



NON-INTERVENTIONAL (NI) STUDY PROTOCOL

Study information

Title	Evaluation of Anticoagulants among Venous Thromboembolism Patients with Active Cancer: Pooled Analysis from Claims Databases
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Research question and objectives	Aim 1: Compare the demographic and clinical characteristics among venous thromboembolism (VTE) patients with active cancer prescribed apixaban, low molecular weight heparin (LMWH), or warfarin. Aim 2: Evaluate treatment patterns among VTE patients with active cancer prescribed apixaban, LMWH, or warfarin. Aim3: Compare the risk of major bleeding, clinically relevant nonmajor (CRNM) bleeding and recurrent VTE within 6 months and using all available follow-up period among VTE patients with active cancer prescribed apixaban, LMWH, or warfarin.
Authors	Allison Keshishian Email: akeshishian@statinmed.com Xuemei Luo Email: xuemei.luo@pfizer.com

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LIST OF ABBREVIATIONS

Abbreviation	Definition
AE	Adverse Event
AMPLIFY	Apixaban for the Initial Management of Pulmonary Embolism and Deep-Vein Thrombosis as First-Line Therapy
BMS	Bristol-Myers Squibb
COPD	Chronic Obstructive Pulmonary Disease
CPT	Current Procedural Terminology
CRNM	Clinically Relevant Non-Major
DOACs	Direct Oral Anticoagulants
DME	Durable Medical Equipment
DVT	Deep Vein Thrombosis
EDB	Enrollment Database
ER	Emergency Room
GHP	Group Health Plan
GLM	Generalized Linear Models
GPP	Good Pharmacoepidemiology Practices
HCFA	Health Care Financing Agency
HCPCS	Common Procedure Coding System
HHA	Home Health Agency
HIPAA	Health Insurance Portability and Accountability Act
HR	Hazard Ratios
ICD-9-CM	International Classification of Disease, 9 th Revision, Clinical Modification
ICD-10-CM	International Classification of Disease, 10 th Revision, Clinical Modification
ICH	Intracranial Hemorrhage
INR	International Normalized Ratio
IPTW	Inverse Probability of Treatment Weighting
LMWH	Low Molecular Weight Heparin
NDC	National Drug Codes
OAC	Oral Anticoagulant
PAC	Parenteral Anticoagulant
PE	Pulmonary Embolism
PPPM	Per Patient Per Month
RCT	Randomized Controlled Trial
UB	Uniform Bill
VKA	Vitamin K antagonist
VTE	Venous Thromboembolism

1. RESPONSIBLE PARTIES

Principal Investigator(s) of the Protocol

Name, degree(s)	Title	Affiliation	Address
Allison Keshishian, MPH	Sr. Project Manager	STATinMED Research	211 N. 4 th Ave Ann Arbor, MI 48104
Xuemei Luo	Director, Health Economics and Outcomes Research	Pfizer, Inc	445 Eastern Point Road, Groton, CT 06340

ABSTRACT

Title: Evaluation of Anticoagulants among Venous Thromboembolism Patients with Active Cancer: Pooled Analysis from Claims Databases

Version: 1.0

Date of Protocol: May 01 2019

Rationale and background: Arterial and venous thromboembolism (VTE), which includes deep vein thrombosis (DVT) or pulmonary embolism (PE), is the second leading cause of death in cancer patients receiving outpatient chemotherapy. Cancer-associated VTE carries a significantly greater risk of recurrent event and major bleeding compared to VTE in non-cancer patients. In most cases, VTE is diagnosed after cancer; however, an unprovoked VTE can be the harbinger that leads to a diagnosis of malignancy. The prevalence of VTE in cancer patients was found to be 13 per 1000 person-years. Ten percent of patients with acute unprovoked VTE develop cancer while 2.6% of provoked VTE patients develop cancer. The most frequently observed cancers are that of the ovary, pancreas, and liver and are usually detected within 6 months following the first VTE event. CHEST Guidelines suggests use of low molecular weight heparin (LMWH) over a vitamin K antagonist (VKA) in patients diagnosed with VTE and cancer. Limited real-world evidence is available regarding the safety and effectiveness of anticoagulants among VTE patients with active cancer.

This study will evaluate the use of apixaban, warfarin, and LMWH use among VTE patients with active cancer and compare the safety and effectiveness of different treatments.

Objectives:

Aim 1: Compare the demographic and clinical characteristics among VTE patients with active cancer prescribed apixaban, LMWH, or warfarin.

Aim 2: Evaluate treatment patterns among VTE patients with active cancer prescribed apixaban, LMWH, or warfarin.

Aim 3: Compare the risk of major bleeding, clinically relevant nonmajor (CRNM) bleeding and recurrent VTE within 6 months and using all available follow-up period among VTE patients with active cancer prescribed apixaban, LMWH, or warfarin.

Study design: The study will be a longitudinal retrospective cohort analysis using a pooled (Humana, IMS, Optum, and MarketScan) database. The study period will be from March 1, 2014 to the end of the study (MarketScan: 01MAR2014 - 30JUNE2017; Optum & Humana: 01MAR2014 - 31DEC2017; PharMetrics: 01MAR2014 - 31MAR2018). The prescription claims for apixaban, LMWH, or warfarin will be identified as index date. The study allows for a 6-month baseline period prior to the index date in the identification period (September 1, 2014 through July 31, 2017 or until the last date of the data cut available at the time of execution of the study). Patients will be required to have a VTE diagnosis (index VTE event) and active cancer within 6 months before or 30 days after the VTE diagnosis. Active cancer

will be defined as having cancer diagnosis or cancer treatment (chemotherapy, radiation and cancer-related surgery). Patients will also be required to have an apixaban, LMWH, or warfarin prescription claim within 30 days of the index VTE event. The first prescription date for apixaban, LMWH or warfarin will be defined as index date for respective cohort. Patients will be followed from the day after the index date until the earliest of treatment discontinuation, treatment switch, death, disenrollment, or end of study. Additional analysis censoring patients at 6 months will also be conducted.

Population: VTE patients with active cancer in the Humana, Optum, IMS, and MarketScan databases who were prescribed apixaban, LMWH, or warfarin between September 1, 2014 and September 31, 2017 and had continuous health plan enrollment for 6 months prior to the index VTE event.

Variables: Demographic and clinical characteristics, clinical treatment patterns, and clinical outcomes including major bleeding, CRNM bleeding, and recurrent VTE.

Data sources: The study will be conducted using member enrollment as well as medical and pharmacy claims from the Optum, Humana, IMS, and MarketScan databases.

Study size: All eligible patients available for analysis will be included.

Data analysis: Means, medians, and standard deviations will be provided for continuous variables. Numbers and percentages will be provided for dichotomous and polychotomous variables. Bivariate comparisons of baseline characteristics and outcomes measures will be provided. Inverse probability treatment weighting (IPTW) will be used to balance treatment cohorts. Appropriate tests (eg, t-test, chi-square test) will be used based on the distribution of the measure. The cumulative incidence rate for clinical outcomes (major bleeding, CRNM bleeding, and recurrent VTE) will be calculated. Cox proportional hazard ratio model will be used to evaluate the risk of clinical outcomes (MB, CRNM bleeding, recurrent VTE). Data analysis will be executed using statistical software SAS version 9.3/9.4.

2. AMENDMENTS AND UPDATES

Amendment number	Date	Substantial or administrative amendment	Protocol section(s) changed	Summary of amendment(s)	Reason
1.0	01/11/2019		5.6.2	Treatment patterns, risk of non-persistence, and VTE risk scale were added	Depending on the descriptive results the team decided to evaluate risk of non-persistence in the VTE cancer population
2.0	03/29/2019		5.6.3 5.7 5.11 4.0	Follow-up Multivariate analysis (IPTW) to evaluate the risk of MB, CRNM bleeding, and recurrent VTE, Subgroup analysis Revised the introduction section	All available follow-up will be used to evaluate the outcomes. Additional analysis censoring patients at 6 months will also be conducted to be consistent with VTE cancer trials. Multivariate analysis will be conducted to evaluate outcomes by taking into consideration of potential confounding factors. IPTW will be used in order to preserve sample size Subgroup analysis will be conducted to evaluate robustness of study findings Introduction section was revised to reflect the current literature on VTE cancer (incidence rates and mortality rates)
3.0	05/01/2019		5.7	Subgroup analysis Add analysis on treatment patterns using IPTW to balance patient characteristics	The following subgroup analysis (including but not limited too) will be conducted: - VTE risk scale (very high risk, high risk, low risk) - Cancer treatment vs no cancer treatment - Chemotherapy vs no chemotherapy - Metastasis vs no metastasis - GI cancer vs no GI cancer

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3. MILESTONES

Milestones	Planned Completion Date
Completion of protocol development	8/10/2018
Start data collection/analysis	8/21/2018
Completion of main analysis for VTE	10/31/2019
Final study report	3/31/2020
Submit abstract	
Manuscript Submission	

4. RATIONALE AND BACKGROUND

Arterial and venous thromboembolism (VTE), which includes deep vein thrombosis (DVT) or pulmonary embolism (PE), is the second leading cause of death in cancer patients receiving outpatient chemotherapy.¹ Cancer-associated VTE carries a significantly greater risk of recurrent event and major bleeding compared to VTE in non-cancer patients.^{2,3} In most cases, VTE is diagnosed after cancer; however, unprovoked VTE can be the harbinger that leads to a diagnosis of malignancy.⁴ Cancer is an independent risk factor for VTE and accounts for 18% of the total VTE cases.⁵ A study found that among VTE patients, cancer was the strongest predictor for all-cause and PE-related mortality.⁶ VTE is also associated with short and long-term morbidity, significant health care utilization, and increased all-cause costs among ambulatory cancer patients.^{7,8,9}

The prevalence of VTE in cancer patients was found to be 13 per 1000 person-years.¹⁰ Incidence of cancer-associated VTE was estimated to be 8 patients per 1000 patient years whereas cumulative incidence of VTE among cancer patients was reported as 7.4%.^{11, 12} The incidence of recurrence of VTE was reported as 9.6 per 100 person-years, the highest incidence being 22.1 per 100 person-years in the first 6 months after VTE diagnosis.¹³ Therefore, VTE patients with cancer may require longer periods of treatments with anticoagulation.¹⁴ Approximately ten percent of patients with acute unprovoked VTE and 2.6% of provoked VTE patients are diagnosed with cancer within 1 year of the VTE diagnosis (with ~60% of these occult cancers diagnosed within 1 month of index VTE, and ~80% diagnosed up to 6 months after the index VTE event).¹⁵ The mortality risk among VTE patients with cancer was reported as 64.5% at one year and 88.1% after 10 years after VTE diagnosis.¹³ Ovary, pancreatic, and

liver cancers are the most frequently observed cancers among VTE patients and are usually detected within 6 months followed the first VTE event.^{15,16,17,18}

The risk of VTE increases by 4-7 times in malignant patients compared to non-malignant patients.¹⁹ The risk of VTE depends on patient characteristics such as age, lifestyle, and ethnicity; the cancer stage; type of malignancy; and cancer treatment.^{20,21} A population-based cohort found that brain, lung, and ovarian cancer; myeloproliferative or myelodysplastic disorder; stage IV cancer; cancer stage progression; and leg paresis are predictors of increased risk of VTE recurrence.²² Among cancer treatments, cancer surgery and radiation therapy were found to be associated with VTE.^{11, 23, 24}

American Society of Clinical Oncology guidelines recommend that VTE prophylaxis with anticoagulants (unfractionated heparin, LMWH, or fondaparinux) should be given to all hospitalized cancer patients in the absence of bleeding and that LMWH is the preferred therapy for cancer patients with VTE.²⁵ According to the European Medicines Agency, the safety and efficacy of apixaban has not been established in active cancer patients.²⁶ The 2016 CHEST Guidelines suggest the use of LMWH over VKA in patients diagnosed with VTE and cancer.²⁷ The last decade has seen an emergence of direct oral anticoagulants (DOACs) for the treatment of VTE. However, the efficacy and safety of DOACs in comparison to LMWH for VTE patients with cancer have not been well documented in the clinical trials.

In a meta-analysis of randomized controlled trials (RCTs) comparing DOACs and LMWH to vitamin K antagonist (VKAs) for the treatment of cancer-associated venous thrombosis, LMWH showed significant reduction in recurrent VTE versus VKA among cancer patients.²⁸ However, LMWH was associated with non-significant increase in risk of major bleeding versus VKA whereas DOACs showed a non-significant reduction in risk of major bleeding versus VKA.²⁰ In a real-world analysis comparing the safety of anticoagulants including rivaroxaban, LMWH or warfarin for VTE treatment in patients with newly diagnosed cancer, major bleeding was similar across rivaroxaban, LMWH, and warfarin users.²⁹ Newly diagnosed cancer patients who initiated rivaroxaban had significantly lower risk of recurrent VTE compared to patients treated with LMWH or warfarin.²¹

Insufficient real-world evidence is available regarding the safety and effectiveness of anticoagulants among VTE patients with active cancer. This protocol will evaluate the safety and effectiveness of apixaban, warfarin, and LMWH use among VTE patients with active cancer.

5. RESEARCH METHODS

The following aims will be addressed:

Aim 1: Compare the demographic and clinical characteristics among VTE patients with active cancer prescribed apixaban, LMWH, or warfarin.

Aim 2: Evaluate treatment patterns among VTE patients with active cancer prescribed apixaban, LMWH, or warfarin.

Aim3: Compare the risk of major bleeding, CRNM bleeding, recurrent VTE within 6 months and using all available follow-up period among VTE patients with active cancer prescribed

apixaban, LMWH, or warfarin.

5.1. Study design

5.1.1. Key index period definitions

- **Study period:** The study period will range from March 1, 2014 through July 31, 2017 or until the last date of the data cut available at the time of execution of the study. The end of study may be different for each database based on last available data cut (MarketScan: 01MAR2014 - 30JUNE2017; Optum & Humana: 01MAR2014 - 31DEC2017; PharMetrics: 01MAR2014 - 31MAR2018).
- **Patient identification period:** The identification period will range from September 1, 2014 through July 31, 2017 or until the last date of the data cut available at the time of execution of the study. Apixaban was approved in March 14, 2014 for VTE. Hence, we will be identifying patients from September 2014 to allow for a baseline period of at least 6 months for all the patients.
- **Baseline period:** The baseline period will be 6 months prior to the index date. See the definition about index date in the next section.
- **Follow-up period:** The follow-up period will be from the day after the index date to the earliest of treatment discontinuation, treatment switch, death, health plan disenrollment, or end of study. Additional analysis censoring patients at 6months will also be conducted.

5.1.2. Key index point definitions

- **Index VTE event:** The first evidence of a VTE diagnosis in the primary or secondary position in the inpatient or ambulatory setting during the identification period for each patient will be designated as the index VTE event.
- **Index therapy:** The apixaban, LMWH, or warfarin treatment prescribed within 30 days from the index VTE event will be designated as the index therapy.
- **Index date:** The first prescription claim date for the index therapy will be designated as the index date.

Study Design Figure (for illustration purposes, may not be proportionate)

Figure 1. Study Design Figure for LMWH Only Cohort

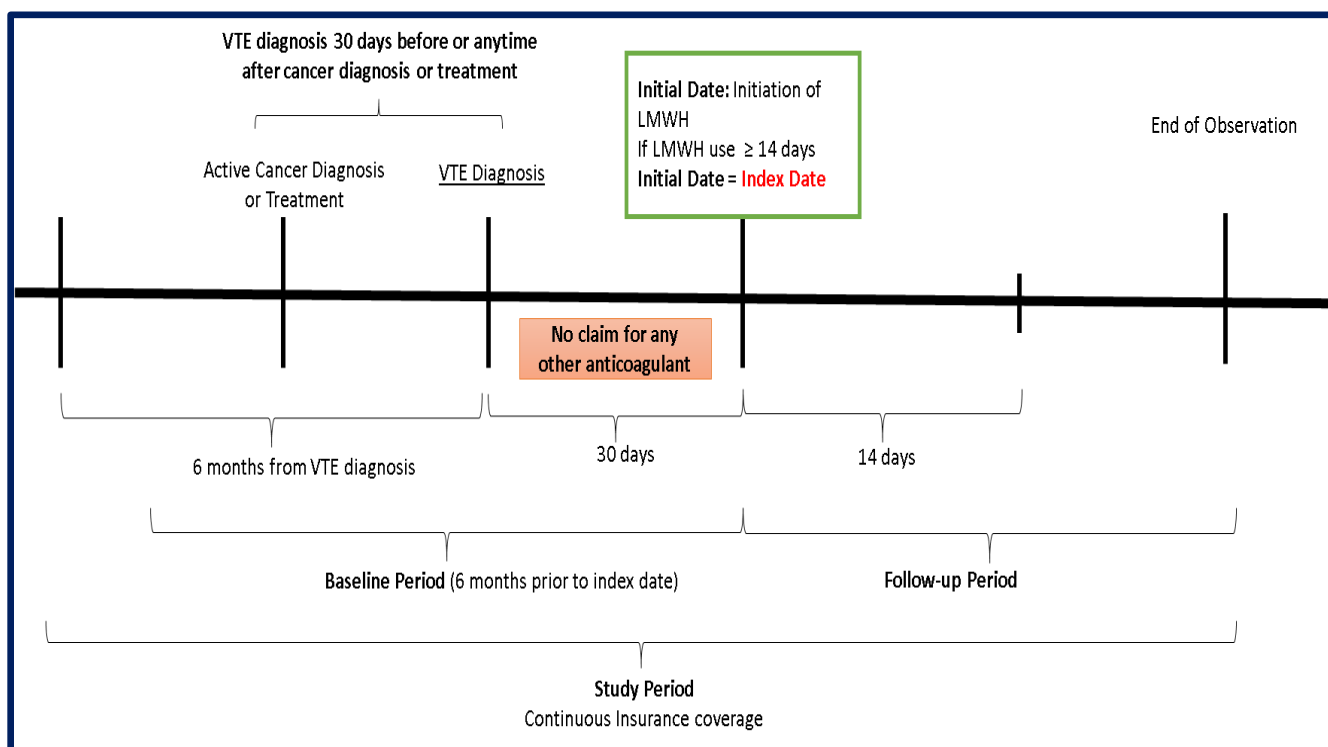


Figure 2. Study Design Figure for Warfarin Only Cohort

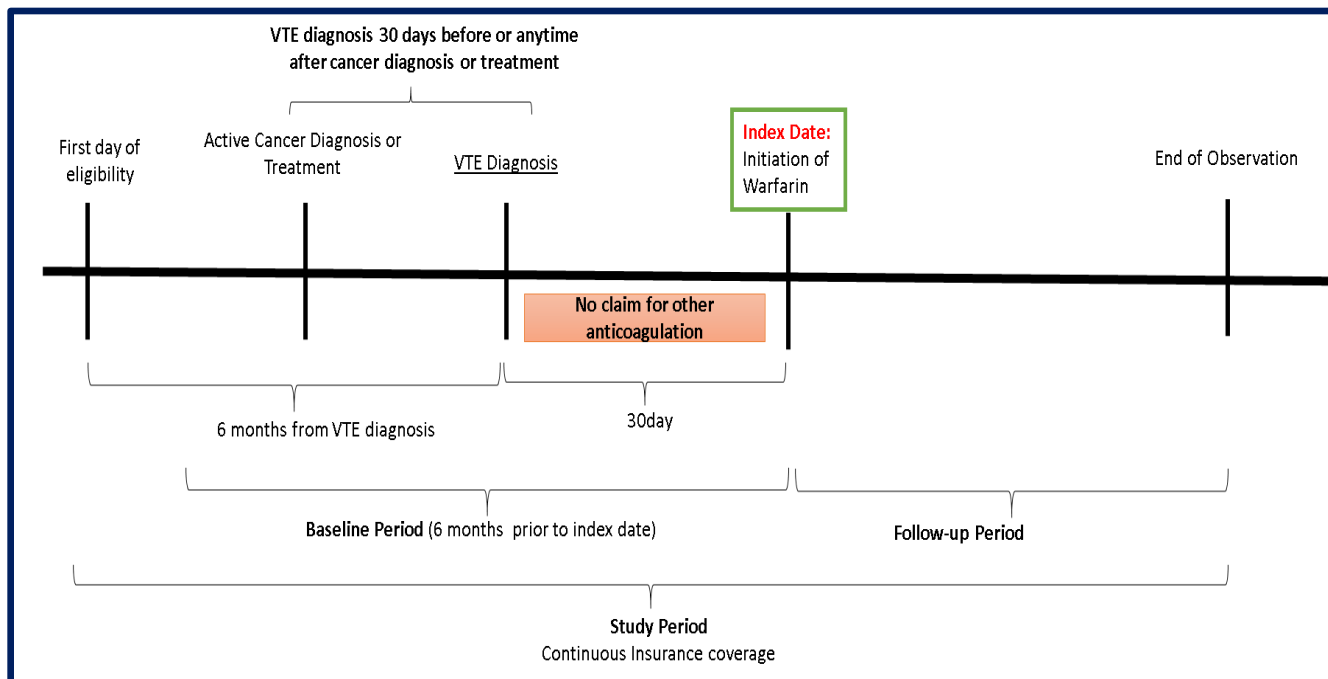


Figure 3. Study Design Figure for Warfarin LMWH Bridging Cohort

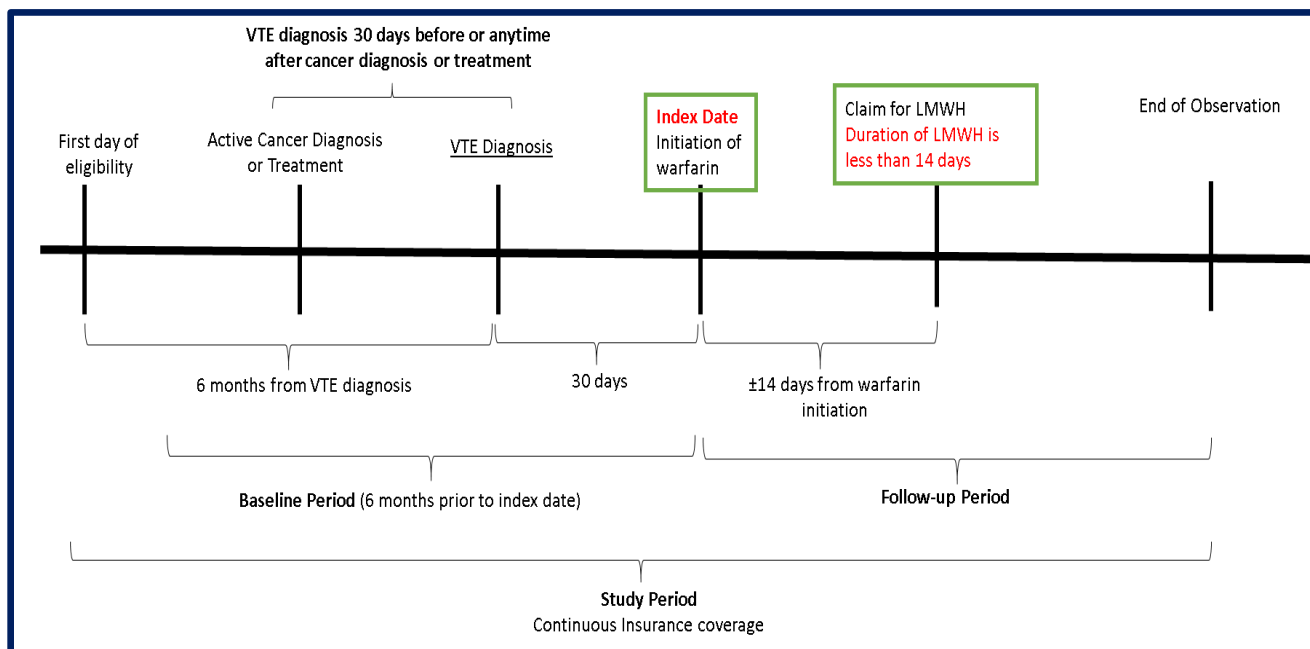
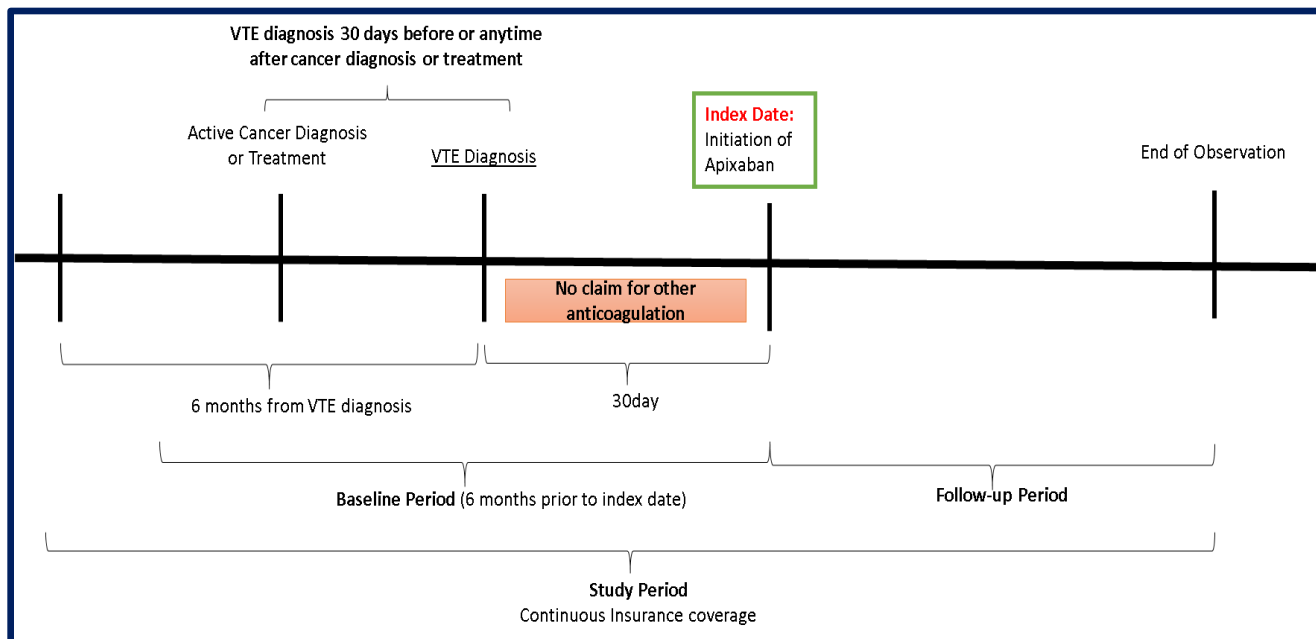


Figure 4. Study Design Figure for Apixaban Only Cohort



5.2. Setting

Adult patients prescribed apixaban, LMWH, or warfarin will be selected between September 1, 2014 and July 31, 2017 or until the last date available at the time of study initiation. Patients will be required to have a VTE diagnosis in the primary or secondary position (index VTE event) and active cancer. Active cancer will be defined as having cancer diagnosis or cancer treatment (chemotherapy [IV and oral], radiation, and cancer-related surgery) within the time period 6 months before or 30 days after the index VTE event. Whether the 30-day period from index VTE to active cancer should be extended to a longer time period (eg, 60 days or 90 days) will be finalized after conducting a feasibility analysis. Patients will also be required to have an apixaban, LMWH, or warfarin prescription claim within 30 days of the index VTE event. Patients will be required to have health plan enrollment for 6 months prior to the index VTE event to ensure that the patients' complete medical history is available. Patients will be required to be aged ≥ 18 years on the index date.

