



NON-INTERVENTIONAL (NI) STUDY PROTOCOL

Study information

Title	Non-Interventional Postmarketing Safety Study to Evaluate the COMIRNATY 2024-2025 Formula (monovalent KP.2) in the United States
Protocol number	C4591070
Protocol version identifier	2.0
Date	22 April 2026
EU Post Authorization Study (PAS) register number	To be completed prior to start of data collection
Active substance	COVID-19 Vaccine, mRNA
Medicinal product	COMIRNATY 2024-2025 Formula
Research question and objectives	<p>The study will be conducted in two phases, each with its own specific objectives.</p> <p><u>Phase 1</u></p> <p>Phase 1 will sequentially monitor the occurrence of pre-specified adverse events of special interest (AESIs) in near real-time following vaccination.</p> <p>Primary objective:</p> <ul style="list-style-type: none">To estimate the incidence of pre-specified AESIs in a risk window following vaccination with the COMIRNATY 2024-2025 Formula compared to the incidence of these events during a post-vaccination control window (ie, expected rates of these events). <p><u>Phase 2</u></p> <p>Phase 2 will compare the incidence of pre-specified AESIs among individuals who receive the COMIRNATY 2024-2025 Formula to individuals with no recorded vaccination with the COMIRNATY 2024-2025 Formula for up to one year (365 days) after vaccination.</p> <p>Primary objective:</p> <ul style="list-style-type: none">To estimate the incidence of pre-specified AESIs among individuals who receive the COMIRNATY 2024-2025 Formula compared to the incidence among individuals with no recorded vaccination with the COMIRNATY 2024-2025 Formula.

090177e1a617ace1\Approved\Approved On: 18-May-2026 22:07 (GMT)

PFIZER CONFIDENTIAL



	<p>Secondary objective:</p> <ul style="list-style-type: none">To estimate the incidence of pre-specified AESIs among individuals who receive the COMIRNATY 2024-2025 Formula compared to the incidence among individuals with no recorded vaccination with the COMIRNATY 2024-2025 Formula within subgroups of immunocompromised individuals, individuals with specific comorbidities, individuals with prior SARS-CoV-2 infection, individuals with prior COVID-19 vaccination, individuals with concomitant administration of non-COVID-19 vaccines, pregnant individuals, children, and the elderly, if sample size permits.
Country(ies) of study	United States
Authors	<p>Jenny Sun, PhD Safety Surveillance Research Scientist Pfizer Inc. (617) 417-9453 jenny.sun@pfizer.com</p> <p>Anna Booman, PhD Epidemiologist Optum Epidemiology (763) 348-2125 anna_booman@optum.com</p> <p>Andrea Chomistek, ScD Senior Scientist Optum Epidemiology (763) 349-7727 andrea.chomistek@optum.com</p>
<p>This document contains confidential information belonging to Pfizer. Except as otherwise agreed to in writing, by accepting or reviewing this document, you agree to hold this information in confidence and not copy or disclose it to others (except where required by applicable law) or use it for unauthorized purposes. In the event of any actual or suspected breach of this obligation, Pfizer must be promptly notified.</p>	

090177e1a617ace1\Approved\Approved On: 18-May-2026 22:07 (GMT)



1. TABLE OF CONTENTS

1. TABLE OF CONTENTS.....3

2. LIST OF ABBREVIATIONS.....7

3. RESPONSIBLE PARTIES.....9

4. ABSTRACT.....10

5. AMENDMENTS AND UPDATES.....15

6. MILESTONES.....20

7. RATIONALE AND BACKGROUND.....21

8. RESEARCH QUESTION AND OBJECTIVES22

 8.1. Phase 1.....22

 8.1.1. Primary Objective:.....22

 8.2. Phase 2.....22

 8.2.1. Primary Objective:.....22

 8.2.2. Secondary Objective:.....22

9. RESEARCH METHODS23

 9.1. Study Design23

 9.1.1. SCRI23

 9.1.2. Cohort Design.....24

 9.2. Setting.....25

 9.2.1. SCRI25

 9.2.1.1. Inclusion Criteria.....25

 9.2.1.2. Exclusion Criteria.....26

 9.2.2. Cohort Study.....27

 9.2.2.1. Inclusion Criteria.....27

 9.2.2.2. Exclusion Criteria.....28

 9.2.3. Vaccination Date and Cohort Entry Date29

 9.2.4. Baseline Period29

 9.2.5. Follow-Up Period30

 9.2.5.1. SCRI.....30

 9.2.5.2. Cohort Study30

090177e1a617ace1\Approved\Approved On: 18-May-2026 22:07 (GMT)



9.3. Variables.....	31
9.3.1. Exposures.....	31
9.3.1.1. COMIRNATY 2024-2025 Formula.....	31
9.3.1.2. Comparator Cohort.....	31
9.3.2. Outcomes	32
9.3.2.1. Outcome-Specific Risk and Control Periods	34
9.3.3. Covariates	35
9.4. Data Sources.....	37
9.4.1. Optum Pre-Adjudicated Claims Database.....	37
9.4.2. Optum Research Database.....	38
9.5. Study Size.....	38
9.6. Data Management	38
9.7. Data Analysis	39
9.7.1. SCRI	39
9.7.1.1. Primary Analysis	39
9.7.2. Cohort Study.....	39
9.7.2.1. Propensity Score Modeling and Matching.....	39
9.7.2.2. Primary Analysis	41
9.7.2.3. Secondary Analysis	42
9.7.2.4. Subgroup Analysis	42
9.8. Quality Control.....	43
9.9. Limitations of the Research Methods.....	44
9.10. Other Aspects	45
10. PROTECTION OF HUMAN PARTICIPANTS	45
10.1. Patient Information.....	45
10.2. Patient Consent.....	45
10.3. Institutional Review Board (IRB)/Ethics Committee (EC).....	45
10.4. Ethical Conduct of the Study	46
11. MANAGEMENT AND REPORTING OF ADVERSE EVENTS/ADVERSE REACTIONS	46



