. M., Han, X., Kimmel, S. E., & Hennessy, S. (2008). Warfarin with fluoroquinolones, sulfonamides, or azole antifungals: Interactions and the risk of hospitalization for gastrointestinal bleeding. *Clinical Pharmacology and Therapeutics, 84*(5): 581-588.

Van Walraven, C., Jennings, A., Oake, N., Fergusson, D., & Forster, A. J. (2006). Effect of study setting on anticoagulation control: A systematic review and metaregression. *Chest, 129*(5), 1155-66.

Van Walraven, C., Oake, N., Wells, P. S., & Forster, A. J. (2007). Burden of potentially avoidable anticoagulant-associated hemorrhagic and thromboembolic events in the elderly. *Chest, 131*(5), 1508-15.

White, H. D., M. Gruber, Feyzi, J., Kaatz, S., Tse, H. F., Husted, S., et al. (2007). Comparison of outcomes among patients randomized to warfarin therapy according to anticoagulant control: Results from SPORTIF III and V. *Archives of Internal Medicine, 167*(3), 239-245.

Wysowski, D. K., Nourjah, P., & Swartz, L. (2007). Bleeding complications with warfarin use: A prevalent adverse effect resulting in regulatory action. *Archives of Internal Medicine, 167*(13), 1414-9.

Clinical Recommendation Statement

The American College of Chest Physicians (ACCP) has published evidence-based guidelines regarding the management of vitamin K antagonists, which include the following statements regarding INR monitoring related to drug-drug interactions (Ansell et al., 2008):

"Environmental factors such as drugs, diet, and various disease states can alter the pharmacokinetics of warfarin…Consequently, the international normalized ratio (INR) should be measured more frequently than the usual 4-week interval when virtually any drug or herbal medicine is added or withdrawn from the regimen of a patient treated with warfarin."

References

Ansell, J., Hirsh, J., Hylek, E., Jacobson, A., Crowther, M., & Palareti, G. (2008). Pharmacology and management of the vitamin K antagonists: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines (8th Edition). *Chest, 133*(6 Suppl), 160S-198S.

Release Notes/Summary of Changes

Statement of intent for the selection of ICD-10 codes: The goal was to convert this measure to a new code set, fully consistent with the intent of the original measure.

2011 Updates

- Clarified unit of analysis and added optional physician group attribution algorithm.
- Updated National Drug Codes (NDCs) as of October 28, 2011.
- Updated ICD-9-CM diagnosis codes with 2011 changes (V10.9 updated with V10.90, V10.91).
- Updated interacting anti-infective medications.
- Added: kanamycin, dicloxacillin, amoxicillin, cloxacillin, oxytetracycline, peginterferon alfa-2b.
- Removed: miconazole, cefazolin, ceftriaxone.

2012 Updates

- Updated National Drug Codes (NDCs) as of October 31, 2012.
- See Codes Table attachment for NDC Updates and ICD-9-CM to ICD-10-CM Crosswalk.
- Modified age requirement to at least 18 at the beginning of the measurement period.

Technical Specifications

- **Target Population**

  At least 18 years of age as of the beginning of the measurement period.

Denominator

- **Denominator Statement**

  Number of episodes with a newly started interacting anti-infective medication with an overlapping days' supply of warfarin

- **Denominator Details**

  Individuals must have at least 2 claims for warfarin on different dates of service. If more than one prescription for warfarin with the same date of service overlaps an interacting anti-infective medication, then keep the prescription with the greatest days' supply. If more than one prescription for warfarin with different dates of service overlaps an interacting anti-infective medication, then keep the episode with the greatest number of overlapping days.

  WARFARIN MEDICATIONS:
  Anticoagulants: warfarin

  ANTI-INFECTIVE MEDICATIONS:

  Aminoglycosides
  Active ingredients: neomycin, paromomycin, kanamycin
  Anticoagulant effect: Increased
  Drug interaction facts significance rating: 4

Antifungal Agents
Active ingredients: fluconazole, voriconazole
Anticoagulant effect: Increased
Drug interaction facts significance rating: 1

Active ingredients: griseofulvin
Anticoagulant effect: Decreased
Drug interaction facts significance rating: 2

Active ingredients: itraconazole, ketoconazole
Anticoagulant effect: Increased
Drug interaction facts significance rating: 3

Active ingredients: terbinafine
Anticoagulant effect: Increased/decreased
Drug interaction facts significance rating: 3