Follow-up Period:

The follow-up period will be defined as the period from the day after the index date through the earliest of the health plan disenrollment, death, index therapy discontinuation, switch to another OAC, initiation of (new) parenteral anticoagulant (PAC) treatment, or end of study period. Additional analysis censoring patients at 6 months will also be conducted.

Discontinuation will be defined as no evidence of index apixaban, LMWH, or warfarin use for 30 days from the last day of days' supply of the last filled prescription. The discontinuation

date will be the last day of days' supply of the last filled prescription. The follow-up will be censored at 30 days after the index drug discontinuation date.

VTE patients that receive a prescription for an OAC other than the index therapy during the follow-up period will be considered switchers if this OAC prescription is within ± 30 days of the last days' supply. For the Warfarin-LMWH Bridging cohort, a LMWH claim will be allowed within 14 days before or after the first warfarin claim if the days of supply is < 14 days.

5.2.1. Inclusion criteria

Patients will be included in the study if they:

- a) had a medical claim with a primary or secondary VTE diagnosis (index VTE event) in the inpatient or ambulatory setting during the identification period (01SEP2014-31JULY2017). If occurring in the outpatient setting, the index VTE event date will be defined as the service date; if in the inpatient setting, the discharge date will be designated as the index VTE event date. Qualifying outpatient encounters followed by qualifying inpatient encounters within 7 days will be considered an inpatient episode (unless LMWH, warfarin or apixaban was initiated between encounters, in which case it would be classified as an outpatient VTE event);
- b) had active cancer. Active cancer will be defined as having ≥ 2 medical claims for cancer diagnosis or 1 claim for cancer diagnosis plus ≥ 1 claim for cancer treatment (eg, chemotherapy, radiation, cancer-related surgery) within the time period 6 months before or 30 days after the index VTE event. The reason to include patients with active cancer 30 days after the index VTE event is that some patients may present with VTE even before the cancer diagnosis was made. Whether the 30-day period from index VTE to active cancer should be extended to a longer time period (eg, 60 days or 90 days) will be finalized after conducting a feasibility analysis;
- c) had ≥ 1 pharmacy claim for apixaban, LMWH, or warfarin during the 30-day period following the index VTE event;
 1. **LMWH Cohort:** If patients had LMWH for ≥ 14 days after the index VTE event and did not have another anticoagulant (Table 1 except LMWH) during the period between index VTE event and 14 days after LMWH initiation, then the first LMWH prescription date will be designated as the index date. The reason to have LMWH treatment for ≥ 14 days for this cohort is to ensure that the LMWH used here was not intended for short-term bridging therapy;
 2. **Warfarin Only Cohort:** If patients who initiated warfarin within 30 days after index VTE event and did not have a claim for any other anticoagulant (Table 1 except warfarin) between the index VTE event and the warfarin prescription date or a LMWH claim 14 days after warfarin initiation, then their first warfarin prescription date will be designated as the index date;

3. **Warfarin LMWH Bridging Cohort:** If patients used warfarin and had a claim for LMWH (LMWH cannot be used for ≥ 14 days) within 14 days before or after warfarin initiation, then their first warfarin prescription date will be designated as the index date. There should be no other anticoagulant (Table 1 except warfarin or LMWH) during the following time periods:

(a) between index VTE event and initiation of warfarin

(b) for the duration of LMWH treatment if it occurs within 14 days after warfarin initiation.

Feasibility analysis will be conducted to calculate the number of patients in the Warfarin LMWH Bridging cohort that had an event between the LMWH claim and the warfarin claim. Depending on the sample size, the team will decide whether to exclude or include the patients in the warfarin bridging cohort

4. **Apixaban Only Cohort:** If patients who initiated apixaban within 30 days after index VTE event and did not have a claim for any other anticoagulant (Table 1 except apixaban) between the index VTE event and the initiation of apixaban, the first apixaban prescription date will be designated as the index date;

d) were aged ≥ 18 years as of the index date; and

e) had continuous health plan enrollment for ≥ 6 months prior to the index VTE event until the index date.

Table 1. Oral and Parenteral Anticoagulants

Drug	Anticoagulant Type	HCPCS Codes
Low Molecular Weight Heparin	PAC	
Dalteparin	PAC	J1645
Enoxaparin	PAC	J1650
Tinzaparin	PAC	J1655
Heparin	PAC	J1642, J1644
Fondaparinux	PAC	J1652
Warfarin	OAC	-
Apixaban	OAC	-
Dabigatran etexilate mesylate	OAC	-
Rivaroxaban	OAC	-
Edoxaban	OAC	-

5.2.2. Exclusion criteria

Patients will be excluded from the study if they:

- a) had evidence of atrial fibrillation/flutter during the 6-month period preceding the index date (to ensure that OAC use is associated with VTE diagnosis only);

- b) had evidence of mechanical heart valve during the 6-month period preceding the index date;
- c) had evidence of receiving another OAC or PAC on the index date (or during the period between the index VTE event and the index date). LMWH is allowed between the index VTE event and index date for the Warfarin-LMWH Bridging cohort;
- d) had evidence of VTE during the 6-month period preceding the index VTE event since the study aims to capture new VTE patients;
- e) had evidence of any OAC/PAC use during the 6-month period preceding the index VTE event unless it is determined that such therapy was administered prophylactically (See Appendix 2);

NOTE: Prophylactic use of OAC/PAC will be determined based on the duration of use and timing of use (eg, relative to knee/hip replacement surgery or medical inpatient admission); the operational algorithm to be employed to differentiate between prophylactic and therapeutic OAC/PAC use is set forth in Appendix 2.

- f) had evidence of inferior vena cava filter at any time during the study period; or
- g) had evidence of pregnancy at any time during the study period.

All codes for the selection criteria are detailed in Table 1, Table 2, and Appendix 1.

6.1.3. Cohorts

After applying the inclusion and exclusion criteria, eligible patients will be assigned to the following cohorts based on index treatment:

- **LMWH only:** Patients that had a LMWH claim within 30 days of the index VTE events, were treated for ≥ 14 days after the index VTE event, and did not have another anticoagulant (Table 1 except LMWH) during the period between index VTE event and 14 days after LMWH initiation. These patients will be identified first.
- **Warfarin only:** Patients who initiated warfarin within 30 days after the index VTE event and did not have a claim for any other anticoagulant (Table 1 except warfarin) during the period between the index VTE event and the initiation of warfarin or a LMWH within 14 days after warfarin initiation
- **Warfarin LMWH bridging cohort:** Patients that used warfarin within 30 days after the index VTE event and had a claim for LMWH within 14 days before or after warfarin initiation. LMWH cannot be used for ≥ 14 days. There should be no other anticoagulant (Table 1 except warfarin and LMWH) during the period between index VTE event and initiation of warfarin as well as for the duration of LMWH if it occurs within 14 days after warfarin initiation. Feasibility analysis will be conducted to calculate the number

of patients in the Warfarin LMWH Bridging cohort that had an event between the LMWH claim and the warfarin claim. Depending on the sample size, the team will decide whether to exclude or include the patients in the warfarin bridging cohort

- **Apixaban only:** Patients who initiated apixaban within 30 days after the index VTE event and did not have a claim for any other anticoagulant (Table 1 except apixaban) during the period between the index VTE event and the initiation of apixaban.

5.3. Variables

Baseline variables during the 6 months prior to and on the index date will be measured. Baseline variables will be evaluated using codes in any position (primary or secondary) unless noted otherwise.

Table 2. Baseline Demographic and Clinical Characteristic Variables

Variable	Operational Definition
Variables will be measured during baseline period (6 months prior to and on the index date)	
Age	Age will be defined as of the index date and used to assign patients to the following age groups: 18-54, 55-64, 65-74, 75-79, and ≥ 80 years.
Sex	A flag will be created for female beneficiaries and reported as a percentage.
US Geographic Region	The United States will be divided into five regions: Northeast, South, Midwest, West, and Other. Geographic region will be captured from enrollment data.
Setting of Index VTE Event	Flags will be created for patients with index VTE event in inpatient or ambulatory settings. Qualifying outpatient encounters followed by qualifying inpatient encounters within 7 days will be considered an inpatient episode (unless warfarin, LMWH, or apixaban was initiated between encounters, in which case it would be classified as an outpatient encounter).
Position of VTE Diagnosis	Flags will be created for the position of VTE diagnosis including primary (principle diagnosis or first listed) or secondary position.
VTE Diagnosis	Flags will be created for the type of VTE diagnosis including DVT only, PE with DVT, or PE without DVT.
VTE Etiology	Flags will be created for VTE etiology, including provoked or unprovoked VTE. Provoked VTE will be defined as events that are preceded by hormone therapy, fracture/trauma involving lower extremities, pelvic/orthopedic surgery, or hospitalization for any reason for ≥ 3 days during 3 months prior to index VTE event; unprovoked VTE will be defined as all events not classified as provoked. (See Table 6 and Appendix 1 for codes)
AIDS	A flag will be created for patients with claims for AIDS. (See Table 7 Appendix 1 for codes)
Alcohol abuse	A flag will be created for patients with claims for alcohol abuse (See Table 7, Appendix 1 for codes)

Variable	Operational Definition
Anemia	A flag will be created for patients with claims for anemia. (See Table 7 and Appendix 1 for codes)
Central venous Catheter	A flag will be created for patients with claims for central venous catheter. (See Table 7 and Appendix 1 for codes)
Cerebrovascular disease	A flag will be created for patients with claims for cerebrovascular disease. (See Table 7 and Appendix 1 for codes)
Coagulation Defects	A flag will be created for patients with claims for coagulation defects. (See Table 7 and Appendix 1 for codes)
Ischemic heart/ coronary artery disease	A flag will be created for patients with claims for ischemic heart/coronary artery disease. (See Table 7 and Appendix 1 for codes)
Dementia	A flag will be created for patients with claims for dementia. (See Table 7 and Appendix 1 for codes)
Dyspepsia or stomach discomfort	A flag will be created for patients with claims for dyspepsia or stomach discomfort. (See Table 7 and Appendix 1 for codes)
Hemiplegia or Paraplegia	A flag will be created for patients with claims for hemiplegia or paraplegia (See Table 7 and Appendix 1 for codes)
Hyperlipidemia	A flag will be created for patients with claims for hyperlipidemia. (See Table 7 and Appendix 1 for codes)
Obesity	A flag will be created for patients with claims for obesity (See Table 7 and Appendix 1 for codes)
Pneumonia	A flag will be created for patients with claims for pneumonia. (See Table 7 and Appendix 1 for codes)
Rheumatologic disease	A flag will be created for patients with claims for rheumatologic disease. (See Table 7 and Appendix 1 for codes)
Sleep apnea	A flag will be created for patients with claims for sleep apnea. (See Table 7 and Appendix 1 for codes)
Spinal cord injury	A flag will be created for patients with claims for spinal cord injury. (See Table 7 and Appendix 1 for codes)
Thrombophilia	A flag will be created for patients with claims for thrombophilia. (See Table 7 and Appendix 1 for codes)
Varicose Veins	A flag will be created for patients with claims for varicose veins. (See Table 7 and Appendix 1 for codes)
Congestive Heart Failure	A flag will be created for patients with claims for congestive heart failure. (See Table 7 and Appendix 1 for codes)
Diabetes	A flag will be created for patients with claims for diabetes. (See Table 7 and Appendix 1 for codes)
Hypertension	A flag will be created for patients with claims for hypertension. (See Table 7 and Appendix 1 for codes)
Renal Disease	A flag will be created for patients with claims for renal disease. A flag for chronic kidney disease stage V, end-stage renal disease, or dialysis will be created. (See Table 7 and Appendix 1 for codes)

Variable	Operational Definition
Liver Disease	A flag will be created for patients with claims for liver disease. (See Table 7 and Appendix 1 for codes)
COPD	A flag will be created for patients with claims for chronic obstructive pulmonary disease. (See Table 7 and Appendix 1 for codes)
Peptic Ulcer Disease	A flag will be created for patients with claims for ulcer disease. (See Table 7 and Appendix 1 for codes)
Inflammatory bowel disease	A flag will be created for patients with claims for inflammatory bowel disease. (See Table 7 and Appendix 1 for codes)
Peripheral vascular disease	A flag will be created for patients with claims for peripheral vascular disease. (See Table 7 and Appendix 1 for codes)
Baseline Bleed	A flag will be created for patients with claims for bleeding. (See Table 7 and Appendix 1 for codes)
Recent history of falls	A flag will be created for patients having a fall and reported as a percentage. (see Table 7 and Appendix 1 for codes)
Fracture/trauma involving the lower extremities	A flag will be created for patients having a fracture or a trauma and reported as a percentage. (see Table 7 and Appendix 1 for codes)
Selected surgeries	A flag will be created for patients having a surgery and reported as a percentage. (see Table 8 and Appendix 1 for codes)
Baseline Deyo-Charlson Comorbidity Index	The Deyo-Charlson Comorbidity Index will be created. (See Table 9 and Appendix 1 for codes)
Other Baseline Medications	Flags will be created for patients with prescription fills for antiarrhythmic, statin, antiplatelet, aromatase inhibitors, beta blockers, gastroprotective agents, SERMs, NSAIDs, and hormone therapy. (see Table 10 and Appendix 1 for codes)
Apixaban Index dose	Standard dose (apixaban 5 mg) and lower dose (apixaban 2.5 mg) based on dose of the initial prescription of apixaban.
Cancer-related variables will be measured 6 months prior to index date until 30 days after index date	
Cancer Site	Flags will be created for site of the cancer in the body. (see Table 11 and Appendix 1 for codes)
Cancer Type	A flag will be created for hematologic cancer and reported as a percentage. (see Table 11 and Appendix 1 for codes)
Cancer-related Treatment	Flags will be created for patients with claims for chemotherapy, immunotherapy, radiation, or cancer-related surgery. (See Tables 1, 3, 4, and 5 as well as Appendix 1 for codes)
VTE Risk Scale	Flags will be created for patients that had very high risk of cancer (stomach, pancreas, and brain), high risk (lung, lymphoma, gynecologic, bladder, testicular, renal cell carcinoma), and other cancers. ^{30, 31}

Table 2. Clinical and Outcome Variables

Variable	Operational Definition
Major Bleeding	A major bleeding event observed during follow-up will be identified using hospital records which had a major bleeding diagnosis as the first listed diagnosis as listed by ICD-9-CM or ICD-10 diagnosis or procedure code. Major bleeding event will be a dichotomous variable that equals 1 if there was ≥ 1 bleeding event during the follow-up period. Time to the first major bleeding event will be calculated. Major bleeding will be stratified by GI bleeding, ICH, and other bleeding. (see Table 12 and Appendix 1 for codes)
CRNM Bleeding	A CRNM bleeding event will be defined as a bleeding event not considered to be major bleeding (without a principal diagnosis code for GI/ICH/other bleeding or a procedure code for bleeding treatment). This includes: • an acute-care inpatient admission with a secondary diagnosis for “non-critical site” bleeding such as GI bleeding, or other selected non-critical types/sites of bleeding; or • an ambulatory-care encounter with a diagnosis code for GI bleeding, and other selected non-critical types/sites of bleeding (without a diagnosis code for ICH bleeding). (See Table 13 and Appendix 1 for codes)
Recurrent VTE	A recurrent VTE event will be identified as an acute-care inpatient admission with a corresponding first listed diagnosis; admissions occurring within 7 days of the qualifying VTE event-irrespective of care setting will not be considered as a recurrent VTE event.
Discontinuation	Discontinuation will be defined as no evidence of index prescription for 30 days from the last day of days’ supply of last filled prescription. The date of discontinuation will be the last day of days’ supply of last filled prescription.
Time-to-Discontinuation	Time from the index date to discontinuation date will be evaluated among patients that discontinued index therapy.
Switch among Anticoagulants	Patients that receive a prescription for an anticoagulant other than the index drug prescription during the follow-up period will be considered switchers if this prescription is within ± 30 days of last days’ supply and will further be categorized into the drug they switched to: Apixaban, dabigatran, edoxaban, rivaroxaban, warfarin, LMWH, unfractionated heparin (UFH), and fondaparinux.
Persistence	Persistence (in days) will be defined as the number of days the patient remained on the index drug with a gap of ≤ 30 days between the run-out date of the previous prescription and the following prescription. Percentage of patients that continued treatment during the follow-up period will also be evaluated.

5.4. Data source

MarketScan

The Truven MarketScan Commercial Claims and Encounters and Medicare Supplemental and Coordination of Benefits database will be used for this study. The MarketScan Commercial Claims and Encounters database is a high-quality resource with the combined claims of employer-and health plan-sourced data containing medical and drug data for several million individuals annually. The database offers the largest convenience sample, with >94 million unique patients since 1996. All census regions are represented, predominantly the South and North Central (Midwest) regions. The database includes enrollment history and claims for medical (provider and institutional) and pharmacy services. Inpatient services are at both the claim and summarized stay level. The Medicare Supplemental and Coordination of Benefits database only includes a subset of the Medicare population that are Medicare-eligible retirees with employer-sponsored Medicare Supplemental plans. This database contains predominantly fee-for-service plan data. The Medicare Supplemental and Coordination of Benefits database may not accurately represent the US Medicare population.

Optum

OptumInsight has access to a proprietary research database containing claims and enrollment data dating back to 1993. For 2013, data relating to ~57 million individuals with both medical and pharmacy benefit coverage are available. An additional 39 million enrollees with medical benefits only are also available. The underlying information is geographically diverse across the United States and is updated frequently. The research activities utilize de-identified data from the research database except in limited instances where applicable law allows the use of patient identifiable data.

Claims for pharmacy services are typically submitted electronically by the pharmacy at the time prescriptions are filled. The claims history is a profile of all outpatient prescription pharmacy services provided and covered by the health plan. Pharmacy claims data include drug name, dosage form, drug strength, fill date, days of supply, financial information, and de-identified patient and prescriber codes, allowing for longitudinal tracking of medication refill patterns and changes in medications. Pharmacy claims are typically added to the research database within 6 weeks of dispensing.

Medical claims or encounter data are collected from all available health care sites (inpatient hospital, outpatient hospital, emergency room [ER], physician's office, surgery center, etc) for virtually all types of provided services, including specialty, preventive, and office-based treatments. Medical claims and coding conform to insurance industry standards. Claims for ambulatory services submitted by individual providers (eg, physicians) use the Health Care Financing Agency (HCFA)-1500 format. Claims for facility services submitted by institutions, (eg, hospitals) use the uniform bill (UB)-82 or UB-92 format. Medical claims include multiple diagnosis codes recorded with the ICD-9-CM diagnosis codes; procedures recorded with ICD-9-CM procedure codes, Current Procedural Terminology (CPT), or HCFA Common Procedure

Coding System (HCPCS) codes; site of service codes; provider specialty codes; revenue codes (for facilities); paid amounts; and other information. Typically, facility claims do not include any drugs administered in hospital. Approximately 6 months following the delivery of services is required for complete medical data. Medical claims identifies patients that used United Health Group for their healthcare services.

IMS PharMetrics Plus

The IMS PharMetrics Plus claims database includes claims for medical (provider and institutional) and pharmacy services in the United States, with claim paid and allowed amounts as well as all-patient payment amounts. The database reflects ~40 million lives in any given recent year. IMS PharMetrics Plus is the product of a strategic partnership between IMS and Blue Health Intelligence (BHI) and incorporates a number of Blue Cross Blue Shield plans. Complete data from a large number of commercial health plans covering all 50 states are available. The population aged >65 years consists of enrollees in managed care plans for seniors, the working elderly, and others in commercial plans; BHI Medicare Advantage members are not included.

Humana

The Humana database includes over 18 million lives of commercial and Medicare members and covers all census regions in the United States. The database contains information on patient demographics; enrollment history; and claims for inpatient, outpatient, ER, and other medical services. In addition, the Humana database contains information on pharmacy and laboratory claims. Most of the members in Humana reside in Midwestern and southern regions of the country. More than 9 million people in Humana have both medical and pharmacy coverage. Medical claims include information regarding physician visits, outpatient visits and hospital inpatient stay. Pharmacy data includes information on prescription fills for each member, days of supply, payment amounts per insurers and beneficiaries and dates of services.

5.5. Study size

All eligible patients available for analysis will be included.

The four commercial databases described will be pooled together to create a master pooled dataset. The advantages of using this pooled dataset include large study sample, diverse patient population and generalizability of the data.

5.6. Data analysis

All data analysis will be executed using statistical software STATA and SAS version 9.3/9.4.

5.6.1. Baseline Patient Characteristics (Aim 1)

Baseline demographic and clinical factors such as age, gender, geographic region, type of index VTE event, position of VTE diagnosis, VTE diagnosis, VTE etiology, baseline medications and co-morbidities among VTE patients newly initiated with apixaban, LMWH, or warfarin will be summarized. Descriptive statistics, ie, mean, standard deviation, median and inter-quartile range for continuous variables and differences across treatments will be compared using the Student's t-test or Wilcoxon rank sum test. Percentages for categorical and binary variables will be presented for all baseline patient characteristics and will be compared using the chi-square test or Fishers Exact test.