12. PLANS FOR DISSEMINATING AND COMMUNICATING STUDY RESULTS.....46

13. REFERENCES47

14. LIST OF TABLES54

15. LIST OF FIGURES54

16. ANNEX 1. LIST OF STANDALONE DOCUMENTS55

17. ANNEX 2. CODE LISTS56

 17.1. Appendix I – COMIRNATY 2024-2025 Formula.....56

 17.1.1. CPT Codes56

 17.1.2. NDC Codes56

 17.2. Appendix II – Comparator Codes57

 17.2.1. COVID-19 Vaccine 2024-2025 Formulations Other than the
 COMIRNATY 2024-2025 Formula57

 17.2.1.1. Moderna Spikevax.....57

 17.2.1.2. Novavax COVID-19 Vaccine, Adjuvanted.....57

 17.2.2. Other Vaccines.....57

 17.2.2.1. CPT Codes.....58

 17.2.2.2. NDC Codes60

 17.2.3. Outpatient Physician Evaluation and Management CPT Codes.....61

 17.3. Appendix III – Safety Outcomes of Interest61

 17.4. Appendix IV – Covariate Codes81

 17.4.1. Comorbidities81

 17.4.1.1. Asthma81

 17.4.1.2. Non-Malignant Blood Disorders82

 17.4.1.3. Chronic Lung Disease90

 17.4.1.4. Down Syndrome.....95

 17.4.1.5. Heart Disease.....95

 17.4.1.6. History of SARS-CoV-2 Infection.....108

 17.4.1.7. Immunocompromised Status.....108

 17.4.1.8. Kidney Disorders.....113

 17.4.1.9. Liver Disorders.....121

090177e1a617ace1\Approved\Approved On: 18-May-2026 22:07 (GMT)



17.4.1.10. Neurological or Neurodevelopmental Conditions.....	124
17.4.1.11. Malignant Neoplasms.....	125
17.4.1.12. Obesity	126
17.4.1.13. Type 2 Diabetes.....	126
17.4.2. Medication History	129
17.4.2.1. Systemic Immunomodulators.....	129
17.4.2.2. Corticosteroids	145
17.4.2.3. . Antivirals	146
17.4.2.4. Antibiotics	149
18. ANNEX 3. ADDITIONAL INFORMATION.....	161

090177e1a617ace1\Approved\Approved On: 18-May-2026 22:07 (GMT)



2. LIST OF ABBREVIATIONS

Abbreviation	Definition
ADEM	Acute disseminated encephalomyelitis
AESI	Adverse event of special interest
AMA	American Medical Association
ASD	Atrial septal defect
AVSD	Atrioventricular septal defect
BEST	Biologics Effectiveness and Safety
CBER	Center for Biologics Evaluation and Research
CDC	Centers for Disease Control and Prevention
CHD	Congenital heart disease
CI	Confidence interval
CMS	Centers for Medicare and Medicaid Services
COPD	Chronic obstructive pulmonary disease
COVID-19	Coronavirus disease 2019
CPT	Current Procedural Terminology
CVST	Cerebral venous sinus thrombosis
EC	Ethics committee
ED	Emergency department
EMA	European Medicines Agency
EUROCAT	European Surveillance of Congenital Anomalies
FDA	Food and Drug Administration
GPP	Good pharmacoepidemiology practices
HCPCS	Healthcare Common Procedure Coding System
HIV	Human immunodeficiency virus
ICD-10-CM	International Classification of Diseases, 10 th Revision, Clinical Modification
ICD-10-PCS	International Classification of Diseases, 10th Revision, Procedure Coding System
IIS	Immunization Information Systems
IP	Inpatient
IRB	Institutional Review Board
LMP	Last menstrual period
MI	Myocardial infarction
mRNA	Messenger RNA
MS	Multiple sclerosis
NDC	National Drug Code
NI	Non-interventional
NSTEMI	Non-ST elevation myocardial infarction
OP	Outpatient
ORD	Optum Research Database

090177e1a617ace1\Approved\Approved On: 18-May-2026 22:07 (GMT)



Abbreviation	Definition
PAS	Post authorization study
PASS	Post-authorization safety study
PDA	Patent ductus arteriosus
PE	Pulmonary embolism
PS	Propensity score
RSV	Respiratory syncytial virus
SAP	Statistical analysis plan
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
SAS	Statistical Analysis System
SCRI	Self-controlled risk interval
SGA	Small for gestational age
SOP	Standard operating procedure
STEMI	ST elevation myocardial infarction
TAPVR	Total anomalous pulmonary venous return
TM	Transverse myelitis
US	United States
VAERS	Vaccine Adverse Event Reporting System
VSD	Ventricular septal defect

090177e1a617ace1\Approved\Approved On: 18-May-2026 22:07 (GMT)



3. RESPONSIBLE PARTIES

Principal Investigator(s) of the Protocol

Name, Degree(s)	Job Title	Affiliation	Address
Jenny Sun, PhD	Safety Surveillance Research Scientist	Pfizer Inc.	66 Hudson Blvd New York, NY 10001
Anna Booman, PhD	Epidemiologist, Epidemiology	Optum Epidemiology	1325 Boylston Street, 11 th Floor Boston, MA 02215
Andrea Chomistek, ScD	Senior Scientist, Epidemiology	Optum Epidemiology	1325 Boylston Street, 11 th Floor Boston, MA 02215



4. ABSTRACT

Title: Non-Interventional Postmarketing Safety Study to Evaluate the COMIRNATY 2024-2025 Formula (monovalent KP.2) in the United States

Version: 2.0

Date: 22 April 2026

Authors: Optum: Anna Booman, PhD, Epidemiologist, Epidemiology; Andrea Chomistek, ScD, Senior Scientist, Epidemiology; Pfizer: Jenny Sun, PhD, Safety Surveillance Research Scientist

Rationale and background: In August 2024, the Food and Drug Administration (FDA) approved the COMIRNATY 2024-2025 Formula, a monovalent messenger RNA (mRNA) vaccine targeting the Omicron variant KP.2. More information is needed on whether the safety profile of the COMIRNATY 2024-2025 Formula remains consistent with the safety profile of the original formula (BNT162b2 approved in August 2021) in the overall population and in subpopulations of interest.