Antiviral
Active ingredients: Amprenavir, interferon-alfa, interferon-beta
Anticoagulant effect: Increased
Drug interaction facts significance rating: 4

Active ingredients: ribavirin
Anticoagulant effect: Decreased
Drug interaction facts significance rating: 4

Active ingredients: rifampin
Anticoagulant effect: Decreased
Drug interaction facts significance rating: 1

Active ingredients: oseltamivir
Anticoagulant effect: Increased
Drug interaction facts significance rating: 4

Active ingredients: atazanavir, darunavir, fosamprenavir, indinavir, nelfinavir, ritonavir, saquinavir, tipranavir
Anticoagulant effect: Increased/decreased
Drug interaction facts significance rating: 4

Active ingredients: nevirapine
Anticoagulant effect: Decreased
Drug interaction facts significance rating: 2

Cephalosporins
Active ingredients: cefotetan
Anticoagulant effect: Increased
Drug interaction facts significance rating: 1

Fluoroquinolones
Active ingredients: ciprofloxacin, levofloxacin, moxifloxacin, norfloxacin, ofloxacin
Anticoagulant effect: Increased
Drug interaction facts significance rating: 1

Macrolides
Active ingredients: azithromycin, clarithromycin, erythromycin
Anticoagulant effect: Increased
Drug interaction facts significance rating: 1

Penicillin
Active ingredients: nafcillin, dicloxacillin
Anticoagulant effect: Decreased
Drug interaction facts significance rating: 2

Active ingredients: ampicillin, oxacillin, penicillin G, piperacillin, ticarcillin, amoxicillin, cloxacillin
Anticoagulant effect: Increased
Drug interaction facts significance rating: 4

Tetracycline
Active ingredients: demeclocycline, doxycycline, minocycline, tetracycline, oxytetracycline
Anticoagulant effect: Increased
Drug interaction facts significance rating: 1

Others
Active ingredients: rifabutin, rifapentine
Anticoagulant effect: Decreased
Drug interaction facts significance rating: 1

Anti-infective Agents – Misc
Active ingredients: sulfamethoxazole, chloramphenicol, telithromycin, metronidazole, tinidazole
Anticoagulant effect: Increased
Drug interaction facts significance rating: 1

Active ingredients: sulfisoxazole, drotrecogin alfa,
Anticoagulant effect: Increased
Drug interaction facts significance rating: 4

Active ingredients: rifaximin
Anticoagulant effect: Decreased
Drug interaction facts significance rating: 4

Interferons
Active ingredients: peginterferon alfa-2b
Anticoagulant effect: Decreased
Drug interaction facts significance rating: 2

Anti-malarial
Active ingredients: atovaquone, mefloquine, proguanil
Anticoagulant effect: Increased
Drug interaction facts significance rating: 1

Active ingredients: quinine
Anticoagulant effect: Increased
Drug interaction facts significance rating: 4

Note: Adapted from (Holbrook et al., 2005; Tatro, 2007). Drugs listed were selected based on a significance rating of 1, 2, 3, or 4 per Drug Interaction Facts. Excludes the following routes of administration: external

(EX), inhalation (IN), irrigation (IR), ophthalmic (OP), otic (OT), mouth/throat preparations (MT), and route does not apply (XX). Isoniazid was excluded because the interaction is dose-dependent. All other formulations and combination products of the active ingredients listed are included unless otherwise noted. Obsolete drug products are excluded from NDCs with an inactive date more than 3 years prior to the beginning of the measurement period or look-back period, if applicable. Updated: First Databank and Medi-Span, 2012.

References:

Holbrook, A. M., Pereira, J. A., Labiris, R., McDonald, H., Douketis, J. D., Crowther, M., et al. (2005). Systematic overview of warfarin and its drug and food interactions. *Archives of Internal Medicine, 165*(10), 1095-1106.

Tatro, D. S. (Ed.). (2007). *Drug Interaction Facts*. Conshohocken, Pa: Wolters Kluwer Health.