5.6.2. Treatment Patterns (Aim 2)

Treatment patterns will include but not limit to medication discontinuation, switching and persistence. Patients that receive a prescription for an anticoagulant other than the index drug prescription during the follow-up period will be considered switchers if this prescription is within ± 30 days of last days' supply. Among patients that did not switch, percentage of patients that discontinued their index treatment will be evaluated. Discontinuation will be defined as no evidence of index prescription for 30 days from the last day of days' supply of last filled prescription. The date of discontinuation will be the last day of days' supply of last filled prescription. Time from the index date to discontinuation date will be evaluated among patients that discontinued index therapy. Numbers and percentages will be provided for dichotomous and polychotomous variables when performing descriptive analysis of categorical data. Discontinuation and switch will further be evaluated among patients that had at least 3 and 6 months of continuous enrollment (including patients that died during this period).

Persistence (in days) will be defined as the number of days the patient remained on the index drug with a gap of ≤ 30 days between the run-out date of the previous prescription and the following prescription. Percentage of patients that continued treatment during the follow-up period will also be evaluated.

The risk of non-persistence will be evaluated using cox proportional hazard models. Non-persistent will be defined as patients that discontinued or switch the index drug during the follow-up period. The cox proportional hazards models test on survival (or time to non-persistence) data via maximum likelihood with exponential, Weibull, and Gompertz distributions to be considered. Covariates to be included in the cox model may include the following: age, gender, region, type of VTE, setting of VTE, etiology of VTE, CCI, comorbidities not included in CCI, history of falls, fractures, baseline bleeds, metastatic status, type of cancer, VTE risk scale, cancer-related treatment and baseline bleed. The final lists of variables to be used in the model will be discussed and determined during analysis development, after reviewing the descriptive tables. Additional analysis will be conducted using IPTW (see below) to balance patient characteristics.

5.6.3. Rate of Recurrent VTE, Major Bleeding, and CRNM Bleeding (Aim 3)

The cumulative incidence rate for clinical outcomes (major bleeding, CRNM bleeding, recurrent VTE) will be calculated. Major bleeding will be stratified by GI bleeding, ICH, and other bleeding; CRNM bleeding will be stratified by GI bleeding and other bleeding. The incidence rate will be calculated as the number of patients who experience the event divided by the observed time at risk. The incidence rate will be calculated per 100 person-years.

Inverse probability treatment weighting (IPTW) will be used to balance patient characteristics when comparing outcomes among different cohorts. IPTW uses propensity scores to obtain estimates of the average treatment effect. The propensity score will be calculated using a multinomial logistic model with three treatment cohorts (apixaban, warfarin, and LMWH) included in the model, using LMWH patients as the reference (i.e. control cohort). The propensity score is defined as the probability of a patient receiving a certain treatment or not conditional on their observed baseline covariates (e.g. age, gender, comorbidities, medications, etc.). The list of variables included in the logistic model will be based on clinical rationale. The propensity score acts as a balancing score between the cohorts. After calculating the propensity score, the distribution of the propensity scores will be reviewed. Each patient will be weighted by the inverse of the probability of their treatment option (weight=1/proensity score).

If a treated patient has a very low propensity score, a very large weight will be generated. Large weights can increase the variability of estimated treatment effect. In order to address this, the weights will be stabilized. In order to stabilize the weights, the treatment option and control weights will be multiplied by a constant, equal to the expected value of being in the treatment or comparison cohorts, respectively. This reduces the variability of the weights and reduces the variance of the treatment effect estimates.

$$\frac{\sum_{i=1}^{N_T} PS_i}{N_T} * \frac{1}{PS_i}$$

The distribution of the stabilized weight will be reviewed. If no extreme outliers are observed, the stabilized weights will be applied to the sample. In cases of extreme outliers, the large weights could be set to a less extreme value (e.g. recoding all weights that are outside 5th and 95th percentile to the 5th and 95th value, respectively). If needed, truncation can be done after stabilizing the weights.

After the weights are applied, the balance of the baseline covariates will be assessed. First, the means and proportions of baseline variables will be compared. The standardized difference compares the difference in means in units of the standard deviation. If the standardized difference is less than 10%, the covariates will be considered balanced. For continuous variables, the balance of the distribution will also be assessed. The high-order movements and interactions between variables should be similar between cohorts. The standardized difference will be used to compare the mean of the square of continuous variables. Graphical comparisons of the distribution of continuous variables will be completed. Side-by-side boxplots and empirical cumulative distribution functions will be used to compare the distribution of continuous covariates in the unweighted and weighted samples. Since the graphical approach

can be subjective, a numerical method for comparing the distribution of continuous baseline covariates will also be completed. Kolmogorov-Smirnov test allows a comparison of the distribution of a continuous variable between two independent groups.^{32,33,34,35}

Cox proportional hazards models will be used to compare the time to MB, CRNM bleeding, and recurrent VTE between apixaban, warfarin, and LMWH cohorts after inverse probability treatment weighting. Thereby, proportional hazards on survival (or time-to-event) data will be tested via maximum likelihood, with consideration of exponential Weibull and Gompertz distributions.

The proportional hazards proportionality assumption will be evaluated by visually inspecting the Kaplan-Meier plot within the matched cohort and confirmed by testing the significance of interactions between treatment and the log of time. If this assumption is invalidated, an interaction term of time or time-dependent covariate may be added based on final decisions.

5.7. Subgroup Analysis

Analyses of study measures, as described above, may be repeated on the following subgroups of interest—sample size permitting—including not limited to :

1. VTE risk scale (very high risk, high risk, low risk)
2. Cancer treatment vs no cancer treatment
3. Chemotherapy vs no chemotherapy
4. Metastasis vs no metastasis
5. GI cancer vs no GI cancer

5.8. Feasibility Analysis:

The following feasibility analysis will be conducted before finalizing the selection criteria:

1. The number of patients that had a cancer diagnosis during 30, 60, or 90 days after index VTE events—this will be evaluated to determine which time period (30 vs. 60 vs. 90) will be used in final protocol.
2. The number of patients that had ≥ 2 medical claims for cancer diagnosis or ≥ 1 claim for cancer diagnosis and ≥ 1 claim for cancer treatment (eg, chemotherapy, radiation, cancer-related surgery)—this analysis will be conducted to finalize the definition for “active cancer” patients.
3. The number of patients in the Warfarin LMWH Bridging cohort that had an event between the LMWH claim and the warfarin claim will be calculated. Depending on the

sample size, the team will decide whether to exclude them or include them in the warfarin bridging cohort.

5.9. Quality control

Not applicable

5.10. Strengths and limitations of the research methods

A key strength is that retrospective observational analyses provide a better understanding about the study population in real-world clinical practice and offer complimentary information to controlled clinical trials. Retrospective observational studies also allow the evaluation of patients who are often under-represented in clinical trials, such as those with comorbidities and the elderly. Since prescribing patterns in the real-world can be complex, the retrospective analysis provides a comprehensive picture of how medications are used by clinicians in routine practice. The national commercial claims databases incorporate all medical and pharmacy claims of patients and allow for longitudinal analysis of a nationally representative sample. Pooling four databases together increase study sample size and improve generalizability of study findings.

There are certain limitations associated with the use of claims data. First, the presence of a claim for a filled prescription does not indicate whether the medication was actually consumed or taken as prescribed. Second, the presence of a diagnosis code on a medical claim is not a positive presence of disease, as the diagnosis code may be incorrectly coded or included as rule-out criteria rather than actual disease. Third, certain information is not readily available in claims data that could influence study outcomes, such as INR tests. Fourth, this retrospective observational study can only demonstrate association and not causality. Fifth, we did not exclude duplicates from the database. However, prior literature reported only 0.5% duplicates between two databases.³⁶ Hence, it should not impact our study results. Finally, the results may not be generalizable to the entire US VTE cancer population since only commercially insured patients are evaluated.

5.11. Other aspects

Not Applicable

6. PROTECTION OF HUMAN SUBJECTS

6.1. Patient Information and Consent

As a secondary data collection study using fully anonymized data, informed consent is not required.

6.2. Patient withdrawal

Not Applicable

6.3. Institutional Review Board (IRB)/Independent Ethics Committee (IEC)

IRB/IEC review is not required.

6.4. Ethical conduct of the study

The study will be conducted in accordance with legal and regulatory requirements, as well as with scientific purpose, value, and rigor and will follow generally accepted research practices described in Guidelines for Good Pharmacoepidemiology Practices (GPP) issued by the International Society for Pharmacoepidemiology (ISPE).

7. MANAGEMENT AND REPORTING OF ADVERSE EVENTS/ADVERSE REACTIONS

This study includes unstructured data (eg, narrative fields in the database) that will be converted to structured (ie, coded) data solely by a computer using automated/algorithmic methods and/or data that already exist as structured data in an electronic database. In these data sources, it is not possible to link (ie, identify a potential association between) a particular product and medical event for any individual. Thus, the minimum criteria for reporting an adverse event (AE) (ie, identifiable patient, identifiable reporter, a suspect product, and event) are not available and AEs are not reportable as individual AE reports.

8. PLANS FOR DISSEMINATING AND COMMUNICATING STUDY RESULTS

A final study report detailing the final study protocol and the analysis results will be provided when the study is complete.

9. COMMUNICATION OF ISSUES

In the event of any prohibition or restriction imposed (eg, clinical hold) by an applicable Competent Authority in any area of the world, or if the investigator is aware of any new information which might influence the evaluation of the benefits and risks of a Pfizer/BMS product, Pfizer/BMS should be informed immediately.

In addition, the investigator will inform Pfizer/BMS immediately of any urgent safety measures taken by the investigator to protect the study patients against any immediate hazard, and of any serious breaches of this NI study protocol of which the investigator becomes aware.

10. LIST OF TABLES

Table 1. Baseline Demographic and Clinical Characteristic Variables in VTE population

Table 2. Outcome Variables in the VTE Population

11. LIST OF FIGURES

Figure 1. Study Design Figure

12. APPENDIX 1. LIST OF RELEVANT ICD-9-CM DIAGNOSIS, CPT, AND HCPCS CODES

Appendix Table 1. Selection Criteria

Diagnosis	ICD-9 Code	ICD-10 Code
Atrial fibrillation	427.31, 427.32	I480, I482, I481, I483, I484, I4891, I4892
Mechanical Heart Valve	ICD-9 Procedure Codes: 35.05-35.09, 35.20-35.28, 35.97	ICD-10 Procedure Codes: 02RF07Z, 02RF08Z, 02RF0JZ, 02RF0KZ, 02RF37H, 02RF37Z, 02RF38H, 02RF38Z, 02RF3JH, 02RF3JZ, 02RF3KH, 02RF3KZ, 02RF47Z, 02RF48Z, 02RF4JZ, 02RF4KZ, 02RG07Z, 02RG08Z, 02RG0JZ, 02RG0KZ, 02RG37H, 02RG37Z, 02RG38H, 02RG38Z, 02RG3JH, 02RG3JZ, 02RG3KH, 02RG3KZ, 02RG47Z, 02RG48Z, 02RG4JZ, 02RG4KZ, 02RH07Z, 02RH08Z, 02RH0JZ, 02RH0KZ, 02RH37H, 02RH37Z, 02RH38H, 02RH38Z, 02RH3JH, 02RH3JZ, 02RH3KH, 02RH3KZ, 02RH47Z, 02RH48Z, 02RH4JZ, 02RH4KZ, 02RJ07Z, 02RJ08Z, 02RJ0JZ, 02RJ0KZ, 02RJ47Z, 02RJ48Z, 02RJ4JZ, 02RJ4KZ, 02UG3JZ, X2RF03Z, X2RF33Z, X2RF43Z
VTE	415.11, 415.13, 415.19, 415.11, 415.19, 451.2, 451.81, 451.83, 451.84, 451.9, 453.1, 453.2, 453.4, 453.6, 453.8, 453.9	I2692, I2699, T82817A, T82818A, I801, I802, I803, I809, I821, I82210, I82220, I82290, I8240, I8241, I8242, I8243, I8244, I8249, I824Y, I824Z, I8281, I8260, I8261, I8262, I82A1, I82B1, I82C1, I82890, I8290
Malignant Neoplasm (excluding non-melanoma skin)	140-172, 174-209.3	C01, C07, C12, C19, C20, C23, C33, C37, C55, C58, C52, C61, C73, D45, C000, C001, C003, C004, C005, C006, C008, C002, C009, C020, C021, C022, C023, C028, C024, C029, C080, C081, C089, C030, C031, C039, C040, C041, C048, C049, C060, C061, C050, C051, C052, C058, C059, C062, C069, C098, C099, C090, C091, C100, C101, C108, C102, C103, C104, C109, C110, C111, C112, C113, C118, C119, C130, C131, C132, C138, C139, C140, C142, C148, C153, C154, C155, C158, C159, C160, C164, C163, C161, C162, C165, C166, C168, C169, C170, C171, C172, C173, C178, C179, C183, C184, C186, C187, C180, C181, C182, C185, C188, C189, C211, C210, C212, C218, C220, C222, C223, C224, C227, C228, C221, C229, C240, C241, C248, C249, C250, C251, C252, C253, C254, C257, C258, C259, C480, C451, C481, C488, C482, C260, C261, C269, C300, C301, C310, C311, C312, C313, C318, C319, C320, C321, C322, C323, C328, C329, C342, C384, C450, C380, C452, C381, C382, C388, C383, C390, C399, C410, C411, C412, C413, C414, C419, C470, C490, C473, C493, C474, C494, C475, C495, C476, C496, C478, C498, C479, C499, C430, C434, C438, C439, C460, C461, C462, C464, C463, C467, C469, C530, C531, C538, C539, C541, C542, C543, C549, C540, C548, C561, C562, C569, C573, C574, C510, C511, C512, C519, C518, C577, C578, C579, C600, C601, C602, C609, C632, C608, C637, C638, C639, C670, C671, C672, C673, C674, C675, C676, C677, C678, C679, C641, C642, C649, C651, C652, C659, C661, C662, C669, C680, C681, C688, C689, C710, C711, C712, C713, C714, C715, C716, C717, C718, C719, C700, C709, C720, C721, C701, C729, C750, C751, C752, C753, C754, C755, C758, C759, C760, C761, C762, C763, C457, C768, C770, C771, C772, C773, C774, C775, C778, C779, C781, C782, C784, C785, C786, C787, C792, C799, C800, C459, C801, C802, C884, C865, C866, C96A, C960, C962, C864, C860, C862, C863, C861, C964, C969, C96Z, C882, C883, C888, C889, C7A1, C7A8, C4A0, C4A4, C4A8, C4A9, C0680, C0689, C3400, C3401, C3402, C3410, C3411, C3412, C3430, C3431, C3432, C3480, C3481, C3482, C3490, C3491, C3492, C4000, C4001, C4002, C4010, C4011, C4012, C4020, C4021, C4022, C4030, C4031, C4032, C4080, C4081, C4082, C4090, C4091, C4092, C4710, C4711, C4712, C4910, C4911, C4912, C4720, C4721, C4722, C4920, C4921, C4922, C4310, C4311, C4312, C4320, C4321, C4322, C4330, C4331, C4339, C4351, C4352, C4359, C4360, C4361, C4362, C4370, C4371,

Diagnosis	ICD-9 Code	ICD-10 Code
		C4372, C4650, C4651, C4652, C5700, C5701, C5702, C5710, C5711, C5712, C5720, C5721, C5722, C6200, C6201, C6202, C6210, C6211, C6212, C6290, C6291, C6292, C6300, C6301, C6302, C6310, C6311, C6312, C6940, C6941, C6942, C6960, C6961, C6962, C6950, C6951, C6952, C6900, C6901, C6902, C6910, C6911, C6912, C6920, C6921, C6922, C6930, C6931, C6932, C6980, C6981, C6982, C6990, C6991, C6992, C7220, C7221, C7222, C7230, C7231, C7232, C7240, C7241, C7242, C7250, C7259, C7400, C7401, C7402, C7410, C7411, C7412, C7490, C7491, C7492, C7640, C7641, C7642, C7650, C7651, C7652, C7800, C7801, C7802, C7830, C7839, C7880, C7889, C7900, C7901, C7902, C7910, C7911, C7919, C7931, C7932, C7940, C7949, C7951, C7952, C7960, C7961, C7962, C7970, C7971, C7972, C7981, C7982, C7989, C8330, C8339, C8331, C8332, C8333, C8334, C8335, C8336, C8337, C8338, C8350, C8359, C8351, C8352, C8353, C8354, C8355, C8356, C8357, C8358, C8370, C8379, C8371, C8372, C8373, C8374, C8375, C8376, C8377, C8378, C8380, C8389, C8381, C8382, C8383, C8384, C8385, C8386, C8387, C8388, C8310, C8319, C8311, C8312, C8313, C8314, C8315, C8316, C8317, C8318, C8460, C8469, C8470, C8479, C8461, C8471, C8462, C8472, C8463, C8473, C8464, C8474, C8465, C8475, C8466, C8476, C8467, C8477, C8468, C8478, C8520, C8529, C8521, C8522, C8523, C8524, C8525, C8526, C8527, C8528, C8300, C8309, C8390, C8399, C8301, C8391, C8302, C8392, C8303, C8393, C8304, C8394, C8305, C8395, C8306, C8396, C8307, C8397, C8308, C8398, C8170, C8179, C8171, C8172, C8173, C8174, C8175, C8176, C8177, C8178, C8100, C8109, C8140, C8149, C8101, C8141, C8102, C8142, C8103, C8143, C8104, C8144, C8105, C8145, C8106, C8146, C8107, C8147, C8108, C8148, C8110, C8119, C8111, C8112, C8113, C8114, C8115, C8116, C8117, C8118, C8120, C8129, C8121, C8122, C8123, C8124, C8125, C8126, C8127, C8128, C8130, C8139, C8131, C8132, C8133, C8134, C8135, C8136, C8137, C8138, C8190, C8199, C8191, C8192, C8193, C8194, C8195, C8196, C8197, C8198, C8200, C8209, C8210, C8219, C8220, C8229, C8230, C8239, C8240, C8249, C8260, C8269, C8280, C8289, C8290, C8299, C8201, C8211, C8221, C8231, C8241, C8261, C8281, C8291, C8202, C8212, C8222, C8232, C8242, C8262, C8282, C8292, C8203, C8213, C8223, C8233, C8243, C8263, C8283, C8293, C8204, C8214, C8224, C8234, C8244, C8264, C8284, C8294, C8205, C8215, C8225, C8235, C8245, C8265, C8285, C8295, C8206, C8216, C8226, C8236, C8246, C8266, C8286, C8296, C8207, C8217, C8227, C8237, C8247, C8267, C8287, C8297, C8208, C8218, C8228, C8238, C8248, C8268, C8288, C8298, C8400, C8409, C8401, C8402, C8403, C8404, C8405, C8406, C8407, C8408, C8410, C8419, C8411, C8412, C8413, C8414, C8415, C8416, C8417, C8418, C9140, C9141, C9142, C8440, C8449, C8441, C8442, C8443, C8444, C8445, C8446, C8447, C8448, C8250, C8259, C8490, C8499, C84A0, C84A9, C84Z0, C84Z9, C8510, C8519, C8580, C8589, C8590, C8599, C8251, C8491, C84A1, C84Z1, C8511, C8581, C8591, C8252, C8492, C84A2, C84Z2, C8512, C8582, C8592, C8253, C8493, C84A3, C84Z3, C8513, C8583, C8593, C8254, C8494, C84A4, C84Z4, C8514, C8584, C8594, C8255, C8495, C84A5, C84Z5, C8515, C8585, C8595, C8256, C8496, C84A6, C84Z6, C8516, C8586, C8596, C8257, C8497, C84A7, C84Z7, C8517, C8587, C8597, C8258, C8498, C84A8, C84Z8, C8518, C8588, C8598, C9000, C9001, C9002, C9010, C9011, C9012, C9020, C9030, C9021, C9031,

Diagnosis	ICD-9 Code	ICD-10 Code
		C9022, C9032, C9100, C9101, C9102, C9110, C9111, C9112, C91Z0, C91Z1, C91Z2, C9130, C9150, C9160, C91A0, C9131, C9151, C9161, C91A1, C9132, C9152, C9162, C91A2, C9190, C9191, C9192, C9200, C9240, C9250, C9260, C92A0, C9201, C9241, C9251, C9261, C92A1, C9202, C9242, C9252, C9262, C92A2, C9210, C9211, C9212, C9220, C9221, C9222, C9230, C9231, C9232, C92Z0, C92Z1, C92Z2, C9290, C9291, C9292, C9300, C9301, C9302, C9310, C9311, C9312, C9390, C9391, C9392, C9330, C93Z0, C9331, C93Z1, C9332, C93Z2, C9400, C9401, C9402, C9420, C9421, C9422, C9430, C9480, C9431, C9481, C9432, C9482, C9500, C9501, C9502, C9510, C9511, C9512, C9590, C9591, C9592, C7A00, C4A10, C4A11, C4A12, C4A20, C4A21, C4A22, C4A30, C4A31, C4A39, C4A60, C4A61, C4A62, C4A70, C4A71, C4A72, C4A51, C4A52, C4A59, C50011, C50012, C50019, C50111, C50112, C50119, C50211, C50212, C50219, C50311, C50312, C50319, C50411, C50412, C50419, C50511, C50512, C50519, C50611, C50612, C50619, C50811, C50812, C50819, C50911, C50912, C50919, C50021, C50022, C50029, C50121, C50122, C50129, C50221, C50222, C50229, C50321, C50322, C50329, C50421, C50422, C50429, C50521, C50522, C50529, C50621, C50622, C50629, C50821, C50822, C50829, C50921, C50922, C50929, C7A019, C7A010, C7A011, C7A012, C7A029, C7A020, C7A021, C7A022, C7A023, C7A024, C7A025, C7A026, C7A090, C7A091, C7A092, C7A093, C7A094, C7A095, C7A096, C7A098
IVCF	ICD-9-PCS Code: 38.7x CPT Code: 37191, 37192, 37193, 37620	ICD-10-PCS Codes: 02HV0DZ, 02HV3DZ, 02HV4DZ, 02LV0CZ, 02LV0DZ, 02LV0ZZ, 02LV3CZ, 02LV3DZ, 02LV3ZZ, 02LV4CZ, 02LV4DZ, 02LV4ZZ, 02VV0CZ, 02VV0DZ, 02VV0ZZ, 02VV3CZ, 02VV3DZ, 02VV3ZZ, 02VV4CZ, 02VV4DZ, 02VV4ZZ, 06H00DZ, 06H03DZ, 06H04DZ, 06L00CZ, 06L00DZ, 06L00ZZ, 06L03CZ, 06L03DZ, 06L03ZZ, 06L04CZ, 06L04DZ, 06L04ZZ, 06V00CZ, 06V00DZ, 06V00ZZ, 06V03CZ, 06V03DZ, 06V03ZZ, 06V04CZ, 06V04DZ, 06V04ZZ
Cancer-related surgery ³⁷	ICD-9-PCS Code: 85.21, 85.23, 85.31, 85.32, 85.33, 85.34, 85.35, 85.36, 85.41, 85.42, 85.43, 85.44, 85.45, 85.46, 85.47, 85.48, 99.25, 99.28, 99.85	ICD-10-PCS Codes: 0HBT7ZZ, 0HBT8ZZ, 0HBTXZZ, 0HBU7ZZ, 0HBU8ZZ, 0HBUXZZ, 0HBV7ZZ, 0HBV8ZZ, 0HBVXZZ, 0HBT0ZZ, 0HBT3ZZ, 0HBU0ZZ, 0HBU3ZZ, 0HBV0ZZ, 0HBV3ZZ, 0HBT0ZZ, 0HBT3ZZ, 0HBU0ZZ, 0HBU3ZZ, 0HBV0ZZ, 0HBV3ZZ, 0H0T0JZ, 0H0T3JZ, 0H0U0JZ, 0H0U3JZ, 0HRT0JZ, 0HRT3JZ, 0HRU0JZ, 0HRU3JZ, 0HRV0JZ, 0HRV3JZ, 0HBT0ZZ, 0HBT3ZZ, 0HBU0ZZ, 0HBU3ZZ, 0H0V0JZ, 0H0V3JZ, 0HBV0ZZ, 0HBV3ZZ, 0HTT0ZZ, 0HTU0ZZ, 0HTV0ZZ, 07T50ZZ, 07T60ZZ, 0HTT0ZZ, 0HTU0ZZ, 07T50ZZ, 07T60ZZ, 0HTV0ZZ, 07T50ZZ, 07T60ZZ, 0HTT0ZZ, 0HTU0ZZ, 0KTH0ZZ, 0KTJ0ZZ, 07T50ZZ, 07T60ZZ, 0HTV0ZZ, 0KTH0ZZ, 0KTJ0ZZ, 07T50ZZ, 07T60ZZ, 07T70ZZ, 07T90ZZ, 07T80ZZ, 07T90ZZ, 0HTT0ZZ, 0HTU0ZZ, 0KTH0ZZ, 0KTJ0ZZ, 07T50ZZ, 07T60ZZ, 07T70ZZ, 07T80ZZ, 07T90ZZ, 0HTV0ZZ, 0KTH0ZZ, 0KTJ0ZZ, 3E03305, 3E04305, 3E00X0M, 3E0130M, 3E0230M, 3E03303, 3E0330M, 3E04303, 3E0430M, 3E05303, 3E0530M, 3E06303, 3E0630M, DWY18ZZ, DWY28ZZ, DWY38ZZ, DWY48ZZ, DWY58ZZ, DWY68ZZ
	CPT Code: 19120, 19125, 19126, 19301, 19302-19307, 19140, 19160, 19162, 19180, 19182, 19200,	