This non-interventional study is designated as a post-authorization safety study (PASS) and is a condition of authorization to the FDA.

Research question and objectives:

The study will be conducted in two phases, each with its own specific objectives.

Phase 1

Phase 1 will sequentially monitor the occurrence of pre-specified adverse events of special interest (AESIs) in near real-time following vaccination.

Primary objective:

- To estimate the incidence of pre-specified AESIs in a risk window following vaccination with the COMIRNATY 2024-2025 Formula compared to the incidence of these events during a post-vaccination control window (ie, expected rates of these events).

Phase 2

Phase 2 will compare the incidence of pre-specified AESIs among individuals who receive the COMIRNATY 2024-2025 Formula to individuals with no recorded vaccination with the COMIRNATY 2024-2025 Formula for up to one year (365 days) after vaccination.



Primary objective:

- To estimate the incidence of pre-specified AESIs among individuals who receive the COMIRNATY 2024-2025 Formula compared to the incidence among individuals with no recorded vaccination with the COMIRNATY 2024-2025 Formula.

Secondary objective:

- To estimate the incidence of pre-specified AESIs among individuals who receive the COMIRNATY 2024-2025 Formula compared to the incidence among individuals with no recorded vaccination with the COMIRNATY 2024-2025 Formula within subgroups of immunocompromised individuals, individuals with specific comorbidities, individuals with prior SARS-CoV-2 infection, individuals with prior COVID-19 vaccination, individuals with concomitant administration of non-COVID-19 vaccines, pregnant individuals, children, and the elderly, if sample size permits.

Study design: This is a non-interventional observational study utilizing an administrative claims database in the United States (US). Phase 1 will utilize a self-controlled risk interval (SCRI) design, and Phase 2 will utilize a matched cohort design. These two different study designs are complementary, each with its own strengths. The SCRI design is less impacted by misclassification of coronavirus disease 2019 (COVID-19) vaccine exposure and confounding by time-fixed characteristics, while the cohort study design enables a longer follow-up period.

Population: The study population will be drawn from a nationwide healthcare insurance claims database. It will include all eligible individuals who receive the COMIRNATY 2024-2025 Formula from 22 August 2024 (the date of product approval/authorization) through 31 March 2025. The end date of 31 March 2025 was chosen based on the assumption that vaccine uptake will be similar to uptake during the 2022-2023 and 2023-2024 vaccine seasons. During the 2022-2023 and 2023-2024 COVID-19 seasons, the end of March reflected the time when uptake of the COVID-19 vaccine was no longer increasing (ie, most individuals who received the COVID-19 vaccine had done so prior to March), and COVID-19 cases declined substantially from their fall/winter peak.

The source population for this study will consist of all individuals with at least one medical or pharmacy claim from 22 August 2024 through 31 March 2025. In Phase 1, individuals age ≥ 6 months will be eligible for inclusion if they receive at least one dose of the COMIRNATY 2024-2025 Formula from 22 August 2024 through 31 March 2025, have continuous medical and pharmacy insurance coverage in the 365 days prior to their vaccination date, experience a safety outcome of interest during a risk or control period, and do not experience the safety event of interest during the clean period prior to vaccination. In Phase 2, individuals age ≥ 6 months will be eligible for inclusion in the exposed cohort if they receive a dose of the COMIRNATY 2024-2025 Formula and have continuous medical and pharmacy insurance coverage in the 365 days prior to their vaccination. Individuals age ≥ 6 months will be eligible for inclusion in the unexposed cohort if they do not receive a dose



of the COMIRNATY 2024-2025 Formula but do have an outpatient physician visit with or without receipt of another vaccine and if they have continuous medical and pharmacy insurance coverage in the 365 days prior to their outpatient healthcare encounter. Individuals in the unexposed cohort will be matched to those in the exposed cohort if their outpatient healthcare encounter is within the same 14-day calendar period as the exposed individual's vaccination date and if they are in the same age group.

Variables:

- *Exposures:* Exposure to the COMIRNATY 2024-2025 Formula will be defined by the presence of National Drug Codes (NDC) on pharmacy claims or Common Procedural Terminology (CPT) codes¹ on medical claims.
- *Outcomes:* The pre-specified safety outcomes of interest include the following: acute disseminated encephalomyelitis (ADEM), transverse myelitis (TM), encephalitis/myelitis/encephalomyelitis (not ADEM or TM), anaphylaxis, Bell's palsy, cerebral venous sinus thrombosis (CVST), convulsions/seizures (non-febrile), glomerulonephritis, Guillain-Barré syndrome, herpes zoster, immune-mediated myositis, immune thrombocytopenia, Kawasaki disease, multi inflammatory syndrome (in children and adults), multiple sclerosis (MS), myocardial infarction (MI), myocarditis/pericarditis, pulmonary embolism (PE), hemorrhagic stroke, and ischemic stroke. In Phase 2 of the study, pregnancy outcomes will also be assessed among pregnant individuals and their infants, if sample size permits. The outcomes of interest include major congenital malformations, preterm birth, small for gestational age (SGA), spontaneous abortion, and stillbirth. All study outcomes will be identified through claims indicators using published validated claims-based algorithms with high performance when available.
- *Covariates:* Baseline covariates will include information related to patient demographics, comorbidities, COVID-19 vaccination, healthcare utilization, and medication history. Additional baseline covariates will be identified on an empiric basis by examining the 25 most frequently occurring diagnoses, drugs dispensed, and procedures performed among individuals with and without COMIRNATY 2024-2025 Formula exposure. Demographic attributes will be determined on the vaccination/cohort entry date and prior COVID-19 vaccination will be assessed using all available data. Other factors will be assessed in the one year (365 days) prior to the vaccination date or cohort entry date.