- **Denominator Exceptions and Exclusions**

  We excluded the following individuals from the denominator:

  Individuals with a diagnosis of cancer

  Optional Exclusion:

  Individuals who are monitoring INR at home

- **Denominator Exceptions and Exclusions Details**

  CODES USED TO IDENTIFY CANCER:
  ICD-9-CM: 210.0-228.1, 273.3, 288.3, V10.00-V10.89, V10.90, V10.91, V87.41

  ICD-10-CM: C88.0, D10.0, D10.1, D10.2, D10.30, D10.39, D10.4, D10.5, D10.6, D10.7, D10.9, D11.0, D11.7, D11.9, D12.0, D12.1, D12.2, D12.3, D12.4, D12.5, D12.6, D12.7, D12.8, D12.9, D13.0, D13.1, D13.2, D13.30, D13.39, D13.4, D13.5, D13.6, D13.7, D13.9, D14.0, D14.1, D14.2, D14.30, D14.31, D14.32, D14.4, D15.0, D15.1, D15.2, D15.7, D15.9, D16.00, D16.01, D16.02, D16.10, D16.11, D16.12, D16.20, D16.21, D16.22, D16.30, D16.31, D16.32, D16.4, D16.5, D16.6, D16.7, D16.8, D16.9, D17.0, D17.1, D17.20, D17.21, D17.22, D17.23, D17.24, D17.30, D17.39, D17.4, D17.5, D17.6, D17.7, D17.9, D18.00, D18.01, D18.02, D18.03, D18.09, D18.1, D19.0, D19.1, D20.0, D20.1, D21.0, D21.10, D21.11, D21.12, D21.20, D21.21, D21.22, D21.3, D21.4, D21.5, D21.6, D21.9, D22.0, D22.10, D22.11, D22.12, D22.20, D22.21, D22.22, D22.30, D22.39, D22.4, D22.5, D22.60, D22.61, D22.62, D22.70, D22.71, D22.72, D22.9, D23.0, D23.10, D23.11, D23.12, D23.20, D23.21, D23.22, D23.30, D23.39, D23.4, D23.5, D23.60, D23.61, D23.62, D23.70, D23.71, D23.72, D23.9, D24.1, D24.2, D24.9, D25.0, D25.1, D25.2, D25.9, D26.0, D26.1, D26.7, D26.9, D27.0, D27.1, D27.9, D28.0, D28.1, D28.2, D28.7, D28.9, D29.0, D29.1, D29.20, D29.21, D29.22, D29.30, D29.31, D29.32, D29.4, D29.8, D29.9, D30.00, D30.01, D30.02, D30.10, D30.11, D30.12, D30.20, D30.21, D30.22, D30.3, D30.4, D30.8, D30.9, D31.00, D31.01, D31.02, D31.10, D31.11, D31.12, D31.20, D31.21, D31.22, D31.30, D31.31, D31.32, D31.40, D31.41, D31.42, D31.50, D31.51, D31.52, D31.60, D31.61, D31.62, D31.90, D31.91, D31.92, D32.0, D32.1, D32.9, D33.0, D33.1, D33.2 ,D33.3, D33.4, D33.7, D33.9, D34, D35.00, D35.01, D35.02, D35.1, D35.2, D35.3, D35.4, D35.5, D35.6, D35.7, D35.9, D36.10, D36.11, D36.12, D36.13, D36.14, D36.15, D36.16, D36.17, D72.1, K31.7, K63.5, Z85.00, Z85.01, Z85.020, Z85.028, Z85.030, Z85.038, Z85.040, Z85.048, Z85.05, Z85.060, Z85.068, Z85.07, Z85.09, Z85.110, Z85.118, Z85.12, Z85.20, Z85.21, Z85.22, Z85.230, Z85.238, Z85.29, Z85.3, Z85.40, Z85.41, Z85.42, Z85.43, Z85.44, Z85.45, Z85.46, Z85.47, Z85.48, Z85.49, Z85.50, Z85.51, Z85.520, Z85.528, Z85.53, Z85.59, Z85.6, Z85.71, Z85.72, Z85.79, Z85.810, Z85.818, Z85.819, Z85.820, Z85.821, Z85.828, Z85.830, Z85.831, Z85.840, Z85.841, Z85.848, Z85.850, Z85.858, Z85.89, Z85.9, Z92.21

  Optional Exclusion:

  Individuals who are monitoring INR at home identified by HCPCS (G0248-G0250)

Numerator

- **Numerator Statement**

  Number of episodes in the denominator with an INR test performed 3 to 7 days after the start date of an anti-infective medication

- **Numerator Details**

  Hospitalizations of more than 48 hours are counted as an INR test.

  Codes Used to Identify INR Monitoring:

  Prothrombin time CPT: 85610

  Source: American Medical Association (2006). Updated: AMA (2009).

Stratification or Risk Adjustment

Depending on the operational use of the measure, measure results will be stratified by:

- State
- Physician Group*
- Gender
- Age – Divide age group 18-64 into 3 categories: 18-24, 25-44, 45-64
- Race/ethnicity
- Dual Eligibility

*See algorithm section below for physician group attribution methodology used for this measure.