Diagnosis	ICD-9 Code	ICD-10 Code
	19220, 19240, 19260, 19271, 19272, 19300, 19301, 19302, 19303, 19304, 19305, 19306, 19307, 19316, 19318, 19324, 19325, 19357, 19361, 19364, 19366, 19367, 19368, 19369, 21015, 21016, 21034, 21044, 21045, 21557, 21935, 21936, 23200, 23210, 23220, 23221, 23222, 24077, 24079, 24150, 24151, 24152, 24153, 25077, 25170, 26117, 26250, 26255, 26260, 26261, 26262, 27049, 27075, 27076, 27077, 27078, 27079, 27329, 27365, 27615, 27645, 27646, 27647, 28046, 28171, 28173, 28175, 31785, 31786, 32503, 32504, 33050, 33120, 33130, 45160, 45170, 47711, 47712, 49200, 49201, 49215, 54530, 54535, 58950, 58951, 58952, 58957, 58958, 58960, 60252, 60254, 60600, 60605, 61510, 61517, 61518, 61519, 61520, 61521, 61526, 61530, 61546, 61548, 63275, 63276, 63277, 63278, 63280, 63281, 63282, 63283, 63285, 63286, 63287, 63290	

TABLE 2: PREGNANCY CODES

ICD-9-DIAGNOSIS CODES	630-679, V22, V23, V24, V27, V28, V61.6, V61.7, 792.3, 796.5
ICD-10-DIAGNOSIS CODES	O80, O68, O76, O82, O85, O94, O654, O720, O650, O651, O652, O653, O658, O659, O662, O666, O010, O011, O019, O020, O029, O021, O000, O001, O002, O008, O009, O035, O030, O036, O031, O037, O032, O039, O034, O045, O046, O047, Z332, O070, O071, O072, O074, O080, O081, O086, O084, O085, O083, O082, O087, O089, O200, O208, O209, O670, O678, O679, O119, O111, O112, O113, O139, O131, O132, O133, O161, O162, O163, O152, O159, O151, O169, O210, O211, O212, O218, O219, O479, O471, O480, O481, O905, O906, O330, O252, O253, O331, O332, O337, O338, O339, O770, O771, O778, O779, O755, O611, O610, O618, O619, O752, O753, O759, O655, O660, O661, O665, O668, O663, O669, O620, O621, O622, O623, O624, O629, O628, O630, O639, O631, O632, O700, O701, O702, O703, O709, O717, O704, O719, O711, O712, O713, O714, O715, O716, O721, O722, O723, O730, O731, O741, O740, O742, O891, O743, O892, O748, O744, O745, O746, O747, O898, O893, O894, O895, O896, O749, O899, O750, O751, O904, O754, O874, O870, O871, O873, O872, O878, O879, O864, O900, O901, O860, O902, O903, O909, O923, O925, O926, O924, O289, O280, O281, O282, O283, O284, O285, O288, O1220, O1221, O1222, O1223, O0281, O0289, O0387, O0337, O0384, O0334, O0382, O0332, O0383, O0333, O0381, O0331, O0385, O0386, O0388, O0389, O0335, O0336, O0338, O0339, O0380, O0330, O0487, O0484, O0482, O0483, O0481, O0485, O0486, O0488, O0489, O0480, O0737, O0734, O0732, O0733, O0731, O0735, O0736, O0738, O0739, O0730, O0882, O0881, O0883, O0889, O4400, O4401, O4402, O4403, O4410, O4411, O4412, O4413, O4590, O4591, O4592, O4593, O4690, O4691, O4692, O4693, O1002, O1092, O1003, O1093, O1042, O1043, O1012, O1022, O1032, O1013, O1023, O1033, O1400, O1490, O1402, O1403, O1492, O1493, O1410, O1420, O1412, O1413, O1422, O1423, O1500, O1502, O1503, O6000, O6002, O6003, O4700, O4702, O4703, O1200, O2600, O1201, O1202, O1203, O2601, O2602, O2603, O1210, O1211, O1212, O1213, O9089, O2620, O2621, O2622, O2623, O2300, O2310, O2320, O2330, O2340, O2390, O2341, O2342, O2343, O2391, O2392, O2393, O2301, O2302, O2303, O2311, O2312, O2313, O2321, O2322, O2323, O2331, O2332, O2333, O8611, O8613, O8619, O8620, O8621, O8622, O8629, O2662, O2610, O2630, O2640, O2940, O2960, O2990, O9989, O2611, O2612, O2613, O2631, O2632, O2633, O2641, O2642, O2643, O2672, O2686, O2691, O2692, O2693, O2941, O2942, O2943, O2961, O2962, O2963, O2991, O2992, O2993, O2663, O2673, O2690, O9812, O9813, O9822, O9823, O9832, O9833, O9802, O9803, O9862, O9863, O9852, O9853, O9842, O9872, O9843, O9873, O9882, O9883, O9892, O9893, O2402, O2412, O2432, O2482, O2492, O2493, O2403, O2413, O2433, O2483, O9902, O9903, O9081, O9942, O9943, O2510, O2511, O2512, O2513, O9952, O9962, O9972, O9A12, O9A22, O9A32, O9A42, O9A52, O9953, O9963, O9973, O9A13, O9A23, O9A33, O9A43, O9A53, O9912, O9913, O7582, O3090, O3091, O3092, O3093, O3400, O3401, O3402, O3403, O3410, O3411, O3412, O3413, O3421, O3430, O3431, O3432, O3433, O3440, O3441, O3442, O3443, O3460, O3461, O3462, O3463, O3470, O3471, O3472, O3473, O3480, O3490, O3429, O3481, O3482, O3483, O3491, O3492, O3493, O4390, O4391, O4392, O4393, O4200, O4290, O4202, O4292, O4210, O4212, O0940, O0941, O0942, O0943, O7589, O6640, O6641, O7182, O7100, O7102, O7103, O7189, O7181, O8909, O8901, O2650, O2651, O2652, O2653, O7581, O8689, O8612, O8681, O2200, O2201, O2202, O2203, O2210, O2211, O2212, O2213, O2220, O2221, O2222, O2223, O2230, O2231, O2232, O2233, O2250, O2251, O2252, O2253, O2291, O2292, O2293, O2240, O2241, O2242, O2243, O2290, O8802, O8803, O8812, O8813, O8822, O8823, O8832, O8833, O8882, O8883, O9102, O9103, O9112, O9113, O9122, O9123, O9203, O9202, O9213, O9212, O9229, O9220, O9279, O9270, O30001, O30002, O30003, O30009, O30019, O30039, O30049, O30099, O30101, O30102, O30103, O30109, O30119, O30129, O30199, O30201, O30202, O30203, O30209, O30219, O30229, O30299, O30801, O30802, O30803, O30809, O30819, O30829, O30899, O43211, O43212, O43213, O43221, O43222, O43223, O43231, O43232,

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ICD-10-PCS CODES	0DQP0ZZ, 0DQP3ZZ, 0DQP4ZZ, 0DQP7ZZ, 0DQP8ZZ, 0DQR0ZZ, 0DQR3ZZ, 0DQR4ZZ, 0JCB0ZZ, 0JCB3ZZ, 0Q820ZZ, 0Q823ZZ, 0Q824ZZ, 0Q830ZZ, 0Q833ZZ, 0Q834ZZ, 0TQB0ZZ, 0TQB3ZZ, 0TQB4ZZ, 0TQB7ZZ, 0TQB8ZZ, 0TQD0ZZ, 0TQD3ZZ, 0TQD4ZZ, 0TQD7ZZ, 0TQD8ZZ, 0TQDXZZ, 0U7C7ZZ, 0UCG0ZZ, 0UCG3ZZ, 0UCG4ZZ, 0UCM0ZZ, 0UJD7ZZ, 0UQ90ZZ, 0UQ93ZZ, 0UQ94ZZ, 0UQ97ZZ, 0UQ98ZZ, 0UQC0ZZ, 0UQC3ZZ, 0UQC4ZZ, 0UQC7ZZ, 0UQC8ZZ, 0UQG0ZZ, 0UQG3ZZ, 0UQG4ZZ, 0UQG7ZZ, 0UQG8ZZ, 0UQGXZZ, 0UQM0ZZ, 0UQMXZZ, 0US90ZZ, 0US94ZZ, 0US9XZZ, 0W3R0ZZ, 0W3R3ZZ, 0W3R4ZZ, 0W3R7ZZ, 0W3R8ZZ, 0W8NXZZ, 0WQNXZZ, 10900Z9, 10900ZA, 10900ZB, 10900ZC, 10900ZD, 10900ZU, 10903Z9, 10903ZA, 10903ZB, 10903ZC, 10903ZD, 10903ZU, 10904Z9, 10904ZA, 10904ZB, 10904ZC, 10904ZD, 10904ZU, 10907Z9, 10907ZA, 10907ZB, 10907ZC, 10907ZD, 10907ZU, 10908Z9, 10908ZA, 10908ZB, 10908ZC, 10908ZD, 10908ZU, 10A00ZZ, 10A03ZZ, 10A04ZZ, 10A07Z6, 10A07ZX, 10A07ZZ, 10A08ZZ, 10D00Z0, 10D00Z1, 10D00Z2, 10D07Z3, 10D07Z4, 10D07Z5, 10D07Z6, 10D07Z7, 10D07Z8, 10D17ZZ, 10D18ZZ, 10E0XZZ, 10H00ZZ, 10H00YZ, 10H07ZZ, 10H07YZ, 10J00ZZ, 10J03ZZ, 10J04ZZ, 10J07ZZ, 10J08ZZ, 10J0XZZ, 10J10ZZ, 10J13ZZ, 10J14ZZ, 10J17ZZ, 10J18ZZ, 10J1XZZ, 10J20ZZ, 10J23ZZ, 10J24ZZ, 10J27ZZ, 10J28ZZ, 10J2XZZ, 10P00Z3, 10P00YZ, 10P07Z3, 10P07YZ, 10Q00YE, 10Q00YF, 10Q00YG, 10Q00YH, 10Q00YJ, 10Q00YK,

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HCPCS CODES	59000-59350, 59400-59430, 59510-59866, 59870-59899, 76801-76828, 83661-8366

TABLE 3: LIST OF CHEMOTHERAPY AGENTS ³⁸

Medication	Type	HCPCS Codes (use NDC codes wherever applicable)
Aldesleukin	IV	J9015
Alemtuzumab	Immunotherapy	J0202, J9010
Amifostine	IV	J0207
Arsenic Trioxide	IV	J9017
Atezolizumab	Immunotherapy	C9483, J9022
Avelumab	Immunotherapy	C9491, J9023
Axicabtagene Ciloleucel	IV	Q2041
Azacitidine	IV	J9025
Bendamustine Hydrochloride	IV	J9033, J9034
Bevacizumab	IV	C9257, J9035

Brentuximab Vedotin	IV	J9042
Busulfan	IV	J0594, J8510
Cabazitaxel	IV	J9043
Capecitabine	IV	J8520, J8521
Carboplatin	IV	J9045
Carfilzomib	IV	J9047
Carmustine	IV	J9050
Cetuximab	IV	J9055
Cisplatin	IV	J9060
Cladribine	IV	J9065
Clofarabine	IV	J9027
Copanlisib Hydrochloride	IV	C9030
Cyclophosphamide	IV	J8530, J9070
Cytarabine	IV	J9100
Cytarabine Liposome	IV	J9098, C9024
Dacarbazine	IV	J9130
Dactinomycin	IV	J9120
Daratumumab	IV	C9476, J9145
Darbepoetin Alfa	IV	J0881, J0882
Daunorubicin Hydrochloride	IV	J9150, J9151
Daunorubicin Hydrochloride and Cytarabine Liposome	IV	C9024
Decitabine	IV	J0894
Degarelix	IV	J9155
Denileukin Diftitox	IV	J9160
Denosumab	IV	J0897
Dexamethasone	IV	J1094, J1100, J7312, J7637, J7638, J8540
Dexrazoxane Hydrochloride	IV	J1190
Docetaxel	IV	J9171
Doxorubicin Hydrochloride	IV	J9000
Doxorubicin Hydrochloride Liposome	IV	Q2049, Q2050
Durvalumab	Immunotherapy	C9492
Elotuzumab	IV	C9477, C9176
Epirubicin Hydrochloride	IV	J9178
Epoetin Alfa	IV	J0885, J0886, Q4081, Q5105, Q5106
Eribulin Mesylate	IV	J9179
Etoposide	IV	J8560, J9181
Everolimus	IV	J7527
Filgrastim	IV	J1442, J1446, J1447, Q5101
Fludarabine Phosphate	IV	J8562, J9185

Fluorouracil Injection	IV	J9190
Fulvestrant	IV	J9395
Gefitinib	IV	J8565
Gemcitabine Hydrochloride	IV	J9201
Gemtuzumab Ozogamicin	IV	J9203, J9300
Glucarpidase	IV	C9293
Goserelin Acetate	IV	J9202
Ibritumomab Tiuxetan	IV	A9542, A9543
Idarubicin Hydrochloride	IV	J9211
Ifosfamide	IV	J9208
IL-2 (Aldesleukin)	IV	J9015
Inotuzumab Ozogamicin	IV	C9028
Ipilimumab	Immunotherapy	J9228
Irinotecan Hydrochloride	IV	J9206
Irinotecan Hydrochloride Liposome	IV	J9205, C9474
Ixabepilone	IV	J9207
Lanreotide Acetate	IV	J1930
Leucovorin Calcium	IV	J0640
Leuprolide Acetate	IV	J1950, J9217, J9218, J9219
Mechlorethamine Hydrochloride	IV	J9230
Melphalan	IV	J8600
Melphalan Hydrochloride	IV	J9245
Mesna	IV	J9209
Methylnaltrexone Bromide	IV	J2212
Mitomycin C	IV	J7315, J9280
Mitoxantrone Hydrochloride	IV	J9293
Necitumumab	IV	C9475, J9292
Nelarabine	IV	J9261
Nivolumab	Immunotherapy	C9453, J9299
Obinutuzumab	IV	C9021, J9301
Ofatumumab	Immunotherapy	J9302
Olaratumab	IV	C9485, J9285
Omacetaxine Mepesuccinate	IV	J9262
Ondansetron Hydrochloride	IV	J2405, Q0162, S0119
Oxaliplatin	IV	J9263
Paclitaxel	IV	J9264, J9265, J9267, S1016
Palifermin	IV	J2425
Palonosetron Hydrochloride	IV	J2469
Pamidronate Disodium	IV	J2430
Panitumumab	IV	J9303

Pegaspargase	IV	J9266
Pegfilgrastim	IV	J2505
Peginterferon Alfa-2b	IV	S0148
Pembrolizumab	Immunotherapy	C9027, J9271
Pemetrexed Disodium	IV	J9305
Pertuzumab	IV	J9306
Plerixafor	IV	J2562
Pralatrexate	IV	J9307
Radium 223 Dichloride	IV	A9606
Ramucirumab	IV	C9025, J9308
Rasburicase	IV	J2783
Recombinant Interferon Alfa-2b	IV	J9214
Rituxan (Rituximab)	IV	J9310
Rituxan Hycela (Rituximab and Hyaluronidase Human)	IV	C9467
Romidepsin	IV	J9315
Romiplostim	IV	J2796
Siltuximab	IV	C9455, J2860
Talimogene Laherparepvec	IV	C9472, J9325
Temozolomide	IV	J8700, J9328
Temsirolimus	IV	J9330
Thiotepa	IV	J9340
Tocilizumab	IV	J3262
Topotecan Hydrochloride	IV	J8705, J9351
Trabectedin	IV	C9480, J9352
Trastuzumab	IV	J9354, J9355
Valrubicin	IV	J9357
Vinblastine Sulfate	IV	J9360
Vincristine Sulfate	IV	J9370
Vincristine Sulfate Liposome	IV	J9371
Vinorelbine Tartrate	IV	J9390
Ziv-Aflibercept	IV	J9400
Zoledronic Acid	IV	J3489
Abemaciclib	Oral	
Abiraterone Acetate	Oral	
Acalabrutinib	Oral	
Ado-Trastuzumab Emtansine	Oral	
Afatinib Dimaleate	Oral	
Alectinib	Oral	
Aminolevulinic Acid	Oral	J7308, J7345
Anastrozole	Oral	

Apalutamide	Oral	
Aprepitant	Oral	
Asparaginase Erwinia chrysanthemi	Oral	
Axitinib	Oral	
Bexarotene	Oral	
Bicalutamide	Oral	
Bleomycin	Oral	J9040
Blinatumomab	Oral	
Bortezomib	Oral	
Bosutinib	Oral	
Brigatinib	Oral	
BuMel	Oral	
Cabozantinib-S-Malate	Oral	
Ceritinib	Oral	
Chlorambucil	Oral	S0172
Cobimetinib	Oral	
Crizotinib	Oral	
Dabrafenib	Oral	
Dasatinib	Oral	
Defibrotide Sodium	Oral	
Dinutuximab	Oral	
Eltrombopag Olamine	Oral	
Enasidenib Mesylate	Oral	
Enzalutamide	Oral	
Erlotinib Hydrochloride	Oral	
Exemestane	Oral	
Fluorouracil--Topical	Oral	
Flutamide	Oral	
Fostamatinib Disodium	Oral	
Hydroxyurea	Oral	S0176
Ibrutinib	Oral	
Idelalisib	Oral	
Imatinib Mesylate	Oral	S0088
Imiquimod	Oral	
Ixazomib Citrate	Oral	
Lapatinib Ditosylate	Oral	
Lenalidomide	Oral	
Lenvatinib Mesylate	Oral	
Letrozole	Oral	
Lomustine	Oral	S0178

Megestrol Acetate	Oral	S0179
Mercaptopurine	Oral	S0108
Methotrexate	Oral	J8610, J9250, J9260
Midostaurin	Oral	
Neratinib Maleate	Oral	
Netupitant and Palonosetron Hydrochloride	Oral	C9448, J8655, Q9978
Nilotinib	Oral	
Nilutamide	Oral	
Olaparib	Oral	
Osimertinib	Oral	
Palbociclib	Oral	
Palonosetron Hydrochloride and Netupitant	Oral	J8655, Q9978
Panobinostat	Oral	
Pazopanib Hydrochloride	Oral	
Pomalidomide	Oral	
Ponatinib Hydrochloride	Oral	
Prednisone	Oral	J7506, J7512
Procarbazine Hydrochloride	Oral	S0182
Raloxifene Hydrochloride	Oral	
Regorafenib	Oral	
Ribociclib	Oral	
Rolapitant Hydrochloride	Oral	C9464, J8670, Q9981
Rucaparib Camsylate	Oral	
Ruxolitinib Phosphate	Oral	
Sonidegib	Oral	
Sorafenib Tosylate	Oral	
Sprycel (Dasatinib)	Oral	
Stivarga (Regorafenib)	Oral	
Sunitinib Malate	Oral	
Sutent (Sunitinib Malate)	Oral	
Tamoxifen Citrate	Oral	S0187
Thalidomide	Oral	
Thioguanine	Oral	
Toremifene	Oral	
Trametinib	Oral	
Trifluridine and Tipiracil Hydrochloride	Oral	
Vandetanib	Oral	
Vemurafenib	Oral	
Venetoclax	Oral	
Vismodegib	Oral	

Vorinostat	Oral	
Uridine Triacetate	Granule	
Sipuleucel-T	Infusion	Q2043
Tisagenlecleucel	Infusion	Q2040
Injection, Abarelix For Injectable Suspension, Per 10 Mg	Hormone Therapy	C9216, J9216
Injection, Abarelix, 10 Mg	Hormone Therapy	J0128, S0165
Anastrozole, Oral, 1 Mg	Hormone Therapy	S0170
Injection Degarelix 1 Mg	Hormone Therapy	J9155
Diethylstilbestrol Diphosphate 250 Mh Iv	Hormone Therapy	J9165
Exemestane, 25 Mg	Hormone Therapy	S0156
Gonadorelin Hydrochloride	Hormone Therapy	J1620
Histrelin Implant	Hormone Therapy	J9226, J9225
Injection, Histrelin Acetate, 10 Mcg	Hormone Therapy	Q2020, J1675
Hormonal Anti-Neoplastic	Hormone Therapy	G0356
Injection Lanreotide 1 Mg	Hormone Therapy	J1930, C9237
Injection, Medroxyprogesterone Acetate, 50 Mg	Hormone Therapy	J1051, J1050
Megestrol Acetate, Oral, 20mg	Hormone Therapy	S0179
Nadrolone Phenpropionate	Hormone Therapy	J0340
Nandrolone Decanoate	Hormone Therapy	J2320, J2321, J2322
Octreotide Acetate	Hormone Therapy	J2354, J2352, J2353
Progesterone	Hormone Therapy	J2675
Tamoxifen Citrate, Oral, 10mg	Hormone Therapy	S0187
Testosterone Cypionate	Hormone Therapy	J1070, J1080, J1090
Testosterone Cypionate And Estradiol Cypion	Hormone Therapy	J1060
Testosterone Enanthate	Hormone Therapy	J3120, J3130
Testosterone Enanthate And Estradiol Valera	Hormone Therapy	J0900
Testosterone Propionate	Hormone Therapy	J3150
Testosterone Suspension	Hormone Therapy	J3140
Injection, Triptorelin Pamoate, 3.75 Mg	Hormone Therapy	J3315

TABLE 4: LIST OF CHEMOTHERAPY ADMINISTRATION CODES²⁴

CPT Codes	36640, 61517, 96401, 96402, 96405, 96406, 96409, 96411, 96413, 96415, 96416, 96417, 96420, 96422, 96423, 96425, 96440, 96445, 96446, 96450, 96542, 96549, 99555, Q0083, Q0084, Q0085, S9329, S9330, S9331, 4180F, 36640, 96410, 96408, 96400, 219583, 96542, 203682, 96414, 96412, 242226, 61517, 219687, 0519F, 96545, 206820, 206929, 96549, 99601, 99602, 62360, 62361, 62362, 36823, 36260, 61215, 90765, 90766, 90767, 90768, 96365, 96366, 96367, 96368, 96523, 90781, 90780, 96530, 96520, 95990, 95991, 96522, 96521, 62365, 0169T, 90775, 90776, 90773, 90774, 90772, 90783, 90784, 90782, 90799, 90779, 96379, 81350, 96912, 96910, 96570, 96571, 96567, 83520
Revenue Codes	331, 332, 335,