¹ CPT copyright 2025 American Medical Association (AMA). All rights reserved.

Fee schedules, relative value units, conversion factors and/or related components are not assigned by the AMA, are not part of CPT, and the AMA is not recommending their use. The AMA does not directly or indirectly practice medicine or dispense medical services. The AMA assumes no liability for data contained or not contained herein.

CPT is a registered trademark of the American Medical Association.



Data sources: The patients included in this study will be drawn from the Optum pre-adjudicated claims database for the interim report and from the Optum Research Database (ORD) for the final reporting. The pre-adjudicated medical claims, which are supplemented with adjudicated pharmacy claims and health plan enrollment information, encompass hospital and physician claims that are submitted and processed daily from a large US commercial health plan. The individuals included in the pre-adjudicated medical claims database are fully insured by the health plan, which provides reimbursement of medical and pharmacy services regardless of site of care, and individuals are geographically diverse within the US. The ORD is a proprietary research database containing eligibility and adjudicated pharmacy and medical claims data from a large US health plan affiliated with Optum. In 2022, data were available for approximately 12 million individuals with medical and pharmacy coverage.

Study size: The sample size achieved will depend on the number of recipients of the COMIRNATY 2024-2025 Formula in the databases. All individuals who meet the study's eligibility criteria during the study period will be included.

Data analysis:

Phase 1: For the SCRI design, the observed incidence rates of the pre-specified AESIs will be estimated in the risk window and the control window. Among individuals who experience an outcome of interest in either the risk window or the control window (but not both), an exact conditional Poisson regression model with the natural logarithm of the person-time as the offset will be used to calculate the relative incidence (rate ratio) and corresponding 95% confidence interval (CI) of events occurring during the risk period relative to the control period. The results from the SCRI utilizing the Optum pre-adjudicated claims database will be presented in the interim report, while results utilizing the ORD will be presented in the final report.

Phase 2: In the cohort study, propensity score-matched cohorts of COMIRNATY 2024-2025 Formula-vaccinated patients and comparator patients with no recorded dose of the COMIRNATY 2024-2025 Formula will be created. Following the application of outcome-specific exclusions, the incidence rate of each safety outcome will be estimated among the COMIRNATY 2024-2025 Formula-exposed group and its matched comparator group. The rate ratio will be estimated using unconditional Poisson regression that accounts for the matching process and for individuals who are included in both study cohorts. Secondary analyses will be conducted separately for various subsets of the matched comparator group, including comparators who received a non-COMIRNATY 2024-2025 COVID-19 vaccine on cohort entry, who received a non-COVID-19 vaccine on cohort entry, and who did not receive a vaccine on cohort entry but had another type of qualifying outpatient health encounter. Subgroup analyses will be conducted among immunocompromised individuals, individuals with specific comorbidities, individuals with prior SARS-CoV-2 infection, individuals with prior COVID-19 vaccination, individuals with concomitant administration



of non-COVID-19 vaccines, pregnant individuals, children, and the elderly, if sample size permits. Lastly, a descriptive analysis of the matched cohorts will focus specifically on outcomes related to pregnancy (spontaneous abortion, stillbirth, preterm birth, major congenital malformations and SGA).

Milestones: Planned start of data collection for the interim report is 11 March 2025. Planned completion date for the interim report is 30 June 2025. The planned end of data collection is 31 August 2026, and the planned completion date for the final report is 28 February 2027.



5. AMENDMENTS AND UPDATES

Version Identifier	Date	Amendment Type (substantial or administrative)	Protocol Section(s) Changed	Summary of Amendment(s)	Reason
2.0	22 April 2026	Administrative	2	Updated abbreviations table	Added and removed abbreviations to align with the text
2.0	22 April 2026	Administrative	Title Page, 3, 4	Modified the investigator list	Change in Optum investigators
2.0	22 April 2026	Administrative	4	Defined additional abbreviations as needed	Abbreviations were not previously defined
2.0	22 April 2026	Administrative	4	Added reference to the original formula BNT162b2	Additional details for improved clarity
2.0	22 April 2026	Administrative	4	Clarified the secondary and subgroup analyses in the abstract	Clarification between secondary and subgroup analyses
2.0	22 April 2026	Substantial	4, 9.2.4, 9.3.3	With the exception of prior COVID-19 vaccination, covariates will be assessed in the one year prior to cohort entry date as opposed to all available data; all available data will continue to be used to assess prior COVID-19 vaccination	The one-year lookback period is sufficient for capturing baseline covariates, as individuals with a chronic condition are expected to interact with the healthcare system at least once per year
2.0	22 April 2026	Administrative	7	Changed the information about product approval to past tense	The information regarding the 2024-2025 Formula is no longer present tense given the approval of more recent formulations
2.0	22 April 2026	Administrative	9.1.2, 9.2.3, 9.7.2.1	Clarified details regarding propensity score matching in the cohort study analysis	Additional details provided for improved clarity

090177e1a617ace1\Approved\Approved On: 18-May-2026 22:07 (GMT)