No risk adjustment necessary

Sampling

Not applicable

Calculation Algorithm

Create Denominator:

1. Pull individuals who are 18 or older as of January 1 of the measurement period.

2. Include individuals who were continuously enrolled in Part D coverage during the measurement year, with no more than a one-month gap in enrollment during the measurement year.

3. Include individuals who had no more than a one-month gap in Part A enrollment, no more than a one-month gap in Part B enrollment, and no more than 1 month of HMO enrollment during the current measurement year (FFS individuals only).

4. Identify and delete individuals with cancer, based on Part A and B claims.

5. Pull all warfarin claims from the Part D claims data for the individuals still eligible in Step 4.

6. From the dataset created in Step 5, include those individuals with at least two claims for warfarin on different dates of service.

7. Using the dataset from Step 6, calculate the warfarin start date and warfarin end date.

8. Pull all anti-infective claims from the Part D claims data.

9. From the dataset in Step 8, keep the anti-infective prescription with the highest days' supply for each unique date for each individual.

10. From the dataset in Step 9, keep only the "newly-started" anti-infectives (no other anti-infective in the prior 30 days).

11. Using the dataset from Step 10, calculate the anti-infective start date and anti-infective end date.

12. Merge the warfarin claims dataset from Step 7 and the anti-infective dataset from Step 11, keeping only the individuals' episodes where there are overlapping days' supply of warfarin therapy and anti-infective therapy. If there is more than one anti-infective started on the same date, keep the overlap episode with the largest overlapping period.

Create Numerator:

1. Pull all individuals who had an INR test performed, identified using a CPT code, or who had a hospitalization of more than 48 hours during the measurement period from the Part A and Part B claims data.

2. Of the individuals identified in Step 1, keep those that are also included in the denominator.

3. Compare start date of anti-infective medication with the INR/hospitalization date.

4. Keep only the claims where the INR/hospitalization date occurred at least 3 days after the start of the anti-infective therapy.

5. Keep unique episodes of anti-infective date and first occurring INR test/hospitalization.

6. Keep the episodes in which the first INR/hospitalization occurred within 3-7 days after the start of the anti-infective.

Physician Group Attribution:

Physician group attribution was adapted from *Generating Medicare Physician Quality Performance Measurement Results (GEM) Project: Physician and Other Provider Grouping and Patient Attribution Methodologies* (http://www.cms.gov/GEM). The following is intended as guidance and reflects only one of many methodologies for assigning individuals to a medical group. Please note that the physician group attribution methodology excludes patients that died, even though the overall measure does not.

I. Identify Physician and Medical Groups

1. Identify all Tax Identification Numbers (TINs)/National Provider Identification (NPI)/UPIN combinations from all Part B claims in the measurement year and the prior year. The NPI for the performing provider is used.

   If no NPI is available on the claim, check other data sources, such as CMS provider tables or the National Plan and Provider Enumeration System (NPPES), for a current NPI, based on the physician UPIN. Keep records with valid NPI. Valid NPIs have 10 numeric characters (no alpha characters).

   Note: Due to NPI implementation, UPINs are not necessary for attribution using Part B data from 2008 and later.

2. For valid NPIs, pull credentials and specialty code(s). Credentials and specialty codes are pulled in the following order:
    a. From the CMS provider tables
    b. If not found in A, then pull from NPPES

3. Create 1 record per NPI with all credentials and all specialties. A provider may have more than 1 specialty.

4. Attach TIN to NPI, keeping only those records with credentials indicating a physician (MD or DO), physician assistant (PA), or nurse practitioner (NP).

5. Identify medical group TINs: Medical group TINs are defined as TINs that had physician, physician assistant, or nurse practitioner provider specialty codes on at least 50% of Part B carrier claim line items billed by the TIN during the measurement year or prior year. (The provider specialty codes are listed after Patient Attribution.)
    a. Pull Part B records billed by TINS identified in #4 during the measurement year and prior year.
    b. Identify claims that had the performing NPI (npi_prfrmg) in the list of eligible physicians/TINs, keeping those that match by TIN, performing NPI, and provider state code.
    c. Calculate the percent of Part B claims that match by TIN, npi_prfrmg, and provider state code for each TIN, keeping those TINs with percent greater than or equal to 50%.
    d. Delete invalid TINs. Examples of invalid TINs are defined as having the same value for all 9 digits or values of 012345678, 012345678, 123456789, 987654321, or 87654321.