ICD-9-PCS	99.28, 99.25, 99.29, 17.7, 00.1x, 00.15
ICD-10-PCS	3E06003, 3E06003, 3E06303, 3E06303, 3E04003, 3E04003, 3E04303, 3E04303, 3E0S303, 3E0S303, 3E05003, 3E05003, 3E05303, 3E05303, 3E03003, 3E03003, 3E03303, 3E03303, 3E0R303, 3E0R303, 3E0J30M, 3E0J30M, 3E0J70M, 3E0J70M, 3E0J80M, 3E0J80M, 3E0A30M, 3E0A30M, 3E0V30M, 3E0V30M, 3E0600M, 3E0600M, 3E0630M, 3E0630M, 3E0400M, 3E0400M, 3E0430M, 3E0430M, 3E0Q30M, 3E0Q30M, 3E0Q70M, 3E0Q70M, 3E0BX0M, 3E0BX0M, 3E0B30M, 3E0B30M, 3E0B70M, 3E0B70M, 3E0S30M, 3E0S30M, 3E0CX0M, 3E0CX0M, 3E0C30M, 3E0C30M, 3E0C70M, 3E0C70M, 3E0P30M, 3E0P30M, 3E0P70M, 3E0P70M, 3E0P80M, 3E0P80M, 3E0K30M, 3E0K30M, 3E0K70M, 3E0K70M, 3E0K80M, 3E0K80M, 3E0U30M, 3E0U30M, 3E0H30M, 3E0H30M, 3E0H70M, 3E0H70M, 3E0H80M, 3E0H80M, 3E0W30M, 3E0W30M, 3E0N30M, 3E0N30M, 3E0N70M, 3E0N70M, 3E0N80M, 3E0N80M, 3E0DX0M, 3E0DX0M, 3E0D30M, 3E0D30M, 3E0D70M, 3E0D70M, 3E0230M, 3E0230M, 3E09X0M, 3E09X0M, 3E0930M, 3E0930M, 3E0970M, 3E0970M, 3E0Y30M, 3E0Y30M, 3E0Y70M, 3E0Y70M, 3E0500M, 3E0500M, 3E0530M, 3E0530M, 3E0300M, 3E0300M, 3E0330M, 3E0330M, 3E0M30M, 3E0M30M, 3E0M70M, 3E0M70M, 3E0L30M, 3E0L30M, 3E0L70M, 3E0L70M, 3E0E30M, 3E0E30M, 3E0E70M, 3E0E70M, 3E0E80M, 3E0E80M, 3E0F30M, 3E0F30M, 3E0F70M, 3E0F70M, 3E0F80M, 3E0F80M, 3E00X0M, 3E00X0M, 3E0R30M, 3E0R30M, 3E0130M, 3E0130M, 3E0G30M, 3E0G30M, 3E0G70M, 3E0G70M, 3E0G80M, 3E0G80M, 3E06005, 3E06305, 3E04005, 3E04305, 3E0BX05, 3E0B305, 3E0B705, 3E0S305, 3E0CX05, 3E0C305, 3E0C705, 3E0U305, 3E0DX05, 3E0D305, 3E0D705, 3E09X05, 3E09305, 3E09705, 3E05005, 3E05305, 3E03005, 3E03305, 3E0R305, 3E0600P, 3E0630P, 3E0400P, 3E0430P, 3E0500P, 3E0530P, 3E0300P, 3E0330P, XW04351, XW03351

TABLE 5: RADIATION THERAPY CODES²⁴

ICD-9-Diagnosis	V58.0, V66.1, V67.1, E873.2, E879.2
ICD-10-Diagnosis	Z51.0, Z51.89, Z08, Z09, Y63.2, Y84.2
CPT Codes	77280, 77285, 77290, 77295, 77299, 77300, 77301, 77305, 77310, 77315, 77321, 77326, 77327, 77328, 77331, 77332, 77333, 77334, 77336, 77338, 77371, 77372, 77373, 77399, 77401, 77402, 77403, 77404, 77406, 77407, 77408, 77409, 77411, 77412, 77413, 77414, 77416, 77417, 77418, 77421, 77422, 77423, 77424, 77425, 77427, 77431, 77432, 77435, 77469, 77470, 77499, 77520, 77522, 77523, 77525, 77750, 77761, 77762, 77763, 77776, 77777, 77778, 77785, 77786, 77787, 77789, 77799, 0073T, 0082T, 0083T, 0182T, 0190T, 0197T, 19296, 19297, 19298, 20555, 20660, 31463, 32553, 41019, 49411, 49412, 52250, 55859, 55860, 55875, 55876, 55920, 57155, 57156, 58346, 61720, 61735, 61770, 61781, 61782, 61783, 61793, 61795, 61796, 61797, 61798, 61799, 61800, 63620, 63621, 73670, 76950, 76965, 77014, 77261, 77262, 77263, , 77285, 77306, 77307, 77370, 77380, 77381, 77385, 77386, 77387, 77405, 77410, 77415, 77419, 77420, 77430, 77781, 77782, 77783, 77784, ,77790, 79005, 79030, 79035, 79100, 79101, 79200, 79300, 79400, 79403, 79420, 79440, 79445, 79900, 79999
ICD-9 Procedure Codes	92.2, 92.3, 92.4
ICD-10 Procedure Codes	3E0B304, 3E0B704, 3E0BX04, 3E0C304, 3E0C704, 3E0CX04, 3E0D304, 3E0D704, 3E0DX04, 3E0E304, 3E0E704, 3E0E804, 3E0F304, 3E0F704, 3E0F804, 3E0G304, 3E0G704, 3E0G804, 3E0H304, 3E0H704, 3E0H804, 3E0J304, 3E0J704, 3E0J804, 3E0K304, 3E0K704, 3E0K804, 3E0L304, 3E0L704, 3E0M304, 3E0M704, 3E0N304, 3E0N704, 3E0N804, 3E0P304, 3E0P704, 3E0P804, 3E0Q304, 3E0Q704, 3E0R304,

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	0WHR41Z, 0WHR71Z, 0WHR81Z, 0XH201Z, 0XH231Z, 0XH241Z, 0XH301Z, 0XH331Z, 0XH341Z, 0XH401Z, 0XH431Z, 0XH441Z, 0XH501Z, 0XH531Z, 0XH541Z, 0XH601Z, 0XH631Z, 0XH641Z, 0XH701Z, 0XH731Z, 0XH741Z, 0XH801Z, 0XH831Z, 0XH841Z, 0XH901Z, 0XH931Z, 0XH941Z, 0XHB01Z, 0XHB31Z, 0XHB41Z, 0XHC01Z, 0XHC31Z, 0XHC41Z, 0XHD01Z, 0XHD31Z, 0XHD41Z, 0XHF01Z, 0XHF31Z, 0XHF41Z, 0XHG01Z, 0XHG31Z, 0XHG41Z, 0XHH01Z, 0XHH31Z, 0XHH41Z, 0XHJ01Z, 0XHJ31Z, 0XHJ41Z, 0XHK01Z, 0XHK31Z, 0XHK41Z, 0YH001Z, 0YH031Z, 0YH041Z, 0YH101Z, 0YH131Z, 0YH141Z, 0YH501Z, 0YH531Z, 0YH541Z, 0YH601Z, 0YH631Z, 0YH641Z, 0YH701Z, 0YH731Z, 0YH741Z, 0YH801Z, 0YH831Z, 0YH841Z, 0YH901Z, 0YH931Z, 0YH941Z, 0YHB01Z, 0YHB31Z, 0YHB41Z, 0YHC01Z, 0YHC31Z, 0YHC41Z, 0YHD01Z, 0YHD31Z, 0YHD41Z, 0YHF01Z, 0YHF31Z, 0YHF41Z, 0YHG01Z, 0YHG31Z, 0YHG41Z, 0YHH01Z, 0YHH31Z, 0YHH41Z, 0YHJ01Z, 0YHJ31Z, 0YHJ41Z, 0YHK01Z, 0YHK31Z, 0YHK41Z, 0YHL01Z, 0YHL31Z, 0YHL41Z, 0YHM01Z, 0YHM31Z, 0YHM41Z, 0YHN01Z, 0YHN31Z, 0YHN41Z, CW70NZZ, CW70YZZ, CW73NZZ, CW73YZZ, CW7GGZZ, CW7GYZZ, CW7N8ZZ, CW7NGZZ, CW7NNZZ, CW7NPZZ, CW7NYZZ, CW7YYZZ, DWY5GDZ, DWY5GFZ, DWY5GGZ, DWY5GHZ, DWY5GYZ, D0Y0FZZ, D0Y1FZZ, D0Y6FZZ, D0Y7FZZ, D7Y0FZZ, D7Y1FZZ, D7Y2FZZ, D7Y3FZZ, D7Y4FZZ, D7Y5FZZ, D7Y6FZZ, D7Y7FZZ, D7Y8FZZ, D8Y0FZZ, D9Y0FZZ, D9Y1FZZ, D9Y4CZZ, D9Y4FZZ, D9Y5FZZ, D9Y6FZZ, D9Y7FZZ, D9Y8FZZ, D9Y9FZZ, D9YBCZZ, D9YBFZZ, D9YCCZZ, D9YCFZZ, D9YDCZZ, D9YDFZZ, DBY0FZZ, DBY1FZZ, DBY2FZZ, DBY5FZZ, DBY6FZZ, DBY7FZZ, DBY8FZZ, DDY0FZZ, DDY1CZZ, DDY1FZZ, DDY2CZZ, DDY2FZZ, DDY3CZZ, DDY3FZZ, DDY4CZZ, DDY4FZZ, DDY5CZZ, DDY5FZZ, DDY7CZZ, DDY7FZZ, DDY8CZZ, DDY8FZZ, DFY0CZZ, DFY0FZZ, DFY1CZZ, DFY1FZZ, DFY2CZZ, DFY2FZZ, DFY3CZZ, DFY3FZZ, DGY0FZZ, DGY1FZZ, DGY2FZZ, DGY4FZZ, DGY5FZZ, DHY2FZZ, DHY3FZZ, DHY4FZZ, DHY5FZZ, DHY6FZZ, DHY7FZZ, DHY8FZZ, DHY9FZZ, DHYBFZZ, DHYCFZZ, DMY0FZZ, DMY1FZZ, DPY0FZZ, DPY2FZZ, DPY3FZZ, DPY4FZZ, DPY5FZZ, DPY6FZZ, DPY7FZZ, DPY8FZZ, DPY9FZZ, DPYBFZZ, DPYCFZZ, DTY0CZZ, DTY0FZZ, DTY1CZZ, DTY1FZZ, DTY2CZZ, DTY2FZZ, DTY3CZZ, DTY3FZZ, DUY0CZZ, DUY0FZZ, DUY1CZZ, DUY1FZZ, DUY2CZZ, DUY2FZZ, DVY0CZZ, DVY0FZZ, DVY1FZZ, DWY1FZZ, DWY2FZZ, DWY3FZZ, DWY4FZZ, DWY5FZZ, DWY6FZZ, D0003Z0, D0013Z0, D0063Z0, D0073Z0, D7003Z0, D7013Z0, D7023Z0, D7033Z0, D7043Z0, D7053Z0, D7063Z0, D7073Z0, D7083Z0, D8003Z0, D9003Z0, D9013Z0, D9033Z0, D9043Z0, D9053Z0, D9063Z0, D9073Z0, D9083Z0, D9093Z0, D90B3Z0, D90D3Z0, D90F3Z0, DB003Z0, DB013Z0, DB023Z0, DB053Z0, DB063Z0, DB073Z0, DB083Z0, DD003Z0, DD013Z0, DD023Z0, DD033Z0, DD043Z0, DD053Z0, DD073Z0, DF003Z0, DF013Z0, DF023Z0, DF033Z0, DG003Z0, DG013Z0, DG023Z0, DG043Z0, DG053Z0, DH023Z0, DH033Z0, DH043Z0, DH063Z0, DH073Z0, DH083Z0, DH093Z0, DH0B3Z0, DM003Z0, DM013Z0, DP003Z0, DP023Z0, DP033Z0, DP043Z0, DP053Z0, DP063Z0, DP073Z0, DP083Z0, DP093Z0, DP0B3Z0, DP0C3Z0, DT003Z0, DT013Z0, DT023Z0, DT033Z0, DU003Z0, DU013Z0, DU023Z0, DV003Z0, DV013Z0, DW013Z0, DW023Z0, DW033Z0, DW043Z0, DW053Z0, DW063Z0,
Revenue Codes	333, 344
HPCPS	A4650, A9606, A9699, C1715 , C1716 , C1717 , C1718 , C1719 , C1720 , C1728 , C2616 , C2633 , C2634 , C2635 , C2636 , C2637 , C2638 , C2639 , C2640 , C2641 , C2642 , C2643 , C2698 , C2699 ,C9726, C9728, G0173, G0174, G0242, G0243, G0251, G0338, G0339, G0340, G6003, G6004, G6005, G6006, G6007, G6008, G6009, G6010, G6011, G6012, G6013, G6014, G6015, G6016, Q3001 , S2270, S8049, C1325, C1348, C1350, C1700 , C1701, C1702, C1703, C1704, C1705, C1706, C1707, C1708, C1709, C1710, C1711, C1712, C1790 , C1791, C1792, C1793, C1794, C1795, C1796, C1797, C1798, C1799, C1800, C1801, C1802, C1803, C1804, C1805, C1806, C2632, C9714, C9715, G0178, G0256, G0273, G0274, G0338, G0339, G0340, G0458, C2644, C2645

TABLE 6: FACTORS IDENTIFYING PROVOKED VTE

Factors	Identifying Strategies	
Hormone Therapy		
Estrogen Therapy	Estradiol Cypionate	J1000,
	Estradiol Valerate	J1380
	Estradiol	N/A
	Ethinyl Estradiol	N/A
	Estradiol Benzoate	N/A
	Estradiol Acetate	N/A
	Estradiol Micronized	N/A
	Estrone	J1435
	Estrogens, Conjugated/Meproban	N/A
	Estrogens, Conjugated	J1410
	Estriol	N/A
	Chlorotrianisene	N/A
	Quinestrol	N/A
	Dienestrol	N/A
	Estrogens, Esterified	N/A
	Estropipate	N/A
	Estrogens, Conj., Synthetic A	N/A
	Estrogens, Conj., Synthetic B	N/A
	Estriol Micronized	N/A
Combination E+P	Ethinyl Estradiol/Noreth Ac	N/A
	Norethind Ac/Ethinyl Estradiol	N/A
	Estradiol/Noreth Ac	N/A
	Estradiol/Norgestimate	N/A
	Estradiol/Levonorgestrel	N/A
	Estradiol/Drospirenone	N/A
	Estrogen, Con/M-Progest Acet	N/A
Fracture/Trauma involving the Lower Extremities	Refer to Table 7	
Pelvic or orthopedic surgery	Refer to Table 7	
Any hospitalization	Refer to Table 7	

TABLE 7: BASELINE COVARIATES

Condition	ICD-9 Code(s)	ICD-10 Code(s)
AIDS	042, V08	B20, Z21
Alcohol abuse	ICD-9 Diagnosis: 291, 303, 305.0, 357.5, 425.5, 535.3, 571.0, 571.1, 571.2, 571.3, 790.3, E860.0, E860.1 ICD-9 procedure: 94.46, 94.53, 94.61-94.63, 94.67-94.69 CPT: 99408, 99409, G0396, G0397, H0049, H0050	ICD-10 Diagnosis: G621, I426, K700, K702, K709, R780, E8600, E8601, F1026, F1096, F1097, F1027, F1014, F1024, F1019, F1029, F1094, F1099, F1020, F1021, F1010, K2920, K2921, K7010, K7011, K7030, K7031, K7040, F10121, F10221, F10231, F10921, F10151, F10251, F10951, F10920, F10929, F10150, F10250, F10950, F10230, F10232, F10239, F10182, F10282, F10982, F10159, F10180, F10181, F10188, F10259, F10280, F10281, F10288, F10959, F10980, F10981, F10988, F10220, F10229, F10120, F10129 ICD-10 Procedure: HZ2ZZZZ, HZ30ZZZ, HZ31ZZZ, HZ32ZZZ, HZ33ZZZ, HZ34ZZZ, HZ35ZZZ, HZ36ZZZ, HZ37ZZZ, HZ38ZZZ, HZ39ZZZ, HZ3BZZZ, HZ40ZZZ, HZ41ZZZ, HZ42ZZZ, HZ43ZZZ, HZ44ZZZ, HZ45ZZZ, HZ46ZZZ, HZ47ZZZ, HZ48ZZZ, HZ49ZZZ, HZ4BZZZ, HZ50ZZZ, HZ51ZZZ, HZ52ZZZ, HZ53ZZZ, HZ54ZZZ, HZ55ZZZ, HZ56ZZZ, HZ57ZZZ, HZ58ZZZ, HZ59ZZZ, HZ5BZZZ, HZ5CZZZ, HZ5DZZZ, HZ63ZZZ, HZ83ZZZ, HZ86ZZZ, HZ88ZZZ, HZ89ZZZ, HZ93ZZZ, HZ96ZZZ, HZ98ZZZ, HZ99ZZZ
Anemia	280.x-285.x	D500, D508, D501, D509, D510, D511, D512, D513, D518, D519, D520, D521, D528, D529, D531, D530, D532, D538, D539, D580, D581, D550, D551, D552, D553, D558, D559, D569, D560, D561, D562, D563, D565, D568, D573, D571, D564, D582, D588, D589, D590, D591, D594, D593, D592, D595, D596, D598, D599, D600, D601, D608, D609, D611, D612, D613, D619, D640, D641, D642, D643, D631, D630, D638, D644, D649, D5702, D5701, D5740, D5700, D5720, D5780, D6101, D6109, D6182, D6189, D6481, D6489, D57212, D57412, D57211, D57411, D57811, D57812, D57419, D57219, D57819, D61810, D61811, D61818
Central venous catheter	ICD-9 diagnosis: 999.31, 999.32, 999.33 ICD-9 procedure: 38.93, 38.95, 38.97, 89.62 CPT: 36555- 36569, S5520, S5522	ICD-10 diagnosis: T80218A, T80219A, T80211A, T80212A ICD-10 procedure: 02HS03Z, 02HS33Z, 02HS43Z, 02HT03Z, 02HT33Z, 02HT43Z, 02HV03Z, 02HV33Z, 02HV43Z, 05H003Z, 05H033Z, 05H043Z, 05H103Z, 05H133Z, 05H143Z, 05H303Z, 05H333Z, 05H343Z, 05H403Z, 05H433Z, 05H443Z, 05H503Z, 05H533Z, 05H543Z, 05H603Z, 05H633Z, 05H643Z, 05H703Z, 05H733Z, 05H743Z, 05H803Z, 05H833Z, 05H843Z, 05H903Z, 05H933Z, 05H943Z, 05HA03Z, 05HA33Z, 05HA43Z, 05HB03Z, 05HB33Z, 05HB43Z, 05HC03Z, 05HC33Z, 05HC43Z, 05HD03Z, 05HD33Z, 05HD43Z, 05HF03Z, 05HF33Z, 05HF43Z, 05HG03Z, 05HG33Z, 05HG43Z, 05HH03Z, 05HH33Z, 05HH43Z, 05HL03Z, 05HL33Z, 05HL43Z, 05HM03Z, 05HM33Z, 05HM43Z, 05HN03Z, 05HN33Z, 05HN43Z, 05HP03Z, 05HP33Z, 05HP43Z, 05HQ03Z, 05HQ33Z, 05HQ43Z, 05HR03Z, 05HR33Z, 05HR43Z, 05HS03Z, 05HS33Z, 05HS43Z, 05HT03Z, 05HT33Z, 05HT43Z, 05HV03Z, 05HV33Z, 05HV43Z, 05HY03Z, 05HY33Z, 05HY43Z, 06H003Z, 06H033Z, 06H043Z, 06H103Z, 06H133Z, 06H143Z, 06H203Z, 06H233Z, 06H243Z, 06H303Z, 06H333Z, 06H343Z,

Condition	ICD-9 Code(s)	ICD-10 Code(s)
		06H403Z, 06H433Z, 06H443Z, 06H503Z, 06H533Z, 06H543Z, 06H603Z, 06H633Z, 06H643Z, 06H703Z, 06H733Z, 06H743Z, 06H803Z, 06H833Z, 06H843Z, 06H903Z, 06H933Z, 06H943Z, 06HB03Z, 06HB33Z, 06HB43Z, 06HC03Z, 06HC33Z, 06HC43Z, 06HD03Z, 06HD33Z, 06HD43Z, 06HF03Z, 06HF33Z, 06HF43Z, 06HG03Z, 06HG33Z, 06HG43Z, 06HH03Z, 06HH33Z, 06HH43Z, 06HJ03Z, 06HJ33Z, 06HJ43Z, 06HM03Z, 06HM33Z, 06HM43Z, 06HN03Z, 06HN33Z, 06HN43Z, 06HP03Z, 06HP33Z, 06HP43Z, 06HQ03Z, 06HQ33Z, 06HQ43Z, 06HT03Z, 06HT33Z, 06HT43Z, 06HV03Z, 06HV33Z, 06HV43Z, 06HY03Z, 06HY33Z, 06HY43Z, 0JH60XZ, 0JH63XZ, 0JH80XZ, 0JH83XZ, 0JHD0XZ, 0JHD3XZ, 0JHF0XZ, 0JHF3XZ, 0JHG0XZ, 0JHG3XZ, 0JHH0XZ, 0JHH3XZ, 0JHL0XZ, 0JHL3XZ, 0JHM0XZ, 0JHM3XZ, 0JHN0XZ, 0JHN3XZ, 0JHP0XZ, 0JHP3XZ, 4A02X4A, 4A04XB1, 4A14XB1, B5130ZA, B5131ZA, B513YZA, B513ZZA, B5140ZA, B5141ZA, B514YZA, B514ZZA, B5150ZA, B5151ZA, B515YZA, B515ZZA, B5160ZA, B5161ZA, B516YZA, B516ZZA, B5170ZA, B5171ZA, B517YZA, B517ZZA, B51B0ZA, B51B1ZA, B51BYZA, B51BZZA, B51C0ZA, B51C1ZA, B51CYZA, B51CZZA, B51D0ZA, B51D1ZA, B51DYZA, B51DZZA, B543ZZA, B544ZZA, B546ZZA, B547ZZA, B54BZZA, B54CZZA, B54DZZA
Cerebrovascular disease	ICD-9 Diagnosis: 430, 431, 432.x, 433.xx, 434.xx, 435.x, 436, 437.0, 437.1, 437.8, 437.9, 438.xx, 997.02 CPT: 35390, 37215, 37216 ICD-9 procedure: 38.11, 38.12, 38.42	I602, I604, I606, I607, I608, I609, I610, I611, I612, I613, I614, I615, I616, I618, I619, I621, I629, I651, I658, I659, I663, I636, I669, I668, I638, I639, G450, G458, G451, G452, G460, G461, G462, G459, I672, G463, G464, G465, G466, G467, G468, I680, I688, I679, I6000, I6001, I6002, I6010, I6011, I6012, I6030, I6031, I6032, I6050, I6051, I6052, I6200, I6201, I6202, I6203, I6302, I6312, I6322, I6521, I6522, I6523, I6529, I6501, I6502, I6503, I6509, I6359, I6309, I6319, I6300, I6310, I6320, I6329, I6601, I6602, I6603, I6609, I6611, I6612, I6613, I6619, I6621, I6622, I6623, I6629, I6330, I6339, I6340, I6349, I6350, I6789, I6781, I6782, I6901, I6911, I6921, I6931, I6981, I6991, I6900, I6910, I6920, I6930, I6980, I6990, I63031, I63032, I63039, I63131, I63132, I63139, I63231, I63232, I63239, I63011, I63012, I63019, I63111, I63112, I63119, I63211, I63212, I63219, I63311, I63312, I63319, I63321, I63322, I63329, I63331, I63332, I63339, I63341, I63342, I63349, I63411, I63412, I63419, I63421, I63422, I63429, I63431, I63432, I63439, I63441, I63442, I63449, I63511, I63512, I63519, I63521, I63522, I63529, I63531, I63532, I63539, I63541, I63542, I63549, I67841, I67848, I69928, I69020, I69120, I69220, I69320, I69820, I69920, I69021, I69121, I69221, I69321, I69821, I69921, I69022, I69122, I69222, I69322, I69822, I69922, I69023, I69123, I69223, I69323, I69823, I69923, I69028, I69128, I69228, I69328, I69828, I69059, I69159, I69259, I69359, I69859, I69959, I69051, I69052, I69151, I69152, I69251, I69252, I69351, I69352, I69851, I69852, I69951, I69952, I69053, I69054, I69153, I69154, I69253, I69254, I69353, I69354, I69853, I69854, I69953, I69954, I69039, I69139, I69239, I69339, I69839, I69939, I69031, I69032, I69131, I69132, I69231, I69232, I69331, I69332, I69831, I69832, I69931, I69932, I69033, I69034, I69133, I69134, I69233, I69234, I69333, I69334, I69833, I69834, I69933, I69934, I69049, I69149, I69249, I69349, I69849, I69949, I69041, I69042, I69141, I69142,