Version Identifier	Date	Amendment Type (substantial or administrative)	Protocol Section(s) Changed	Summary of Amendment(s)	Reason
2.0	22 April 2026	Substantial	9.2.1.2, 9.2.2.2	Clarified that individuals receiving any COVID-19 vaccine (including prior COMIRNATY 2024-2025 Formula) would be excluded from the SCRI and cohort analyses	To ensure a proper washout period, excluding prior COMIRNATY 2024-2025 Formula is needed for individuals who may receive more than one dose
2.0	22 April 2026	Administrative	9.2.3	Added details on the cohort entry date for the comparator cohort	Additional details provided for improved clarity
2.0	22 April 2026	Substantial	9.2.4, 9.3.2	Extended the clean period to 365 days prior to vaccination for all AESIs	Improved exclusion of pre-existing conditions prior to vaccination and provides consistency across AESIs
2.0	22 April 2026	Administrative	9.2.5.1	Clarified that the risk interval for acute disseminated encephalomyelitis starts on the date of vaccination	Align text with Table 2
2.0	22 April 2026	Administrative	9.2.5.2	Specified that follow-up for the cohort study will end at one year following cohort entry (as mentioned in other sections) and clarified the end of follow-up criterion related to receipt of a subsequent COVID-19 vaccine	Additional details provided for improved clarity
2.0	22 April 2026	Substantial	9.3.2	Expanded the circumstances where medical records may be retrieved to include analyses beyond safety signals in the primary SCRI	Provides operational flexibility to obtain medical records in the final report or in analyses besides the primary SCRI analysis if a safety signal is detected or

090177e1a617ace1\Approved\Approved On: 18-May-2026 22:07 (GMT)



Version Identifier	Date	Amendment Type (substantial or administrative)	Protocol Section(s) Changed	Summary of Amendment(s)	Reason
				analysis in the interim report	if estimates are approaching the safety signal threshold
2.0	22 April 2026	Administrative	9.3.2	Removed definitions of abbreviations as needed	Abbreviations have previously been defined
2.0	22 April 2026	Substantial	9.3.3	Expanded the list of baseline covariates to include other non-COVID-19 vaccinations (besides the seasonal influenza and RSV vaccines) and number of vaccinations in the prior year	Improved adjustment for potential confounding by other vaccines given prior to the COMIRNATY 2024-2025 Formula
2.0	22 April 2026	Administrative	9.3.3	Specified the forms of each variable (categorical, continuous, binary)	Additional clarification on the model specification
2.0	22 April 2026	Administrative	9.3.3	Clarified that other vaccinations are included in the empirical examination	Vaccinations are captured through NDC or CPT codes
2.0	22 April 2026	Administrative	9.3.3, 17.4.2.2	Clarified that the corticosteroids covariate is restricted to oral routes	Additional details provided for improved clarity; oral corticosteroids better capture systemic therapy and underlying disease severity
2.0	22 April 2026	Administrative	4, 9.3.3	Clarified the number of most frequently occurring codes that will be examined	Additional details provided for improved clarity

090177e1a617ace1\Approved\Approved On: 18-May-2026 22:07 (GMT)



Version Identifier	Date	Amendment Type (substantial or administrative)	Protocol Section(s) Changed	Summary of Amendment(s)	Reason
2.0	22 April 2026	Administrative	9.7.2.1	Specified the logistic regression model that will be used to estimate propensity scores, how calendar time will be included, and noted that scores will be matched to a maximum of 8 decimal places	Additional clarification on the model specification and details of propensity score matching
2.0	22 April 2026	Administrative	9.7.2.2	Specified that the primary analysis accounts for both the matching ratio and individuals included in both study cohorts	Improved clarity of analytic methods
2.0	22 April 2026	Administrative	9.7.2.3	Specified that the secondary analyses account for both the matching ratio and individuals included in both study cohorts	Improved clarity of analytic methods
2.0	22 April 2026	Administrative	9.7.2.3	Changed a numbered list to a bulleted list	Formatting change
2.0	22 April 2026	Substantial	9.7.2.4	Updated the subgroup analysis for individuals ≤ 18 years of age to state that this will be done among individuals < 18 years of age	Revised to match the more commonly used definition for the pediatric population (<18 years)
2.0	22 April 2026	Administrative	9.7.2.4	Specified that the subgroup analyses will include propensity score as a covariate in the model and will account for individuals included in both study cohorts	Improved clarity of analytic methods

090177e1a617ace1\Approved\Approved On: 18-May-2026 22:07 (GMT)



Version Identifier	Date	Amendment Type (substantial or administrative)	Protocol Section(s) Changed	Summary of Amendment(s)	Reason
2.0	22 April 2026	Administrative	9.7.2.4	Clarified that the prevalence of major congenital malformations will be evaluated among individuals whose pregnancy results in a live birth	Additional details provided for improved clarity
2.0	22 April 2026	Administrative	9.9	Added to the limitations the potential for residual confounding due to the use of a one-year covariate period	Additional details to clarify the impact on potential confounding
2.0	22 April 2026	Administrative	17.3	Defined asterisk (*) symbol on ICD-10-CM codes as indicating wildcard positions; defined dagger (†) symbol as indicating outcomes based on COVID-19 vaccine studies conducted as part of the FDA's CBER BEST system	Improved clarity to reduce confusion of using the asterisk (*) symbol for two different meanings
2.0	22 April 2026	Substantial	17.3	Minor updates to code lists for outcomes	Updates needed for additional clarity and improved capture of the AESI

090177e1a617ace1\Approved\Approved On: 18-May-2026 22:07 (GMT)



6. MILESTONES

Milestone	Planned Date
Final study protocol	31 January 2025
Registration in the HMA-EMA Catalogues of RWD studies	To be determined
Start of data collection ^a	11 March 2025
Interim report ^b	30 June 2025
End of data collection ^{c, d}	31 August 2026
Final study report ^d	28 February 2027

a For studies with secondary data collection, the start of data collection is defined as the planned date for starting data extraction for the purposes of the interim analysis.

b The milestone date was chosen to inform decision making for the next adapted vaccine before Fall 2025.

To meet this milestone, the data extraction for the interim reporting will include data through 10 March 2025.

c For studies with secondary data collection, the end of data collection is defined as the planned date on which the analytical dataset will be first completely available; the analytic dataset is the minimum set of data required to perform the statistical analysis for the final reporting.

d The sponsor may extend the study period. This revision, if needed, will be communicated to the FDA as a protocol amendment. Details on this contingency plan are provided in [Section 9.2](#).