6. Identify TINs that are not solo practices.
    a. Pull Part B records billed by physicians identified in #4 for the measurement year and/or prior year. If the performing NPI is not on the claim, match to obtain NPI from the list created in #4 by UPIN.
    b. Count unique NPIs per TIN.
    c. Keep only those TINs having 2 or more providers.
    d. Delete invalid TINs. Examples of invalid TINs are defined as having the same value for all 9 digits or values of 012345678, 012345678, 123456789, 987654321, or 87654321.

7. Create final group of TINs from #5 and #6 (TINs that are medical groups and are not solo practices).

8. Create file of TINs and NPIs associated with those TINs. These are now referred to as the medical group TINs.

II. Identify Individual Sample and Claims

9. Create individual sample.
    a. Pull individuals with 11+ months of Parts A, B, & D during the measurement year.
    b. Verify the individual did not have any months with Medicare as secondary payor. Remove individuals with BENE_PRMRY_PYR_CD not equal to one of the following:
        i. A = working-age individual/spouse with EGHP
        ii. B = ESRD in the 18-month coordination period with an employer group health plan
        iii. G = working disabled for any month of the year
    c. Verify the individual resides in the U.S., Puerto Rico, Virgin Islands or Washington D.C.
    d. Exclude individuals that enter the Medicare hospice at any point during the measurement year.
    e. Exclude individuals that died during the measurement year.

10. For individuals identified in #9, pull office visit claims that occur during the measurement year and in the 6 months prior to the measurement year.
    a. Office visit claims have CPT codes of 99201-99205, 99211-99215, and 99241-99245.
    b. Exclude claims with no physician_upin and no npi_prfrmg.

11. Attach medical group TIN to claims by NPI or UPIN if no performing NPI is available.

III. Patient Attribution

12. Pull all Part B office claims from #11 with designated specialties indicating primary care, cardiology, oncology, cardiac surgery, or orthopedic surgery (see list of provider specialties and specialty codes). Attribute each individual to at most 1 medical group TIN for each measure.
    a. Evaluate specialty on claim (HSE_B_HCFA_PRVDR_SPCLTY_CD) first. If specialty on claim does not match any of the measure-specific specialties, then check additional specialty fields.
    b. If the provider specialty indicates nurse practitioners or physician assistants ('50' or '97'), then check additional specialty codes

13. For each individual, count claims per medical group TIN. Keep only individuals with 2 or more E&M claims.

14. Attribute individual to the medical group TIN with the most claims. If a tie occurs between medical group TINs, attribute the TIN with most recent claim.

15. Attach the medical group TIN to the denominator and numerator files by individual.

Provider Specialties and Specialty Codes

Provider specialties and specialty codes include only physician, physician assistants, and nurse practitioners for physician grouping, TIN selection, and patient attribution. The provider specialty codes and the associated provider specialty are shown below:

01—General practice*
02—General surgery
03—Allergy/immunology
04—Otolaryngology
05—Anesthesiology
06—Cardiology*
07—Dermatology
08—Family practice*
09—Interventional pain management
10—Gastroenterology
11—Internal medicine*
12—Osteopathic manipulative therapy
13—Neurology
14—Neurosurgery
16—Obstetrics/gynecology*
18—Ophthalmology
20—Orthopedic surgery*
22—Pathology
24—Plastic and reconstructive surgery
25—Physical medicine and rehabilitation
26—Psychiatry
28—Colorectal surgery
29—Pulmonary disease
30—Diagnostic radiology
33—Thoracic surgery
34—Urology
36—Nuclear medicine
37—Pediatric medicine
38—Geriatric medicine*

39—Nephrology
40—Hand surgery
44—Infectious disease
46—Endocrinology
50—Nurse practitioner*
66—Rheumatology
70—Multi-specialty clinic or group practice*
72—Pain management
76—Peripheral vascular disease
77—Vascular surgery
78—Cardiac surgery*
79—Addiction medicine
81—Critical care (intensivists)
82—Hematology
83—Hematology/oncology
84—Preventive medicine*
85—Maxillofacial surgery
86—Neuropsychiatry
90—Medical oncology*
91—Surgical oncology*
92—Radiation oncology*
93—Emergency medicine
94—Interventional radiology
97—Physician assistant*
98—Gynecologist/oncologist
99—Unknown Physician Specialty
Other—NA

*Provider specialty codes specific to this measure.