Condition	ICD-9 Code(s)	ICD-10 Code(s)
		I69241, I69242, I69341, I69342, I69841, I69842, I69941, I69942, I69043, I69044, I69143, I69144, I69243, I69244, I69343, I69344, I69843, I69844, I69943, I69944, I69069, I69169, I69269, I69369, I69869, I69969, I69061, I69062, I69161, I69162, I69261, I69262, I69361, I69362, I69861, I69862, I69961, I69962, I69063, I69064, I69163, I69164, I69263, I69264, I69363, I69364, I69863, I69864, I69963, I69964, I69065, I69165, I69265, I69365, I69865, I69965, I69998, I69090, I69190, I69290, I69390, I69890, I69990, I69091, I69191, I69291, I69391, I69891, I69991, I69092, I69192, I69292, I69392, I69892, I69992, I69093, I69193, I69293, I69393, I69893, I69993, I69098, I69198, I69298, I69398, I69898, G9731, G9732, I97810, I97811, I97820, I9782 ICD-10-Procedure codes: 03CG0ZZ, 03CG4ZZ, 03CH0ZZ, 03CH4ZZ, 03CJ0ZZ, 03CJ4ZZ, 03CK0ZZ, 03CK4ZZ, 03CL0ZZ, 03CL4ZZ, 03CM0ZZ, 03CM4ZZ, 03CN0ZZ, 03CN4ZZ, 03CP0ZZ, 03CP4ZZ, 03CQ0ZZ, 03CQ4ZZ, 03CR0ZZ, 03CR3ZZ, 03CR4ZZ, 03CS0ZZ, 03CS3ZZ, 03CS4ZZ, 03CT0ZZ, 03CT3ZZ, 03CT4ZZ, 03CU0ZZ, 03CU3ZZ, 03CU4ZZ, 03CV0ZZ, 03CV3ZZ, 03CV4ZZ, 03RH07Z, 03RH0JZ, 03RH0KZ, 03RH47Z, 03RH4JZ, 03RH4KZ, 03RJ07Z, 03RJ0JZ, 03RJ0KZ, 03RJ47Z, 03RJ4JZ, 03RJ4KZ, 03RK07Z, 03RK0JZ, 03RK0KZ, 03RK47Z, 03RK4JZ, 03RK4KZ, 03RL07Z, 03RL0JZ, 03RL0KZ, 03RL47Z, 03RL4JZ, 03RL4KZ, 03RM07Z, 03RM0JZ, 03RM0KZ, 03RM47Z, 03RM4JZ, 03RM4KZ, 03RN07Z, 03RN0JZ, 03RN0KZ, 03RN47Z, 03RN4JZ, 03RN4KZ, 03RP07Z, 03RP0JZ, 03RP0KZ, 03RP47Z, 03RP4JZ, 03RP4KZ, 03RQ07Z, 03RQ0JZ, 03RQ0KZ, 03RQ47Z, 03RQ4JZ, 03RQ4KZ, 03RR07Z, 03RR0JZ, 03RR0KZ, 03RR47Z, 03RR4JZ, 03RR4KZ, 03RS07Z, 03RS0JZ, 03RS0KZ, 03RS47Z, 03RS4JZ, 03RS4KZ, 03RT07Z, 03RT0JZ, 03RT0KZ, 03RT47Z, 03RT4JZ, 03RT4KZ, 03RU07Z, 03RU0JZ, 03RU0KZ, 03RU47Z, 03RU4JZ, 03RU4KZ, 03RV07Z, 03RV0JZ, 03RV0KZ, 03RV47Z, 03RV4JZ, 03RV4KZ, 05RM07Z, 05RM0JZ, 05RM0KZ, 05RM47Z, 05RM4JZ, 05RM4KZ, 05RN07Z, 05RN0JZ, 05RN0KZ, 05RN47Z, 05RN4JZ, 05RN4KZ, 05RP07Z, 05RP0JZ, 05RP0KZ, 05RP47Z, 05RP4JZ, 05RP4KZ, 05RQ07Z, 05RQ0JZ, 05RQ0KZ, 05RQ47Z, 05RQ4JZ, 05RQ4KZ, 05RR07Z, 05RR0JZ, 05RR0KZ, 05RR47Z, 05RR4JZ, 05RR4KZ, 05RS07Z, 05RS0JZ, 05RS0KZ, 05RS47Z, 05RS4JZ, 05RS4KZ, 05RT07Z, 05RT0JZ, 05RT0KZ, 05RT47Z, 05RT4JZ, 05RT4KZ, 05RV07Z, 05RV0JZ, 05RV0KZ, 05RV47Z, 05RV4JZ, 05RV4KZ
Coagulation Defects	286.0, 286.1, 286.2, 286.3, 286.4, 286.5, 286.6, 286.7, 286.9, 287.0, 287.1, 287.2, 287.3, 287.4, 287.5, 287.8, 287.9, 289.84, 446.6	D65, D66, D67, D68.1, D68.2, D68.0, D68.311, D68312, D68318, D69.0, D69.1, D692, D698, D699, D6832, D684, D688, D689, D693, D696, D6941, D6942, D6949, D6951, D6959, D7582, M311

Condition	ICD-9 Code(s)	ICD-10 Code(s)
Ischemic Heart Disease/ Coronary Artery	ICD-9 Diagnosis: 410.xx, 411.0, 412, 429.71, 429.79, 413.x, 411.1, 411.8x, 414.0x, 414.8, 414.9	ICD-10 Diagnosis: I220, I221, I228, I214, I222, I213, I229, I241, I200, I240, I248, I249, I252, I208, I201, I209, I255, I256, I259, I231, I232, I510, I230, I233, I236, I237, I238, I513, I2109, I2101, I2102, I2119, I2111, I2129, I2121, I2510, I2589, I25110, I25111, I25118, I25119, I25700, I25701, I25708, I25709, I25710, I25711, I25718, I25719, I25720, I25721, I25728, I25729, I25730, I25731, I25738, I25739, I25750, I25751, I25758, I25759, I25760, I25761, I25768, I25769, I25790, I25791, I25798, I25799, I25810, I25811, I25812
	CPT: 33508, 33510, 33511, 33512, 33513, 33514, 33516, 33517, 33518, 33519, 33521, 33522, 33523, 33530, 33533, 33534, 33535, 33536, 33572, 34001, 35301, 35501, 35506, 35507, 35508, 35509, 35510, 35515, 35601, 35606, 35691, 35693, 35694, 35695, 92973, 92974, 92975, 92977, 92978, 92979, 92980, 92981, 92982, 92984	ICD-10 Procedure: 0210093, 0210093, 0210098, 0210098, 0210099, 0210099, 021009C, 021009F, 021009W, 02100A3, 02100A8, 02100A9, 02100AC, 02100AF, 02100AW, 02100J3, 02100J8, 02100J9, 02100JC, 02100JF, 02100JW, 02100K3, 02100K8, 02100K9, 02100KC, 02100KF, 02100KW, 02100Z3, 02100Z8, 02100Z9, 02100ZC, 02100ZF, 0210344, 0210344, 0210344, 02103D4, 0210444, 0210444, 0210493, 0210493, 0210498, 0210498, 0210499, 0210499, 021049C, 021049F, 021049W, 02104A3, 02104A8, 02104A9, 02104AC, 02104AF, 02104AW, 02104D4, 02104J3, 02104J8, 02104J9, 02104JC, 02104JF, 02104JW, 02104K3, 02104K8, 02104K9, 02104KC, 02104KF, 02104KW, 02104Z3, 02104Z8, 02104Z9, 02104ZC, 02104ZF, 0211093, 0211098, 0211098, 0211099, 0211099, 021109C, 021109F, 021109W, 02110A3, 02110A8, 02110A9, 02110AC, 02110AF, 02110AW, 02110J3, 02110J8, 02110J9, 02110JC, 02110JF, 02110JW, 02110K3, 02110K8, 02110K9, 02110KC, 02110KF, 02110KW, 02110Z3, 02110Z8, 02110Z9, 02110ZC, 02110ZF, 0211344, 0211344, 02113D4, 0211444, 0211444, 0211493, 0211498, 0211498, 0211499, 0211499, 021149C, 021149F, 021149W, 02114A3, 02114A8, 02114A9, 02114AC, 02114AF, 02114AW, 02114D4, 02114J3, 02114J8, 02114J9, 02114JC, 02114JF, 02114JW, 02114K3, 02114K8, 02114K9, 02114KC, 02114KF, 02114KW, 02114Z3, 02114Z8, 02114Z9, 02114ZC, 02114ZF, 0212093, 0212098, 0212099, 021209C, 021209F, 021209W, 02120A3, 02120A8, 02120A9, 02120AC, 02120AF, 02120AW, 02120J3, 02120J8, 02120J9, 02120JC, 02120JF, 02120JW, 02120K3, 02120K8, 02120K9, 02120KC, 02120KF, 02120KW, 02120Z3, 02120Z8, 02120Z9, 02120ZC, 02120ZF, 0212344, 0212344, 02123D4, 0212444, 0212444, 0212493, 0212498, 0212499, 021249C, 021249F, 021249W, 02124A3, 02124A8, 02124A9, 02124AC, 02124AF, 02124AW, 02124D4, 02124J3, 02124J8, 02124J9, 02124JC, 02124JF, 02124JW, 02124K3, 02124K8, 02124K9, 02124KC, 02124KF, 02124KW, 02124Z3, 02124Z8, 02124Z9, 02124ZC, 02124ZF, 0213093, 0213098, 0213099, 021309C, 021309F, 021309W, 02130A3, 02130A8, 02130A9, 02130AC, 02130AF, 02130AW, 02130J3, 02130J8, 02130J9, 02130JC, 02130JF, 02130JW, 02130K3, 02130K8, 02130K9, 02130KC, 02130KF, 02130KW, 02130Z3, 02130Z8, 02130Z9, 02130ZC, 02130ZF, 0213344, 0213344, 02133D4, 0213444, 0213444, 0213493, 0213498, 0213499, 021349C, 021349F, 021349W, 02134A3, 02134A8, 02134A9, 02134AC, 02134AF, 02134AW, 02134D4, 02134J3, 02134J8, 02134J9, 02134JC, 02134JF, 02134JW, 02134K3,
	ICD-9 procedure: 00.66, 17.55, 36.01, 36.02, 36.03, 36.04, 36.05, 36.06, 36.07, 36.09, 36.1, 36.10, 36.11, 36.12, 36.13, 36.14, 36.15, 36.16, 36.17, 36.19, 36.2, 36.31, 36.32, 36.33, 36.34, 36.39, 36.91, 36.99, 00.50, 00.51, 00.52, 00.53, 00.54, 37.90, 37.91, 37.92, 37.93, 37.94, 37.95, 37.96,	

Condition	ICD-9 Code(s)	ICD-10 Code(s)
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Dementia	290-290.9	F0390, F0150, F0151
Dyspepsia	787.1, 789.0, 789.4, 789.6, 536.8	K30, R12, R100, R109, R102, R1011, R1012, R1031, R1032, R1033, R1013, R1084, R1010, R1030, R1930, R1931, R1932, R1933, R1934, R1935, R1936, R1937, R10819, R10829, R10811,

Condition	ICD-9 Code(s)	ICD-10 Code(s)
		R10821, R10812, R10822, R10813, R10823, R10814, R10824, R10815, R10825, R10816, R10826, R10817, R10827
Hemiplegia or Paraplegia	344.1, 342-342.9	G041, G8100, G8101, G8102, G8103, G8104, G8110, G8111, G8112, G8113, G8114, G8190, G8191, G8192, G8193, G8194, G8220, G8221, G8222
Hyperlipidemia	272.2, 272.4	E782, E784, E785
Pneumonia	480.x-486	J13, J14, J17, B250, B440, A221, J120, J121, J122, J123, J129, J181, J150, J151, J154, J153, J158, J155, J156, A481, J159, J157, J160, J168, J180, J188, J189, A3791, B7781, A3701, A3711, A3781, J1281, J1289, J1520, J1529, J15211, J15212
Rheumatologic disease	710.1, 710.1, 710.4, 714.0- 714.2, 714.81, 725	M340, M341, M342, M349, M059, M069, M061, M353, M3481, M0540, M0549, M0550, M0559, M3321, M3322, M3482, M3483, M3489, M3320, M3329, M0570, M0579, M0580, M0589, M0600, M0608, M0609, M0620, M0628, M0629, M0630, M0638, M0639, M0680, M0688, M0689, M0500, M0509, M0520, M0529, M0530, M0539, M0560, M0569, M0510, M0519, M05411, M05412, M05419, M05421, M05422, M05429, M05431, M05432, M05439, M05441, M05442, M05449, M05451, M05452, M05459, M05461, M05462, M05469, M05471, M05472, M05479, M05511, M05512, M05519, M05521, M05522, M05529, M05531, M05532, M05539, M05541, M05542, M05549, M05551, M05552, M05559, M05561, M05562, M05569, M05571, M05572, M05579, M05711, M05712, M05719, M05721, M05722, M05729, M05731, M05732, M05739, M05741, M05742, M05749, M05751, M05752, M05759, M05761, M05762, M05769, M05771, M05772, M05779, M05811, M05812, M05819, M05821, M05822, M05829, M05831, M05832, M05839, M05841, M05842, M05849, M05851, M05852, M05859, M05861, M05862, M05869, M05871, M05872, M05879, M06011, M06012, M06019, M06021, M06022, M06029, M06031, M06032, M06039, M06041, M06042, M06049, M06051, M06052, M06059, M06061, M06062, M06069, M06071, M06072, M06079, M06211, M06212, M06219, M06221, M06222, M06229, M06231, M06232, M06239, M06241, M06242, M06249, M06251, M06252, M06259, M06261, M06262, M06269, M06271, M06272, M06279, M06311, M06312, M06319, M06321, M06322, M06329, M06331, M06332, M06339, M06341, M06342, M06349, M06351, M06352, M06359, M06361, M06362, M06369, M06371, M06372, M06379, M06811, M06812, M06819, M06821, M06822, M06829, M06831, M06832, M06839, M06841, M06842, M06849, M06851, M06852, M06859, M06861, M06862, M06869, M06871, M06872, M06879, M05011, M05012, M05019, M05021, M05022, M05029, M05031, M05032, M05039, M05041, M05042, M05049, M05051, M05052, M05059, M05061, M05062, M05069, M05071, M05072, M05079, M05211, M05212, M05219, M05221, M05222, M05229, M05231, M05232, M05239, M05241, M05242, M05249, M05251, M05252, M05259, M05261, M05262, M05269, M05271, M05272, M05279, M05311, M05312, M05319, M05321, M05322, M05329, M05331, M05332, M05339, M05341, M05342, M05349, M05351, M05352, M05359, M05361, M05362, M05369, M05371, M05372, M05379, M05611, M05612, M05619, M05621, M05622, M05629, M05631, M05632, M05639, M05641, M05642, M05649, M05651, M05652, M05659, M05661, M05662, M05669, M05671, M05672, M05679, M05111, M05112, M05119, M05121, M05122, M05129, M05131, M05132, M05139,

Condition	ICD-9 Code(s)	ICD-10 Code(s)
		M05141, M05142, M05149, M05151, M05152, M05159, M05161, M05162, M05169, M05171, M05172, M05179
Sleep apnea	327.23, 780.57 CPT: G8839, G8841, G8900	G4733, G4730
Spinal Cord Injury	952.xx	S14101A, S14102A, S14103A, S14104A, S14111A, S14112A, S14113A, S14114A, S14131A, S14132A, S14133A, S14134A, S14121A, S14122A, S14123A, S14124A, S14151A, S14152A, S14153A, S14154A, S14105A, S14106A, S14107A, S14108A, S14115A, S14116A, S14117A, S14118A, S14135A, S14136A, S14137A, S14138A, S14125A, S14126A, S14127A, S14128A, S14155A, S14156A, S14157A, S14158A, S24101A, S24102A, S24111A, S24112A, S24131A, S24132A, S24151A, S24152A, S24103A, S24104A, S24113A, S24114A, S24133A, S24134A, S24153A, S24154A, S34109A, S34139A, S343XXA, S14109A, S24109A, S140XXA, S14141A, S14142A, S14143A, S14144A, S14145A, S14146A, S14147A, S14148A, S240XXA, S24141A, S24142A, S24143A, S24144A, S3401XA, S34101A, S34102A, S34103A, S34104A, S34105A, S34111A, S34112A, S34113A, S34114A, S34115A, S34119A, S34121A, S34122A, S34123A, S34124A, S34125A, S34129A, S3402XA, S34131A, S34132A, S14119A, S14129A, S14139A, S14149A, S14159A, S24119A, S24139A, S24149A, S24159A
Thrombophilia	289.81, 289.82, 289.9, 238.4, 282.4, 282.6, 289.0	D6869, D759, D56, D45, D75.1, D6851, D6852, D6859, D6861, D6862, D68.69
Varicose Veins	454.x	ICD-10 Diagnosis: I8310, I8311, I8312, I8390, I8391, I8392, I8393, I83001, I83002, I83003, I83004, I83005, I83008, I83009, I83011, I83012, I83013, I83014, I83015, I83018, I83019, I83021, I83022, I83023, I83024, I83025, I83028, I83029, I83201, I83202, I83203, I83204, I83205, I83208, I83209, I83211, I83212, I83213, I83214, I83215, I83218, I83219, I83221, I83222, I83223, I83224, I83225, I83228, I83229, I83811, I83812, I83813, I83819, I83891, I83892, I83893, I83899
Congestive Heart Failure	ICD-9-CM codes: 398.91, 402.01, 402.11, 402.91, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93, 428.xx ICD-9-PCS: 37.20, 37.26, 37.27, 37.51, 37.52, 37.53, 37.54, 37.55, 37.60, 37.61, 37.62, 37.63, 37.64, 37.65,	ICD-10-diagnosis codes: I110, I130, I132, I509, I501, I5020, I5021, I5022, I5023, I5030, I5031, I5032, I5033, I5040, I5041, I5042, I5043, I0981 ICD-10-procedure codes: 02HA0QZ, 02HA0RS, 02HA0RZ, 02HA3QZ, 02HA3RS, 02HA3RZ, 02HA4QZ, 02HA4RS, 02HA4RZ, 02HN0MZ, 02HN3MZ, 02HN4MZ, 02K80ZZ, 02K83ZZ, 02K84ZZ, 02PA0QZ, 02PA0RZ, 02PA3QZ, 02PA3RZ, 02PA4QZ, 02PA4RZ, 02WA0JZ, 02WA0QZ, 02WA0RZ, 02WA3QZ, 02WA3RZ, 02WA4QZ, 02WA4RZ, 02YA0Z0, 02YA0Z1, 02YA0Z2, 0KXF0ZZ, 0KXG0ZZ, OPT10ZZ, OPT20ZZ, 3E053KZ, 3E063KZ, 4A023FZ, 4A02X4Z, 4A02XFZ, 5A02110, 5A02116, 5A0211D, 5A02210, 5A02216, 5A0221D

Condition	ICD-9 Code(s)	ICD-10 Code(s)
	37.66, 37.67, 37.68 CPT codes: 33930, 33933, 33935, 33940, 33944, 33945, 33960, 33961, 33967, 33968, 33970, 33971, 33973, 33974, 33975, 33976, 33977, 33978, 33979, 33980, 33981, 33982, 33983, 33990, 33991, 33992, 33993	
Diabetes Mellitus	249, 250, 357.2, 362, 366.41, 648.0, E932.3, V58.67	E9323, V5867, E089, E139, E088, E138, E119, E109, E118, E108, E098, E0821, E0836, E0840, E0841, E0842, E0843, E0844, E0849, E0851, E0921, E0936, E0940, E0941, E0942, E0943, E0944, E0949, E0951, E1036, E1040, E1042, E1051, E1136, E1140, E1142, E1151, E1336, E1340, E1341, E1342, E1343, E1344, E1349, E0822, E0829, E0852, E0922, E0929, E0952, E1041, E1043, E1044, E1049, E1052, E1141, E1143, E1144, E1149, E1152, E1351, E1352, E0865, E0810, E1310, E0800, E0801, E1300, E1301, E0811, E1311, E1321, E1322, E1329, E0839, E1339, E0859, E1359, E0869, E1365, E1369, E1165, E1065, E1169, E1010, E1100, E1101, E1069, E1011, E1121, E1122, E1129, E1021, E1022, E1029, E1139, E1039, E1159, E1059, O2402, O2412, O2432, O2482, O2492, O2493, O2403, O2413, O2433, O2483, E0910, E0901, E0911, E0965, E0969, E08311, E08319, E08610, E08618, E08628, E08630, E08638, E09311, E09319, E09610, E09618, E09628, E09630, E09638, E10311, E10319, E10618, E10630, E11311, E11319, E11329, E11339, E11349, E11359, E11618, E11630, E08321, E08329, E08331, E08339, E08341, E08349, E08351, E08359, E08649, E09321, E09329, E09331, E09339, E09341, E09349, E09351, E09359, E10321, E10329, E10331, E10339, E10341, E10349, E10351, E10359, E10610, E11321, E11331, E11341, E11351, E11610, E13311, E13319, E13321, E13329, E13331, E13339, E13341, E13349, E13351, E13359, E13610, E13618, E13630, E08641, E13641, E08620, E08621, E08622, E13620, E13621, E13622, E13628, E13638, E13649, E11641, E10641, E11620, E11621, E11622, E11628, E11638, E11649, E10620, E10621, E10622, E10628, E10638, E10649, O24019, O24119, O24319, O24819, O24919, O24011, O24012, O24013, O24111, O24112, O24113, O24311, O24312, O24313, O24811, O24812, O24813, O24911, O24912, O24913, T383X5A, T383X5S, Z794
Hypertension	362.11, 401, 402, 403, 404, 405	I10, I119, I110, I129, I120, I130, I132, I150, I158, I151, N262, I152, I159, I1310, I1311, H35031, H35032, H35033, H35039
Renal Disease	ICD-9-CM: V45.1x, V56.x,	ICD-10 diagnosis: N08, N16, N19, B520, I129, K767, N044, N021, N022, N023, N041, N042, N024, N025, N026, N027, N043, N045,

Condition	ICD-9 Code(s)	ICD-10 Code(s)
	V42.0, 250.4x, 403.00, 403.10, 403.90, 404.00, 404.10, 404.90, 572.4, 581-583, 585, 586, 588, 791.0 ICD-9-PCS: 38.95, 39.27, 39.42, 39.43, 39.93, 39.95, 54.98, 55.69 CPT Codes: 36147, 36148, 36800-36821, 36825, 36830-36833, 36838, 36870, 90918-90925, 90935-90999, 50340, 50360, 50365, 50370	N046, N020, N040, N028, N047, N048, N029, N049, N032, N031, N033, N034, N035, N036, N037, N038, N030, N039, N059, N052, N062, N072, N053, N054, N055, N063, N064, N065, N073, N074, N075, N171, N172, N050, N051, N056, N057, N058, N060, N061, N066, N067, N068, N070, N071, N076, N077, N078, N140, N141, N142, N143, N144, N150, N158, N069, N079, N159, N181, N182, N183, N184, N185, N186, N189, N250, N251, N259, R800, R801, R803, R808, R809, M3214, M3215, M3504, Z4822, E1121, E1122, E1129, E1321, E1322, E1329, E1021, E1022, E1029, I1310, N2581, N2589, Z940, Z992, Z9115, Z4931, Z4901, Z4902, Z4932 ICD-10 PCS Code: 031209D, 031209F, 03120AD, 03120AF, 03120JD, 03120JF, 03120KD, 03120KF, 03120ZD, 03120ZF, 031309D, 031309F, 03130AD, 03130AF, 03130JD, 03130JF, 03130KD, 03130KF, 03130ZD, 03130ZF, 031409D, 031409F, 03140AD, 03140AF, 03140JD, 03140JF, 03140KD, 03140KF, 03140ZD, 03140ZF, 031509D, 031509F, 03150AD, 03150AF, 03150JD, 03150JF, 03150KD, 03150KF, 03150ZD, 03150ZF, 031609D, 031609F, 03160AD, 03160AF, 03160JD, 03160JF, 03160KD, 03160KF, 03160ZD, 03160ZF, 031709D, 031709F, 03170AD, 03170AF, 03170JD, 03170JF, 03170KD, 03170KF, 03170ZD, 03170ZF, 031809D, 031809F, 03180AD, 03180AF, 03180JD, 03180JF, 03180KD, 03180KF, 03180ZD, 03180ZF, 031909F, 03190AF, 03190JF, 03190KF, 03190ZF, 031A09F, 031A0AF, 031A0JF, 031A0KF, 031A0ZF, 031B09F, 031B0AF, 031B0JF, 031B0KF, 031B0ZF, 031C09F, 031C0AF, 031C0JF, 031C0KF, 031C0ZF, 03PY07Z, 03PY0JZ, 03PY0KZ, 03PY37Z, 03PY3JZ, 03PY3KZ, 03PY47Z, 03PY4JZ, 03PY4KZ, 05HY33Z, 06HY33Z, 0TY00Z0, 0TY00Z1, 0TY00Z2, 0TY10Z0, 0TY10Z1, 0TY10Z2, 3E1M39Z, 5A1D70Z, 5A1D80Z, 5A1D90Z
Liver Disease	ICD-9-CM Codes: 070.22, 070.23, 070.32, 070.33, 070.42-070.49, 070.52-070.59, 070.6, 070.7x, 070.9, 277.4, 456.0-456.2, 571-573, 751.62, 996.82, V42.7 ICD-9-PCS: 39.1, 42.91, 50.5 CPT Codes: 47135, 47136	ICD-10-CM Codes: K77, B251, B181, B180, B170, B172, B182, B178, B188, B189, B190, B179, B199, E804, E805, E806, E807, K700, K702, K709, K739, K730, K754, K731, K732, K738, K740, K743, K744, K745, K760, K741, K742, K769, K750, K751, K766, K767, K761, K710, K712, K713, K714, K716, K717, K718, K719, K752, K753, K759, K764, K763, K765, K7291, K7041, K7111, K7201, K7211, Z4823, B1920, B1921, I8501, I8500, I8511, I8510, K7010, K7011, K7030, K7031, K7040, K7460, K7469, K7581, K7689, K7290, K7210, K7110, K7150, K7151, K7589, K7681, T8640, T8641, T8642, T8643, T8649, Z944 ICD-10-PCS Codes: 0610075, 0610075, 0610076, 0610076, 061007Y, 0610095, 0610095, 0610096, 0610096, 061009Y, 06100A5, 06100A6, 06100AY, 06100J5, 06100J6, 06100JY, 06100K5, 06100K6, 06100KY, 06100Z5, 06100Z6, 06100ZY, 0610475, 0610475, 0610476, 0610476, 061047Y, 0610495, 0610495, 0610496, 0610496, 061049Y, 06104A5, 06104A6, 06104AY, 06104J5, 06104J6, 06104JY, 06104K5, 06104K6, 06104KY, 06104Z5, 06104Z6, 06104ZY, 0611079, 0611079, 061107B, 061107Y, 0611099, 0611099, 061109B, 061109Y, 06110A9, 06110AB, 06110AY, 06110J9, 06110JB, 06110JY, 06110K9, 06110KB, 06110KY, 06110Z9, 06110ZB, 06110ZY,