7. RATIONALE AND BACKGROUND

The development of vaccines against SARS-CoV-2 has been critical to ending the Coronavirus disease 2019 (COVID-19) pandemic. In the United States (US), the first vaccines to become available were the messenger RNA (mRNA) vaccines BNT162B2 (COMIRNATY) (Pfizer Inc/BioNTech, 2024) and mRNA-1273 (Moderna US, Inc., 2023). Authorized for emergency use by the US Food and Drug Administration (FDA) on 11 December 2020 and 18 December 2020, respectively, these first-generation vaccines contained a piece of the original SARS-CoV-2 virus's mRNA, instructing cells in the body to make the virus's distinctive "spike" protein and triggering an immune response (FDA, 2020a, 2020b; Nabizadeh et al., 2023). Beginning in August 2022, in response to the new circulating Omicron variant of SARS-CoV-2, the vaccines were adapted to add an mRNA component from the Omicron lineages BA.4 and BA.5, in addition to mRNA from the original viral strain, and were thereafter referred to as bivalent vaccines (FDA, 2022b, 2022c, 2022d). For the 2023-2024 season, a monovalent (single) mRNA component was used to target the Omicron XBB sublineage (FDA, 2023b). In August 2024, the COMIRNATY 2024-2025 Formula was approved for individuals ≥ 12 years of age (Pfizer Inc/BioNTech, 2024). The Pfizer-BioNTech COVID-19 Vaccine 2024-2025 Formula was authorized under emergency use in individuals 6 months through 11 years of age (FDA, 2024). This new formulation contains a monovalent mRNA component corresponding to the Omicron variant KP.2.

The US prescribing information for COMIRNATY highlights the following warnings and precautions:

- "Postmarketing data with authorized or approved mRNA COVID-19 vaccines demonstrate increased risks of myocarditis and pericarditis, particularly within the first week following vaccination. For COMIRNATY, the observed risk is highest in males 12 through 17 years of age."
- "Syncope (fainting) may occur in association with administration of injectable vaccines, including COMIRNATY." (Pfizer Inc/BioNTech, 2024)

Additionally, the following serious adverse events have been observed after immunization with the Pfizer-BioNTech, Moderna, and Janssen vaccines as reported in the Vaccine Adverse Event Reporting System (VAERS): glomerulonephritis, herpes zoster, immune-mediated myositis, and relapsing or progressing multiple sclerosis (MS; VAERS, 2023). More information is needed on whether the safety profile of the COMIRNATY 2024-2025 Formula remains consistent with the safety profile of the original formula in the overall population and subpopulations of interest.

Pfizer/BioNTech, sponsor of the first COVID-19 vaccine to be authorized in the US, is conducting a non-interventional PASS to collect information on the safety profile of its 2024-2025 formula of the COVID-19 vaccine, the Omicron KP.2 monovalent vaccine



(COMIRNATY 2024-2025 Formula; [Pfizer Inc/BioNTech, 2024](#)). This combined protocol and statistical analysis plan (SAP) describes a non-interventional observational study using claims data from a large US insurer to evaluate the safety of the COMIRNATY 2024-2025 Formula in the general population as well as in subpopulations of interest. This non-interventional study is designated as a PASS and is a condition of authorization to the FDA.

8. RESEARCH QUESTION AND OBJECTIVES

The study will be conducted in two phases, each with its own specific objectives.

8.1. Phase 1

Phase 1 will sequentially monitor the occurrence of pre-specified adverse events of special interest (AESIs) in near real-time following vaccination.

8.1.1. Primary Objective:

- To estimate the incidence of pre-specified AESIs in a risk window following vaccination with the COMIRNATY 2024-2025 Formula compared to the incidence of these events during a post-vaccination control window (ie, expected rates of these events).

8.2. Phase 2

Phase 2 will compare the incidence of pre-specified AESIs among individuals who receive the COMIRNATY 2024-2025 Formula to individuals with no recorded vaccination with the COMIRNATY 2024-2025 Formula for up to one year (365 days) after vaccination.

8.2.1. Primary Objective:

- To estimate the incidence of pre-specified AESIs among individuals who receive the COMIRNATY 2024-2025 Formula compared to the incidence among individuals with no recorded vaccination with the COMIRNATY 2024-2025 Formula.

8.2.2. Secondary Objective:

- To estimate the incidence of pre-specified AESIs among individuals who receive the COMIRNATY 2024-2025 Formula compared to the incidence among individuals with no recorded vaccination with the COMIRNATY 2024-2025 Formula within subgroups of immunocompromised individuals, individuals with specific comorbidities, individuals with prior SARS-CoV-2 infection, individuals with prior COVID-19 vaccination, individuals with concomitant administration of non-COVID-19 vaccines, pregnant individuals, children, and the elderly, if sample size permits.



9. RESEARCH METHODS

9.1. Study Design

This non-interventional study will be conducted in two phases. Phase 1 will include a study of self-controlled risk interval (SCRI) design conducted using a pre-adjudicated claims database for the interim report. For the final report, the SCRI study will be repeated using the Optum Research Database (ORD), an adjudicated claims database. Phase 2 will be a comparative safety cohort design using the ORD and will also be included in the final report.

Table 1 summarizes the study designs and data sources included in the interim and final reports. These two different study designs are complementary, each with its own strengths. The SCRI design is less impacted by misclassification of COVID-19 vaccine exposure and confounding by time-fixed characteristics, while the cohort study design enables a longer follow-up period.

Table 1. Study design and data sources for interim and final reporting

	Interim Report	Final Report
Study Design	SCRI, Phase 1 (Section 9.1.1)	SCRI, Phase 1 (Section 9.1.1) Cohort, Phase 2 (Section 9.1.2)
Data Source	Optum pre-adjudicated claims database (Section 9.4.1)	ORD (adjudicated) (Section 9.4.2)

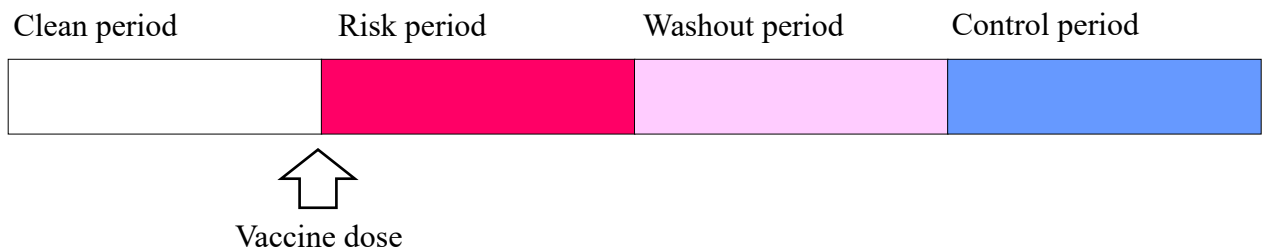
9.1.1. SCRI

Phase 1 will monitor the incidence rate of pre-specified safety events of interest in a general population of individuals who receive the COMIRNATY 2024-2025 Formula using an SCRI study design that tracks post-vaccination risk intervals and control (reference) periods for each vaccinated individual. Monitoring will be conducted during a pre-specified risk period immediately following vaccination, and the observed rate of events during this risk period will be compared to that of a control period temporally removed from the vaccination event. Only individuals who receive the COMIRNATY 2024-2025 Formula, experience a safety outcome of interest during a risk or control period, and do not experience the safety event of interest during the clean period prior to vaccination will be included in the SCRI study (Baker et al., 2015). Figure 1 depicts the periods included in the SCRI. Within each individual, outcomes occurring during the risk interval will be compared with those occurring during the control period to determine whether these outcomes occur more frequently immediately after vaccination as compared with a reference period. A washout

090177e1a617ace1\Approved\Approved On: 18-May-2026 22:07 (GMT)

period will be inserted between the risk interval and the control period to ensure that events relating to the vaccine are not incorrectly attributed to the control period. To ensure that observed outcomes are truly incident, a period free from the outcome of interest (clean period) will be required prior to vaccination.

Figure 1. Self-controlled risk interval design



Certain individuals (ie, immunocompromised patients, those aged 6 months through 11 years; Pfizer/BioNTech, 2024) may receive more than 1 dose of the COMIRNATY 2024-2025 Formula and thus may have multiple risk and control periods. For these individuals, follow-up will be censored at the time of receipt of the second dose of the COMIRNATY 2024-2025 Formula.

The safety outcomes of interest, along with relevant clean windows, risk intervals, and washout and control periods, are listed in [Section 9.3.2](#).

9.1.2. Cohort Design

Phase 2 will consist of a propensity score-matched cohort study of individuals with and without a recorded dose of the COMIRNATY 2024-2025 Formula, conducted within the ORD. During the accrual period of 22 August 2024 through 31 March 2025, individuals who receive the COMIRNATY vaccine will be classified as exposed; those with no recorded vaccination with the COMIRNATY 2024-2025 Formula but who have a healthcare encounter will be classified as comparators. Propensity score (PS) matching will be performed to address control of potential confounding, with matching to be conducted within age group and calendar periods. Age group will be defined as: 6 months–4 years; 5–11 years; 12–17 years; 18–64 years; and ≥ 65 years, while calendar periods will be defined by 14-day increments (eg, 01 September 2024 to 14 September 2024, 15 September 2024 to 28 September 2024). Alternative calendar periods (eg, one month) may be empirically explored. Thus, within any given calendar period, comparators within the same age group will be matched without replacement to a COMIRNATY recipient on PS, down to a maximum allowable level of precision in the PS ([Section 9.7.2.1](#)). This will ensure a sufficient pool of comparators for stratified and/or subpopulation analyses ([Sections 9.7.2.3 & 9.7.2.4](#)). These matched cohorts will be followed for up to one year (365 days) for occurrence of AESIs. The AESIs of interest are listed in [Section 9.3.2](#).



COMIRNATY-exposed individuals and comparators entering the cohort due to receipt of a COVID-19 vaccine who receive a second dose of the same COVID-19 brand within 8 weeks of the first dose will not be censored at the time of second dose. Individuals who receive a second dose of a different brand will be censored at the time of the second dose.

9.2. Setting

The source population for this study will consist of all individuals with at least one medical or pharmacy claim from 22 August 2024 (the date of product approval/authorization) through 31 March 2025. The end date of 31 March 2025 was chosen based on the assumption that vaccine uptake will be similar to uptake in previous vaccine seasons. During the 2022-2023 and 2023-2024 COVID-19 seasons, the end of March reflected the time when uptake of the COVID-19 vaccine was no longer increasing (ie, most individuals who received the COVID-19 vaccine had done so prior to March) (CDC, 2024b), and COVID-19 cases declined substantially from their fall/winter peak (CDC, 2024a).

Trends in COVID-19 vaccine uptake will be monitored until 30 June 2025 using the Centers for Disease Control and Prevention's (CDC) Weekly COVID-19 Vaccination Dashboard (CDC, 2024b), which publishes estimates of the proportions of children aged 6 months through 17 years and adults 18 years and older who have received a COVID-19 vaccine each week during the 2024-2025 season. If in the final week of reported data for June 2025 these estimates show vaccine uptake in either children or adults that is 1% or greater than the respective estimates reported for the first week of April 2025 (ie, an increasing trend in COVID-19 vaccine uptake from the first week of April 2025 to the last week of June 2025), then the Sponsor may extend the end date of the accrual period into September 2025, and the updated source population will be reflected in the final study report. This date reflects the latest accrual date that still allows for meeting of the current study milestones. This revision, if needed, will be communicated to the FDA as a protocol amendment.