Condition	ICD-9 Code(s)	ICD-10 Code(s)
		0611479, 0611479, 061147B, 061147Y, 0611499, 0611499, 061149B, 061149Y, 06114A9, 06114AB, 06114AY, 06114J9, 06114JB, 06114JY, 06114K9, 06114KB, 06114KY, 06114Z9, 06114ZB, 06114ZY, 061207Y, 061209Y, 06120AY, 06120JY, 06120KY, 06120ZY, 061247Y, 061249Y, 06124AY, 06124JY, 06124KY, 06124ZY, 061407Y, 061409Y, 06140AY, 06140JY, 06140KY, 06140ZY, 061447Y, 061449Y, 06144AY, 06144JY, 06144KY, 06144ZY, 061507Y, 061509Y, 06150AY, 06150JY, 06150KY, 06150ZY, 061547Y, 061549Y, 06154AY, 06154JY, 06154KY, 06154ZY, 061607Y, 061609Y, 06160AY, 06160JY, 06160KY, 06160ZY, 061647Y, 061649Y, 06164AY, 06164JY, 06164KY, 06164ZY, 061707Y, 061709Y, 06170AY, 06170JY, 06170KY, 06170ZY, 061747Y, 061749Y, 06174AY, 06174JY, 06174KY, 06174ZY, 0618079, 0618079, 061807B, 061807Y, 0618099, 0618099, 061809B, 061809Y, 06180A9, 06180AB, 06180AY, 06180J9, 06180JB, 06180JY, 06180K9, 06180KB, 06180KY, 06180Z9, 06180ZB, 06180ZY, 0618479, 0618479, 061847B, 061847Y, 0618499, 0618499, 061849B, 061849Y, 06184A9, 06184AB, 06184AY, 06184J9, 06184JB, 06184JY, 06184K9, 06184KB, 06184KY, 06184Z9, 06184ZB, 06184ZY, 061907Y, 061909Y, 06190AY, 06190JY, 06190KY, 06190ZY, 061947Y, 061949Y, 06194AY, 06194JY, 06194KY, 06194ZY, 061B07Y, 061B09Y, 061B0AY, 061B0JY, 061B0KY, 061B0ZY, 061B47Y, 061B49Y, 061B4AY, 061B4JY, 061B4KY, 061B4ZY, 061J07Y, 061J09Y, 061J0AY, 061J0JY, 061J0KY, 061J0ZY, 061J47Y, 061J49Y, 061J4AY, 061J4JY, 061J4KY, 061J4ZY, 06L30ZZ, 06L33ZZ, 06L34ZZ, 0FY00Z0, 0FY00Z1, 0FY00Z2
COPD	491, 492, 496	J410, J411, J449, J441, J440, J418, J42, J439, J430, J431, J432, J438
Peptic Ulcer Disease	531-534	K250, K251, K252, K253, K254, K255, K256, K257, K259, K260, K261, K262, K263, K264, K265, K266, K267, K269, K270, K271, K272, K273, K274, K275, K276, K277, K279, K280, K281, K282, K283, K284, K285, K286, K287, K289
Inflammatory Bowel Disease	555, 556	K5000, K5010, K5080, K5090, K5180, K5120, K5130, K5140, K5150, K5100, K5190, K50012, K50013, K50014, K50112, K50113, K50114, K50812, K50813, K50814, K50912, K50913, K50914, K51012, K51013, K51014, K51212, K51213, K51214, K51312, K51313, K51314, K51412, K51413, K51414, K51512, K51513, K51514, K51812, K51813, K51814, K51912, K51913, K51914, K50011, K50018, K50019, K50111, K50118, K50119, K50811, K50818, K50819, K50911, K50918, K50919, K51211, K51218, K51219, K51311, K51318, K51319, K51411, K51418, K51419, K51511, K51518, K51519, K51011, K51018, K51019, K51811, K51818, K51819, K51911, K51918, K51919
Peripheral Vascular Disease	440, 441, 442, 443, 444, 445	I700, I701, I708, I711, I712, I713, I714, I718, I715, I716, I719, I790, I721, I722, I723, I724, I720, I728, I729, I731, I670, I791, I798, I739, I742, I743, I744, I745, I748, I749, I7025, I7035, I7045, I7055, I7065, I7075, I7301, I7092, I7090, I7091, I7100, I7101, I7102, I7103, I7300, I7771, I7772, I7773, I7774, I7779, I7381, I7389, I7401, I7409, I7410, I7419, I7411, I7581, I7589, I70231, I70232, I70233, I70234, I70235, I70238, I70239, I70241, I70242, I70243, I70244, I70245, I70248, I70249, I70331, I70332, I70333, I70334, I70335, I70338, I70339, I70341, I70342, I70343, I70344,

Condition	ICD-9 Code(s)	ICD-10 Code(s)
		I70345, I70348, I70349, I70361, I70362, I70363, I70368, I70369, I70431, I70432, I70433, I70434, I70435, I70438, I70439, I70441, I70442, I70443, I70444, I70445, I70448, I70449, I70461, I70462, I70463, I70468, I70469, I70531, I70532, I70533, I70534, I70535, I70538, I70539, I70541, I70542, I70543, I70544, I70545, I70548, I70549, I70561, I70562, I70563, I70568, I70569, I70631, I70632, I70633, I70634, I70635, I70638, I70639, I70641, I70642, I70643, I70644, I70645, I70648, I70649, I70661, I70662, I70663, I70668, I70669, I70731, I70732, I70733, I70734, I70735, I70738, I70739, I70741, I70742, I70743, I70744, I70745, I70748, I70749, I70761, I70762, I70763, I70768, I70769, I70201, I70202, I70203, I70208, I70209, I70211, I70212, I70213, I70218, I70219, I70221, I70222, I70223, I70228, I70229, I70261, I70262, I70263, I70268, I70269, I70291, I70292, I70293, I70298, I70299, I70301, I70302, I70303, I70308, I70309, I70311, I70312, I70313, I70318, I70319, I70321, I70322, I70323, I70328, I70329, I70391, I70392, I70393, I70398, I70399, I70601, I70602, I70603, I70608, I70609, I70611, I70612, I70613, I70618, I70619, I70621, I70622, I70623, I70628, I70629, I70691, I70692, I70693, I70698, I70699, I70701, I70702, I70703, I70708, I70709, I70711, I70712, I70713, I70718, I70719, I70721, I70722, I70723, I70728, I70729, I70791, I70792, I70793, I70798, I70799, I70401, I70402, I70403, I70408, I70409, I70411, I70412, I70413, I70418, I70419, I70421, I70422, I70423, I70428, I70429, I70491, I70492, I70493, I70498, I70499, I70501, I70502, I70503, I70508, I70509, I70511, I70512, I70513, I70518, I70519, I70521, I70522, I70523, I70528, I70529, I70591, I70592, I70593, I70598, I70599, I75011, I75012, I75013, I75019, I75021, I75022, I75023, I75029
Fractures/ Trauma involving the Lower Extremities	820-828, 835-838, 890-897, 904, 928.0-928.3, 928.8, 928.9, 945, 956, 959.6, 959.7	 Fractures Involving the Lower Extremities
Falls	E8800, E8801, E8809, E8810, E8811, E882, E8830, E8831, E8832, E8839, E8840, E8841, E8842, E8843, E8843, E8843, E8844, E8845, E8846, E8849, E8849, E8849, E8850, E8851, E8852, E8853, E8854, E8859, E8860, E8869, E887, E8880, E8881, E8888, E8889	W100XXA, W100XXD, W101XXA, W101XXD, W102XXA, W102XXD, W108XXA, W108XXD, W109XXA, W109XXD, W07XXA, W07XXD, W050XXA, W050XXD, W051XXA, W051XXD, W052XXA, W052XXD, W06XXA, W06XXD, W08XXA, W08XXD, W1811XA, W1811XD, W1812XA, W1812XD, W001XXA, W001XXD, W002XXA, W002XXD, W1789XA, W1789XD, W000XXA, W000XXD, W009XXA, W009XXD, W010XXA, W010XXD, W182XXA, W182XXD, W03XXA, W03XXD, W19XXA, W0110XA, W0110XD, W01110A, W01110D, W01111A, W01111D, W01118A, W01118D, W01119A, W01119D, W1802XA, W1802XD, W01190A, W01190D, W01198A, W01198D, W1800XA, W1800XD, W1809XD, W04XXA, W04XXD, W1830XA, W1830XD, W1831XA, W1831XD, W1839XA, W1839XD, W19XXD, W11XXA, W11XXD
Pelvic or orthopedic surgery	Refer to Table 9	Refer to Table 8

Condition	ICD-9 Code(s)	ICD-10 Code(s)
Any hospitalization	Any acute-care inpatient stay from medical claims	
Baseline Bleeds		
Gastrointestinal	ICD-9: 455.2, 455.5, 455.8, 456.0x, 456.2x, 459.0x, 530.21, 530.7x, 530.82, 531.0x, 531.2x, 531.4x, 531.6x, 532.0x, 532.2x, 532.4x, 532.6x, 533.0x, 533.2x, 533.4x, 533.6x, 534.0x, 534.2x, 534.4x, 534.6x, 535.01, 535.11, 535.21, 535.31, 535.41, 535.51, 535.61, 535.71, 537.83, 537.84, 562.02, 562.03, 562.12, 562.13, 568.81, 569.3x, 569.85, 569.86, 578.xx, 784.8	I8501 , I8511 , K2211 , K226 , K250 , K252 , K254 , K256 , K260 , K262 , K264 , K266 , K270 , K272 , K274 , K276 , K280 , K282 , K284 , K286 , K2901 , K2921 , K2931 , K2941 , K2951 , K2961 , K2971 , K2981 , K2991 , K31811 , K3182 , K5521 , K5701 , K5711 , K5713 , K5721 , K5731 , K5733 , K5741 , K5751 , K5753 , K5781 , K5791 , K5793 , K625 , K6381 , K661 , K920 , K921 , K922 , R041 , R58,
	CPT: 43227, 43255, 43501, 44366, 44378, 44391, 45317, 45334, 45382, 46614	
	ICD-9 procedure: 44.43, 44.44, 44.49	04L23DZ, 06L13DZ, 06L43DZ, 06L53DZ, 0DQ60ZZ, 0DQ63ZZ, 0DQ64ZZ, 0DQ67ZZ, 0DQ68ZZ, 0DQ90ZZ, 0DQ93ZZ, 0DQ94ZZ, 0DQ97ZZ, 0DQ98ZZ, 0W3G0ZZ, 0W3G3ZZ, 0W3G4ZZ, 0W3P8ZZ
Intracranial	430.xx, 431.xx, 432..xx, 852.xx, 853.xx, 854.xx	I6000, I6001, I6002, I6010, I6011, I6012, I602, I6030, I6031, I6032, I604, I6050, I6051, I6052, I606, I607, I608, I609, I610, I611, I612, I613, I614, I615, I616, I618, I619, I6200, I6201, I6202, I6203, I621, I629, S0190XA, S062X0A, S062X1A, S062X2A, S062X3A, S062X4A, S062X5A, S062X6A, S062X7A, S062X8A, S062X9A, S06300A, S06301A, S06302A, S06303A, S06304A, S06305A, S06306A, S06307A, S06308A, S06309A, S06340A, S06341A, S06342A, S06343A, S06344A, S06345A, S06346A, S06347A, S06348A, S06349A, S06350A, S06351A, S06352A, S06353A, S06354A, S06355A, S06356A, S06357A, S06358A, S06359A, S06360A, S06361A, S06362A, S06363A, S06364A, S06365A, S06366A, S06367A, S06368A, S06369A, S064X0A, S064X1A, S064X2A, S064X3A, S064X4A, S064X5A, S064X6A, S064X7A, S064X8A, S064X9A, S065X0A, S065X1A, S065X2A, S065X3A, S065X4A, S065X5A, S065X6A, S065X7A, S065X8A, S065X9A, S066X0A, S066X1A, S066X2A, S066X3A, S066X4A, S066X5A, S066X6A, S066X7A, S066X8A, S066X9A, S06890A, S06891A, S06892A, S06893A, S06894A, S06895A, S06896A, S06897A,

Condition	ICD-9 Code(s)	ICD-10 Code(s)
		S06898A, S06899A, S069X0A, S069X1A, S069X2A, S069X3A, S069X4A, S069X5A, S069X6A, S069X7A, S069X8A, S069X9A
Other	ICD-9 diagnosis: 336.1, 360.43, 362.43, 362.81, 363.72, 364.41, 363.61, 363.62, 377.42, 379.23, 423.x, 719.1x, 997.02, 285.1, 376.32, 459.0x, 568.81, 573.8, 593.81, 596.7x, 599.7x, 790.01, 864.01, 865.01, 866.01, 958.2, 998.11, 078.6, 246.3, 372.72, 374.81, 380.31, 602.1, 620.7, 621.4x, 623.6, 626.2, 640.xx, 641.9x, 666.10, 784.7x , 784.8x, 786.3 HCPCS Codes: C1010, C1016, C1018, C1020, C1021, C9504, C9505, P9010, P9011, P9016, P9021, P9022, P9038, P9039, P9040, P9051, P9054, P9056, P9057, P9058, S3906 Facility Revenue Codes: 381, 382 CPT codes: 30901, 30903, 30905, 31238, 42970, 32658, 33020, 47350- 47362, 65815, 65930	A985, D62, D7801, D7802, D7821, D7822, E3601, E3602, E89810, E89811, G9731, G9732, G9751, G9752, H05231, H05232, H05233, H05239, H1130, H1131, H1132, H1133, H2100, H2101, H2102, H2103, H31301, H31302, H31303, H31309, H31311, H31312, H31313, H31319, H31411, H31412, H31413, H31419, H3560, H3561, H3562, H3563, H35731, H35732, H35733, H35739, H4310, H4311, H4312, H4313, H44811, H44812, H44813, H44819, H47021, H47022, H47023, H47029, H59111, H59112, H59113, H59119, H59121, H59122, H59123, H59129, H59311, H59312, H59313, H59319, H59321, H59322, H59323, H59329, H61121, H61122, H61123, H61129, H9521, H9522, H9541, H9542, I312, I97410, I97411, I97418, I9742, I97610, I97611, I97618, I97620, J9561, J9562, J95830, J95831, K661, K9161, K9162, K91840, K91841, L7601, L7602, L7621, L7622, M2500, M25011, M25012, M25019, M25021, M25022, M25029, M25031, M25032, M25039, M25041, M25042, M25049, M25051, M25052, M25059, M25061, M25062, M25069, M25071, M25072, M25073, M25074, M25075, M25076, M2508, M96810, M96811, M96830, M96831, N421, N837, N857, N920, N9961, N9962, N99820, N99821, R040, R041, R042, R0489, R049, R310, R319, R58, R710, S36112A, S37021A, S37022A, S37029A, T792XXA
	ICD-9 procedure: 99.03, 99.04, 21.01, 21.07	2Y41X5Z, 30230H1, 30230N1, 30230P1, 30233H1, 30233N1, 30233P1, 30240H1, 30240N1, 30240P1, 30243H1, 30243N1, 30243P1, 30250H1, 30250N1, 30250P1, 30253H1, 30253N1,

Condition	ICD-9 Code(s)	ICD-10 Code(s)
		30253P1, 30260H1, 30260N1, 30260P1, 30263H1, 30263N1, 30263P1

TABLE 8: SELECTED SURGERIES



TABLE 9: DEYO-CHARLSON COMORBIDITY INDEX CODES

Comorbidity	ICD-9 Codes	ICD-10 Codes	Points
Myocardial Infarction	410, 412	I2109, I2111, I2119, I2129, I213, I214, I252,	1
Congestive Heart Failure	428-428.9	I50.1, I50.20, I50.21, I50.22, I50.23, I50.30, I50.31, I50.32, I50.33, I50.40, I50.41, I50.42, I50.43, I50.9	1
Peripheral vascular disease	443.9, 441-441.9, 785.4, V43.4, 38.48	I7100, I7101, I7102, I7103, I711, I712, I713, I714, I718, I715, I716, I719, I739, I96, Z95828, 04RK07Z, 04RK0JZ, 04RK0KZ, 04RK47Z, 04RK4JZ, 04RK4KZ, 04RL07Z, 04RL0JZ, 04RL0KZ, 04RL47Z, 04RL4JZ, 04RL4KZ, 04RM07Z, 04RM0JZ, 04RM0KZ, 04RM47Z, 04RM4JZ, 04RM4KZ, 04RN07Z, 04RN0JZ, 04RN0KZ, 04RN47Z, 04RN4JZ, 04RN4KZ, 04RP07Z, 04RP0JZ, 04RP0KZ, 04RP47Z, 04RP4JZ, 04RP4KZ, 04RQ07Z, 04RQ0JZ, 04RQ0KZ, 04RQ47Z, 04RQ4JZ, 04RQ4KZ, 04RR07Z, 04RR0JZ, 04RR0KZ, 04RR47Z, 04RR4JZ, 04RR4KZ, 04RS07Z, 04RS0JZ, 04RS0KZ, 04RS47Z, 04RS4JZ, 04RS4KZ, 04RT07Z, 04RT0JZ, 04RT0KZ, 04RT47Z, 04RT4JZ, 04RT4KZ, 04RU07Z, 04RU0JZ, 04RU0KZ, 04RU47Z, 04RU4JZ, 04RU4KZ, 04RV07Z, 04RV0JZ, 04RV0KZ, 04RV47Z, 04RV4JZ, 04RV4KZ, 04RW07Z, 04RW0JZ, 04RW0KZ, 04RW47Z, 04RW4JZ, 04RW4KZ, 04RY07Z, 04RY0JZ, 04RY0KZ, 04RY47Z, 04RY4JZ, 04RY4KZ	1
Cerebrovascular disease	430-438	G450, , G451, G454, G458, G459, I609, I619, I6200, I621, I629, I63019, I63119, I63139, I6320, I63219, I6322, I63239, I6330, I6340, I6350, I6359, , I6509, I651, I6529, I658, I658, I659, I6609, I6619, , I6629, I669, I671, I672, I674, I675, I676, I677, I6781, I6782, I67848, I6789, I679, I69.9	1
Dementia	290-290.9	F0150, F0151, F0390, F05	1
Rheumatologic Disease	710.1, 710.4, 714.0-714.2, 714.81, 725	M0500, M0510, M0530, M0560, M061, M069, M3320, M340, M341, M349, M353	1
Peptic Ulcer Disease	531-534.9	K250-K289	1
Mild Liver Disease	571.2, 571.5, 571.6, 571.4	K7030, K730, K732, K738, K739, K740, K743, K744, K745, K7460, K7469, K754,	1

Comorbidity	ICD-9 Codes	ICD-10 Codes	Points
Diabetes	250-250.3, 250.7	E1010, E1011, E1051, E10641, E1065, E1069, E109, E1100, E1101, E1151, E11641, E1165, E1169, E119	1
Diabetes w/ Complications	250.4-250.6	E1021, E1029, E10311, E10319, E1036, E1039, E1040, E1065, E1121, E1129, E11311, E11319, E1136, E1139, E1140, E1165	2
Hemiplegia or Paraplegia	344.1, 342-342.9	G8101-G8104, G8110-G8114, G8190-GG8194, G8220	2
Renal Disease	582-582.9, 583-583.7, 585, 586, 588-588.9	N032, N033, N035, N038, N039, N052, N055, N059, N08, N171, N172, N181, N182, N183, N184, N185, N186, N189, N19, N250, N251, N2581, N2589, N259,	2
Moderate or Severe Liver Disease	572.2-572.8, 456.0-456.21	I8500, I8501, I8510, I8511, K7210, K7290, K7290, K7291, K766, K767,	3
AIDS	042-044	B20	6

TABLE 10: CODES FOR PHARMACOTHERAPY

Drug	NDCs	HCPCS Codes*
ACE inhibitors/ARBs	Benazepril, Captopril, Enalapril, Fosinopril, Lisinopril, Moexipril, Perindopril, Quinapril, Ramipril, Trandolapril, azilsartan, candesartan, eprosartan, irbesartan, losartan, olmesartan, telmisartan, valsartan,	N/A
Antiarrhythmic	Alinidine, Bretylium, Digitalis, Diltiazem, Diphenylhydantoin, Disopyramide, Dofetilide, Encainide, Flecainide, Mexiletine, Moricizine, Nadolol, Propafenone, Quinidine, Tocainide, Verapamil	N/A
	Adenosine	J0150, J0151, J0152, J0153
	Amiodarone	J0282
	Atropine	J0461, J7635, J7636
	Digoxin	J1160, J1162
	Ibutilide	J1742
	Lidocaine	C9285, J2001
	Procainamide	J2690
	Sotalol	C9482
Antiplatelet	Abciximab	J0130
	Anagrelide Hydrochloride	N/A
	Aspirin/Dipyridamole	G8598, G8599, G8895, G8896, G8897, G9277, G9278, G9435, G9436, G9437, G9793, G9794, G9795
	Cilostazol	G9531
	Clopidogrel Hydrogen Sulfate	G9531
	Dipyridamole	G9531, J1245
	Eptifibatide	J1327
	Prasugrel Hydrochloride	G9531
	Ticagrelor	G9531
	Ticlopidine Hydrochloride	G9531
	Tirofiban Hydrochloride	J3246

Drug	NDCs	HCPCS Codes*
Aromatase inhibitors	Arimidex, aromasin, femara	N/A
Beta blockers	Acebutolol , Atenolol, Betaxolol, Bisoprolol, Esmolol, Carteolol, Carvedilol, Labetalol, Levobunolol, Metipranolol, Metoprolol, Nebivolol, Nadolol, Penbutolol, Pindolol, Propranolol, Sotalol, Timolol,	N/A
Erythropoiesis stimulating agents	Epoetin alfa	J0885, J0886, Q4081
	Epoetin beta	J0887, J0888, Q9973, Q9972
	Epoetin delta	N/A
	Epoetin omega	N/A
	Darbepoetin alpha	J0881, J0882
	Pegylated Epoetin beta	N/A
Gastroprotective agents	Celecoxib, ketoprofen, meloxicam, etoricoxib, misoprostol, dexlansoprazole, esomeprazole, esomeprazole, lansoprazole, omeprazole, pantoprazole, rabeprazole	N/A
Hormones		
NSAIDs	Diclofenac	J 1130
	Bromfenac, Choline and Magnesium salicylate, Methenamine and sodium salicylate , Fenoprofen, Flurbiprofen, Ketoprofen, Naproxen, Oxaprozin, Sulindac, Piroxicam, Etodolac, Meloxicam, Nabumetone, Celecoxib/Celebrex, Indomethacin, Mefenamic acid, Meclofenamate, Diflunisal, Tolmetin, Salsalate,	N/A
	Aspirin	G8598, G8895, G9277, G9793
	Ibuprofen	J1741
	Ketorolac	J1885, C9447
	Diclofenac	J 1130
SERMs	Tamoxifen, raloxifene, arzoxifene, bazedoxifene, lasofoxifene, ospemifene, clomifene, cyclofenil, ormeloxifene, toremifene, raloxifene,	N/A
	Tamoxifen	S0187
Statins	Atorvastatin, Fluvastatin, Lovastatin, Pitavastatin, Pravastatin, Rosuvastatin, Simvastatin.	N/A

*NDCs will be used wherever applicable.

TABLE 11: CANCER TYPE AND SITE OF OCCURRENCE

Cancer	ICD-9 Codes	ICD-10 Codes
Leukemia	204, 205, 206, 207, 208	C91, C92, C93, C94, C95
Bladder	188	C67
Brain Tumor	190–192, 237.5, 237.6, 239.6	C69-C71, D43.2, D43.4, D42.0, D42.1, D42.9, D49.6
Gynecologic (uterus, cervix, placenta, ovary, other female genital organs)	179-184	C51-C58
Lung	162.2, 162.3, 162.4, 162.5, 162.8, 162.9, 231.2,	C34.00, C34.01, C34.02, C34.10, C34.11, C34.12, C34.2, C34.30, C34.31, C34.32, C34.80, C34.81, C34.82, C34.90, C34.91, C34.92, D02.20, D02.21, D02.22
Lymphoma	200, 201, 202.0-202.2, 202.8-202.9,203	C81-C88
Pancreas	157	C25
Renal Cell Carcinoma	189	C64, C65, C66, C68
Stomach	151	C16
Testicular	186	C62
Gastrointestinal Cancer (GI; esophagus, stomach, biliary system, pancreas, small intestine, large intestine, rectum and anus)	150-157	C15-C25
Upper GI cancer (esophagus, stomach)	150, 151	C15, C16
Lower GI cancer (small intestine, large intestine, rectum and anus)	152, 153, 154	C17, C18, C19, C20, C21
Female Breast Cancer	174, 175.0, 175.9, 233.0	C50, D05.00, D05.01, D05.02, D05.10, D05.11, D05.12, D05.80, D05.81, D05.82, D05.90, D05.91, D05.92
Prostate Cancer	185, 233.4	C61, D07.5
Multiple Myeloma	203.0	C90.0

TABLE 12: MAJOR BLEEDING CODES

Category	ICD-9 Codes	ICD-10 Codes
Gastrointestinal	ICD-9-CM Codes: 456.0x, 456.20, 530.82, 531.0x, 531.2x, 531.4x, 531.6x, 532.0x, 532.2x, 532.4x, 532.6x, 533.0x, 533.2x, 533.4x, 533.6x, 534.0x, 534.2x, 534.4x, 534.6x, 535.01, 535.11, 535.21, 535.31, 535.41, 535.51, 535.61, 537.83, 562.02, 562.03, 562.12, 562.13, 568.81, 569.3, 569.85, 578.x	ICD-10-CM Codes: I8501, I8511, K2211, K226, K250, K252, K254, K256, K260, K262, K264, K266, K270, K272, K274, K276, K280, K282, K284, K286, K2901, K2921, K2931, K2941, K2951, K2961, K2971, K2981, K2991, K31811, K3182, K5521, K5701, K5711, K5713, K5721, K5731, K5733, K5741, K5751, K5753, K5781, K5791, K5793, K625, K6381, K661, K920, K921, K922, K9161, K9162, K91840, K91841 ICD-10-PCS Codes: no codes

Category	ICD-9 Codes	ICD-10 Codes
	ICD-9-PCS Codes: 44.43	
Intracranial	430.xx, 431.xx, 432.xx, 852.0x, 852.2x, 852.4x, 853.0x	I6000, I6001, I6002, I6010, I6011, I6012, I602, I6030, I6031, I6032, I604, I6050, I6051, I6052, I606, I607, I608, I609, I610, I611, I612, I613, I614, I615, I616, I618, I619, I6200, I6201, I6202, I6203, I621, I629, S06340A, S06341A, S06342A, S06343A, S06344A, S06345A, S06346A, S06347A, S06348A, S06349A, S06350A, S06351A, S06352A, S06353A, S06354A, S06355A, S06356A, S06357A, S06358A, S06359A, S06360A, S06361A, S06362A, S06363A, S06364A, S06365A, S06366A, S06367A, S06368A, S06369A, S064X0A, S064X1A, S064X2A, S064X3A, S064X4A, S064X5A, S064X6A, S064X7A, S064X8A, S064X9A, S065X0A, S065X1A, S065X2A, S065X3A, S065X4A, S065X5A, S065X6A, S065X7A, S065X8A, S065X9A, S066X0A, S066X1A, S066X2A, S066X3A, S066X4A, S066X5A, S066X6A, S066X7A, S066X8A, S066X9A
Other MB	ICD-9-Diagnosis: 285.1, 360.43, 362.43, 362.81, 363.61, 363.62, 363.72, 364.41, 372.72, 374.81, 376.32, 377.42, 379.23, 423.0x, 596.7x, 599.7x, 602.1x, 620.1, 621.4, 626.2, 626.5, 626.7, 626.8, 626.9, 719.1x, 782.7, 784.7, 784.8, 786.3x, 958.2, 997.02, 998.11 ICD-9 procedure: 99.04	ICD-10 CM Codes: D62, D7801, D7802, D7821, D7822, E3601, E3602, E89810, E89811, G9731, G9732, G9751, G9752, H05231, H05232, H05233, H05239, H1130, H1131, H1132, H1133, H2100, H2101, H2102, H2103, H31301, H31302, H31303, H31309, H31311, H31312, H31313, H31319, H31411, H31412, H31413, H31419, H3560, H3561, H3562, H3563, H35731, H35732, H35733, H35739, H4310, H4311, H4312, H4313, H44811, H44812, H44813, H44819, H47021, H47022, H47023, H47029, H59111, H59112, H59113, H59119, H59121, H59122, H59123, H59129, H59311, H59312, H59313, H59319, H59321, H59322, H59323, H59329, H9521, H9522, H9541, H9542, I312, I97410, I97411, I97418, I9742, I97610, I97611, I97618, I97620, J9561, J9562, J95830, J95831, L7601, L7602, L7621, L7622, M2500, M25011, M25012, M25019, M25021, M25022, M25029, M25031, M25032, M25039, M25041, M25042, M25049, M25051, M25052, M25059, M25061, M25062, M25069, M25071, M25072, M25073, M25074, M25075, M25076, M2508, M96810, M96811, M96830, M96831, N421, N857, N897, N920, N923, N930, N938, N939, N9961, N9962, N99820, N99821, R040, R041, R042, R0489, R049, R233, R310, R319, R58, T792XXA ICD-10 PCS Codes: 30230N1, 30230P1, 30233N1, 30233P1, 30240N1, 30240P1, 30243N1, 30243P1, 30250N1, 30250P1, 30253N1, 30253P1, 30260N1, 30260P1, 30263N1, 30263P1

TABLE 13: CRNM BLEEDING CODE

Critical Care Site	Bleeding Category	ICD-10-CM	ICD-9-CM
No	GI	I8501	4560
No	GI	I8511	45620
No	GI	K228	53082
No	GI	K250	53100
No	GI	K250	53101
No	GI	K252	53120
No	GI	K252	53121
No	GI	K254	53140
No	GI	K254	53141
No	GI	K256	53160
No	GI	K256	53161
No	GI	K260	53200
No	GI	K260	53201
No	GI	K262	53220
No	GI	K262	53221
No	GI	K264	53240
No	GI	K264	53241
No	GI	K266	53260
No	GI	K266	53261
No	GI	K270	53300
No	GI	K270	53301
No	GI	K272	53320
No	GI	K272	53321
No	GI	K274	53340
No	GI	K274	53341
No	GI	K276	53360
No	GI	K276	53361
No	GI	K280	53400
No	GI	K280	53401
No	GI	K282	53420
No	GI	K282	53421
No	GI	K284	53440
No	GI	K284	53441
No	GI	K286	53460
No	GI	K286	53461

Critical Care Site	Bleeding Category	ICD-10-CM	ICD-9-CM
No	GI	K2901	53501
No	GI	K2931	53511
No	GI	K2941	53511
No	GI	K2951	53511
No	GI	K2961	53521
No	GI	K2921	53531
No	GI	K2931	53541
No	GI	K2961	53541
No	GI	K2971	53551
No	GI	K2991	53551
No	GI	K2981	53561
No	GI	K31811	53783
No	GI	K5711	56202
No	GI	K5713	56203
No	GI	K5731	56212
No	GI	K5791	56212
No	GI	K5733	56213
No	GI	K5793	56213
Yes Probably	GI	K661	56881
No	GI	K625	5693
No	GI	K5521	56985
No	GI	K920	5780
No	GI	K921	5781
No	GI	K922	5789
Yes	ICH	I6000	430
Yes	ICH	I6001	430
Yes	ICH	I6002	430
Yes	ICH	I6010	430
Yes	ICH	I6011	430
Yes	ICH	I6012	430
Yes	ICH	I602	430
Yes	ICH	I6030	430
Yes	ICH	I6031	430
Yes	ICH	I6032	430
Yes	ICH	I604	430
Yes	ICH	I6050	430
Yes	ICH	I6051	430
Yes	ICH	I6052	430

Critical Care Site	Bleeding Category	ICD-10-CM	ICD-9-CM
Yes	ICH	I606	430
Yes	ICH	I607	430
Yes	ICH	I608	430
Yes	ICH	I609	430
Yes	ICH	I610	431
Yes	ICH	I611	431
Yes	ICH	I612	431
Yes	ICH	I613	431
Yes	ICH	I614	431
Yes	ICH	I615	431
Yes	ICH	I616	431
Yes	ICH	I618	431
Yes	ICH	I619	431
Yes	ICH	I621	4320
Yes	ICH	I6200	4321
Yes	ICH	I6201	4321
Yes	ICH	I6202	4321
Yes	ICH	I6203	4321
Yes	ICH	I629	4329
Yes	ICH	S066X0A	85200
Yes	ICH	S066X0A	85201
Yes	ICH	S066X1A	85202
Yes	ICH	S066X2A	85202
Yes	ICH	S066X3A	85203
Yes	ICH	S066X4A	85203
Yes	ICH	S066X5A	85204
Yes	ICH	S066X6A	85205
Yes	ICH	S066X7A	85205
Yes	ICH	S066X8A	85205
Yes	ICH	S066X9A	85206
Yes	ICH	S066X0A	85209
Yes	ICH	S066X9A	85209
Yes	ICH	S065X0A	85220
Yes	ICH	S065X0A	85221
Yes	ICH	S065X1A	85222
Yes	ICH	S065X2A	85222
Yes	ICH	S065X3A	85223
Yes	ICH	S065X4A	85223

Critical Care Site	Bleeding Category	ICD-10-CM	ICD-9-CM
Yes	ICH	S065X5A	85224
Yes	ICH	S065X6A	85225
Yes	ICH	S065X7A	85225
Yes	ICH	S065X8A	85225
Yes	ICH	S065X9A	85226
Yes	ICH	S065X0A	85229
Yes	ICH	S065X9A	85229
Yes	ICH	S064X0A	85240
Yes	ICH	S064X0A	85241
Yes	ICH	S064X1A	85242
Yes	ICH	S064X2A	85242
Yes	ICH	S064X3A	85243
Yes	ICH	S064X4A	85243
Yes	ICH	S064X5A	85244
Yes	ICH	S064X6A	85245
Yes	ICH	S064X7A	85245
Yes	ICH	S064X8A	85245
Yes	ICH	S064X9A	85246
Yes	ICH	S064X0A	85249
Yes	ICH	S064X9A	85249
Yes	ICH	S06360A	85300
Yes	ICH	S06340A	85301
Yes	ICH	S06350A	85301
Yes	ICH	S06360A	85301
Yes	ICH	S06341A	85302
Yes	ICH	S06342A	85302
Yes	ICH	S06351A	85302
Yes	ICH	S06352A	85302
Yes	ICH	S06361A	85302
Yes	ICH	S06362A	85302
Yes	ICH	S06343A	85303
Yes	ICH	S06344A	85303
Yes	ICH	S06353A	85303
Yes	ICH	S06354A	85303
Yes	ICH	S06363A	85303
Yes	ICH	S06364A	85303
Yes	ICH	S06345A	85304
Yes	ICH	S06355A	85304

Critical Care Site	Bleeding Category	ICD-10-CM	ICD-9-CM
Yes	ICH	S06365A	85304
Yes	ICH	S06346A	85305
Yes	ICH	S06347A	85305
Yes	ICH	S06348A	85305
Yes	ICH	S06356A	85305
Yes	ICH	S06357A	85305
Yes	ICH	S06358A	85305
Yes	ICH	S06366A	85305
Yes	ICH	S06367A	85305
Yes	ICH	S06368A	85305
Yes	ICH	S06349A	85306
Yes	ICH	S06359A	85306
Yes	ICH	S06369A	85306
Yes	ICH	S06360A	85309
Yes	ICH	S06369A	85309
No But Defines A Major Bleed	Other	D62	2851
Yes	Other	H44811	36043
Yes	Other	H44812	36043
Yes	Other	H44813	36043
Yes	Other	H44819	36043
Yes	Other	H35731	36243
Yes	Other	H35732	36243
Yes	Other	H35733	36243
Yes	Other	H35739	36243
Yes	Other	H3560	36281
Yes	Other	H3561	36281
Yes	Other	H3562	36281
Yes	Other	H3563	36281
Yes	Other	H31301	36361
Yes	Other	H31302	36361
Yes	Other	H31303	36361
Yes	Other	H31309	36361
Yes	Other	H31311	36362
Yes	Other	H31312	36362
Yes	Other	H31313	36362
Yes	Other	H31319	36362
Yes	Other	H31411	36372
Yes	Other	H31412	36372

Critical Care Site	Bleeding Category	ICD-10-CM	ICD-9-CM
Yes	Other	H31413	36372
Yes	Other	H31419	36372
Yes	Other	H2100	36441
Yes	Other	H2101	36441
Yes	Other	H2102	36441
Yes	Other	H2103	36441
No	Other	H1130	37272
No	Other	H1131	37272
No	Other	H1132	37272
No	Other	H1133	37272
No	Other	H0289	37481
Yes	Other	H05231	37632
Yes	Other	H05232	37632
Yes	Other	H05233	37632
Yes	Other	H05239	37632
Yes	Other	H47021	37742
Yes	Other	H47022	37742
Yes	Other	H47023	37742
Yes	Other	H47029	37742
Yes	Other	H4310	37923
Yes	Other	H4311	37923
Yes	Other	H4312	37923
Yes	Other	H4313	37923
Yes	Other	I312	4230
No	Other	N3289	5967
No	Other	R319	59970
No	Other	R310	59971
No	Other	R311	59972
No	Other	R312	59972
No	Other	N421	6021
No	Other	N831	6201
No	Other	N857	6214
No	Other	N920	6262
No	Other	N923	6265
No	Other	N930	6267
No	Other	N897	6268
No	Other	N925	6268
No	Other	N938	6268

Critical Care Site	Bleeding Category	ICD-10-CM	ICD-9-CM
No	Other	N926	6269
No	Other	N939	6269
Yes	Other	M2500	71910
Yes	Other	M25011	71911
Yes	Other	M25012	71911
Yes	Other	M25019	71911
Yes	Other	M25021	71912
Yes	Other	M25022	71912
Yes	Other	M25029	71912
Yes	Other	M25031	71913
Yes	Other	M25032	71913
Yes	Other	M25039	71913
Yes	Other	M25041	71914
Yes	Other	M25042	71914
Yes	Other	M25049	71914
Yes	Other	M25051	71915
Yes	Other	M25052	71915
Yes	Other	M25059	71915
Yes	Other	M25061	71916
Yes	Other	M25062	71916
Yes	Other	M25069	71916
Yes	Other	M25071	71917
Yes	Other	M25072	71917
Yes	Other	M25073	71917
Yes	Other	M25074	71917
Yes	Other	M25075	71917
Yes	Other	M25076	71917
Yes	Other	M2508	71918
Yes	Other	M2500	71919
No	Other	R233	7827
No	Other	R040	7847
No	Other	R041	7848
No	Other	R042	78630
No	Other	R049	78630
No	Other	R0481	78631
No	Other	R0489	78639
No	Other	T792XXA	9582
Yes If Brain Or Spinal	Other	G9731	99702

Critical Care Site	Bleeding Category	ICD-10-CM	ICD-9-CM
Yes If Brain Or Spinal	Other	G9732	99702
No These Are Infarcts	Other	I97810	99702
No These Are Infarcts	Other	I97811	99702
No These Are Infarcts	Other	I97820	99702
No These Are Infarcts	Other	I97821	99702
Yes As Retroperitoneal	Other	D7801	99811
Yes As Retroperitoneal	Other	D7802	99811
Yes As Retroperitoneal	Other	D7821	99811
Yes As Retroperitoneal	Other	D7822	99811
Yes If Retroperitoneal E.G Pancreas, Adrenal	Other	E3601	99811
Yes If Retroperitoneal E.G Pancreas, Adrenal	Other	E3602	99811
Yes If Brain Or Spinal	Other	G9731	99811
Yes If Brain Or Spinal	Other	G9732	99811
Yes If Brain Or Spinal	Other	G9751	99811
Yes If Brain Or Spinal	Other	G9752	99811
Yes	Other	H59111	99811
Yes	Other	H59112	99811
Yes	Other	H59113	99811
Yes	Other	H59119	99811
Yes	Other	H59121	99811
Yes	Other	H59122	99811
Yes	Other	H59123	99811
Yes	Other	H59129	99811
Yes	Other	H59311	99811
Yes	Other	H59312	99811
Yes	Other	H59313	99811
Yes	Other	H59319	99811
Yes	Other	H59321	99811
Yes	Other	H59322	99811
Yes	Other	H59323	99811
Yes	Other	H59329	99811
No	Other	H9521	99811
No	Other	H9522	99811
No	Other	H9541	99811
No	Other	H9542	99811
Yes As May Be Pericardial Or Extend To Retroperitoneal	Other	I97410	99811

Critical Care Site	Bleeding Category	ICD-10-CM	ICD-9-CM
Yes As May Be Pericardial Or Extend To Retroperitoneal	Other	I97411	99811
Yes As May Be Pericardial Or Extend To Retroperitoneal	Other	I97418	99811
Yes As May Be Pericardial Or Extend To Retroperitoneal	Other	I9742	99811
Yes As May Be Pericardial Or Extend To Retroperitoneal	Other	I97610	99811
Yes As May Be Pericardial Or Extend To Retroperitoneal	Other	I97611	99811
Yes As May Be Pericardial Or Extend To Retroperitoneal	Other	I97618	99811
Yes As May Be Pericardial Or Extend To Retroperitoneal	Other	I9762	99811
No Respiratory Not Critical	Other	J9561	99811
No	Other	J9562	99811
No	Other	J95830	99811
No	Other	J95831	99811
No GI Not Critical	Other	K9161	99811
No	Other	K9162	99811
No	Other	K91840	99811
No	Other	K91841	99811
No	Other	L7601	99811
No	Other	L7602	99811
No	Other	L7621	99811
No	Other	L7622	99811
No Unless Associated With Compartment Syndrome	Other	M96810	99811
No Unless Associated With Compartment Syndrome	Other	M96811	99811
No Unless Associated With Compartment Syndrome	Other	M96830	99811
No Unless Associated With Compartment Syndrome	Other	M96831	99811
No Unless Renal Which Is Retroperitoneal	Other	N9961	99811
No Unless Renal Which Is Retroperitoneal	Other	N9962	99811
No Unless Renal Which Is Retroperitoneal	Other	N99820	99811
No Unless Renal Which Is Retroperitoneal	Other	N99821	99811

APPENDIX 2. OPERATIONAL ALGORITHM

Operational algorithm for differentiating between prophylactic versus therapeutic use of OAC/PAC agents:

Step 1: Identifying anticoagulation treatment episodes based on OAC and PAC use during the period of interest; an episode will be assumed to be terminated when a gap of ≥ 30 days occurred.

Step 2: Each identified anticoagulation treatment episode will be determined as prophylactic use if:

- (1) the duration of the episode is ≤ 42 days; and
- (2) the initiation date of anticoagulation in the episode occurred within 2 days before or 7 days after knee/hip replacement surgery.

The initiation date of anticoagulation in the episode occurred within 7 days after the admission date of a hospitalization associated with a “medically ill” primary diagnosis (see below for corresponding codes) and with a ≥ 3 -day length of stay

Step 3: A patient will be excluded from the study if any of his/her 6-month pre-index anticoagulation treatment episodes are determined to be non-prophylactic use.

The algorithm may be modified based on exploratory analyses of the study databases.

HCPCS CODES FOR ORAL AND PARENTERAL ANTICOAGULANTS

Drug	Anticoagulant Type	HCPCS Codes*
Low Molecular Weight Heparin	PAC	
Dalteparin	PAC	J1645
Enoxaparin	PAC	J1650
Tinzaparin	PAC	J1655
Heparin	PAC	J1642, J1644
Fondaparinux	PAC	J1652
Warfarin	OAC	-
Apixaban	OAC	-
Dabigatran etexilate mesylate	OAC	-
Rivaroxaban	OAC	-
Edoxaban	OAC	-

*Codes from the NDC system will also be used to characterize use of PAC

Condition	ICD-9-CM Codes	ICD-10-CM Codes
Knee replacement surgery	81.54. 81.55	0SRC07Z, 0SRC0J9, 0SRC0JA, 0SRC0JZ, 0SRC0KZ, 0SRD07Z, 0SRD0J9, 0SRD0JA, 0SRD0JZ, 0SRD0KZ, 0SRT07Z, 0SRT0J9, 0SRT0JA, 0SRT0JZ, 0SRT0KZ, 0SRU07Z, 0SRU0J9, 0SRU0JA, 0SRU0JZ, 0SRU0KZ, 0SRV07Z, 0SRV0J9, 0SRV0JA, 0SRV0JZ, 0SRV0KZ, 0SRW07Z, 0SRW0J9, 0SRW0JA, 0SRW0JZ, 0SRW0KZ, 0SWC0JZ, 0SWC3JZ, 0SWC4JZ, 0SWD0JZ, 0SWD3JZ, 0SWD4JZ
Hip replacement surgery	81.51, 81.52, 81.53	0SR9039, 0SR903A, 0SR903Z, 0SR907Z, 0SR90J9, 0SR90JA, 0SR90JZ, 0SR90KZ, 0SRA009, 0SRA00A, 0SRA00Z, 0SRA019, 0SRA01A, 0SRA01Z, 0SRA039, 0SRA03A, 0SRA03Z, 0SRA07Z, 0SRA0J9, 0SRA0JA, 0SRA0JZ, 0SRA0KZ, 0SRB039, 0SRB03A, 0SRB03Z, 0SRB07Z, 0SRB0J9, 0SRB0JA, 0SRB0JZ, 0SRB0KZ, 0SRE009, 0SRE00A, 0SRE00Z, 0SRE019, 0SRE01A, 0SRE01Z, 0SRE039, 0SRE03A, 0SRE03Z, 0SRE07Z, 0SRE0J9, 0SRE0JA, 0SRE0JZ, 0SRE0KZ, 0SRR019, 0SRR01A, 0SRR01Z, 0SRR039, 0SRR03A, 0SRR03Z, 0SRR07Z, 0SRR0J9, 0SRR0JA, 0SRR0JZ, 0SRR0KZ, 0SRS019, 0SRS01A, 0SRS01Z, 0SRS039, 0SRS03A, 0SRS03Z, 0SRS07Z, 0SRS0J9, 0SRS0JA, 0SRS0JZ, 0SRS0KZ, 0SW90JZ, 0SW93JZ, 0SW94JZ, 0SWB0JZ, 0SWB3JZ, 0SWB4JZ
Medically-ill	 Medically-ill.docx	

13. ANNEX 1. ADDITIONAL INFORMATION

Not Applicable

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