Each study design will have its own inclusion and exclusion criteria, as listed below.

9.2.1. SCRI

9.2.1.1. Inclusion Criteria

Patients must meet all of the following criteria to be eligible for inclusion in Phase 1 of the study:

1. Receive at least one dose of the COMIRNATY 2024-2025 Formula from the date of the COMIRNATY 2024-2025 product launch through 31 March 2025.
2. Age \geq 6 months when receiving their first recorded dose of the COMIRNATY 2024-2025 Formula.



3. Have continuous medical and pharmacy insurance coverage in the 365 days prior to their vaccination date (as defined in [Section 9.2.3](#)), or since birth if the vaccination occurred at < 1 year of age.
4. Experience a safety outcome of interest during a risk interval or control period (on or after vaccination, as defined in [Section 9.3.2](#)).
5. Do not experience the safety outcome of interest during the clean period (prior to vaccination, as defined in [Section 9.3.2](#)).

9.2.1.2. Exclusion Criteria

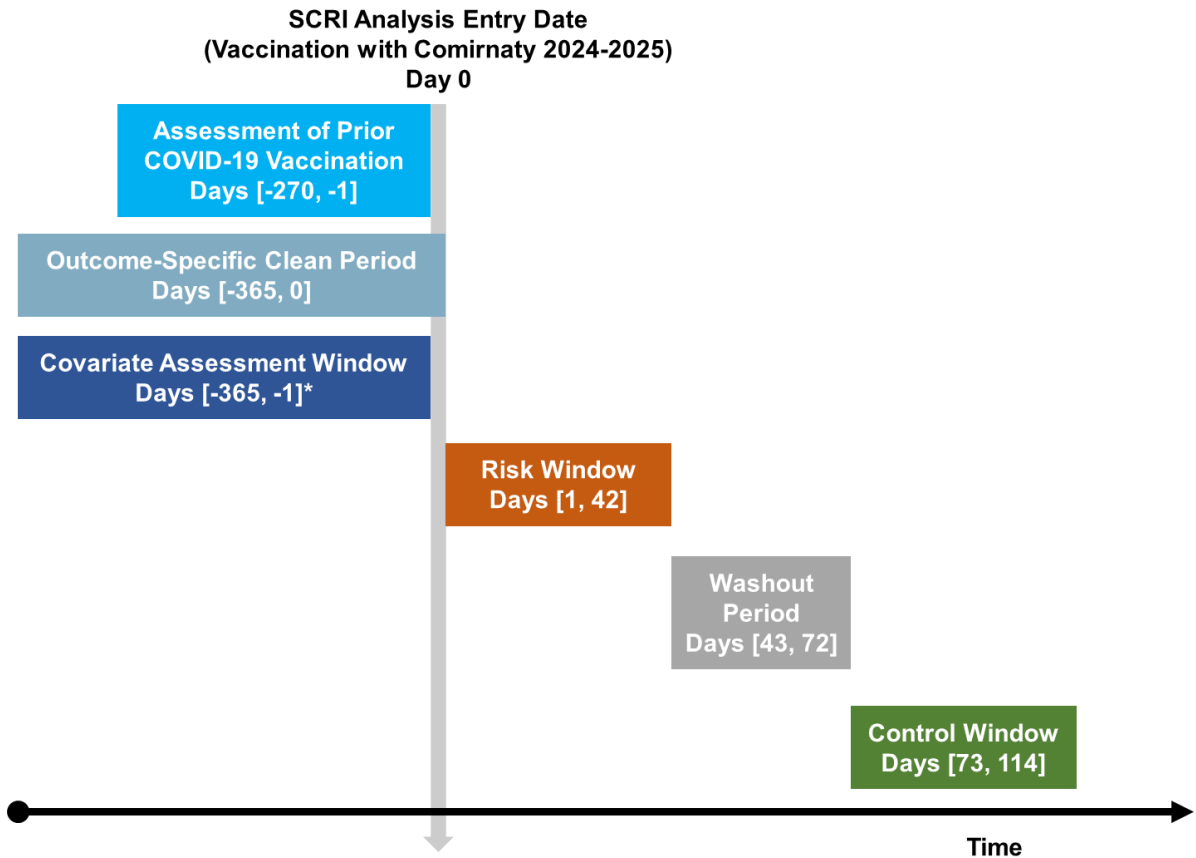
Patients meeting any of the following criteria will not be included in Phase 1 of the study:

1. Are of unknown sex.
2. Have a missing month and year of birth.
3. Have received any COVID-19 vaccine in the 270 days prior to the vaccination date (as defined in [Section 9.2.3](#)).
4. Have received a COVID-19 vaccine other than the COMIRNATY 2024-2025 Formula on the same vaccination date (defined in [Section 9.2.3](#)).

[Figure 2](#) depicts the SCRI study design using the outcome of Guillain-Barré syndrome, using the clean periods and risk intervals as shown in [Table 2](#), as an example.



Figure 2. Self-controlled risk interval design for the outcome of Guillain-Barré syndrome



*Prior COVID-19 vaccination will be identified using all available data.

9.2.2. Cohort Study

9.2.2.1. Inclusion Criteria

Patients must meet all of the following criteria to be eligible for inclusion in Phase 2 of the study:

1. Age \geq 6 months on the day of receiving their first recorded dose of the COMIRNATY 2024-2025 Formula (if a vaccine recipient), or on the day they experience an outpatient healthcare encounter (if a comparator), defined as the cohort entry date (Section 9.2.3).
2. Have continuous medical and pharmacy insurance coverage in the 365 days prior to the cohort entry date, or since birth if the cohort entry date occurred at $<$ 1 year of age.

090177e1a617ace1\Approved\Approved On: 18-May-2026 22:07 (GMT)



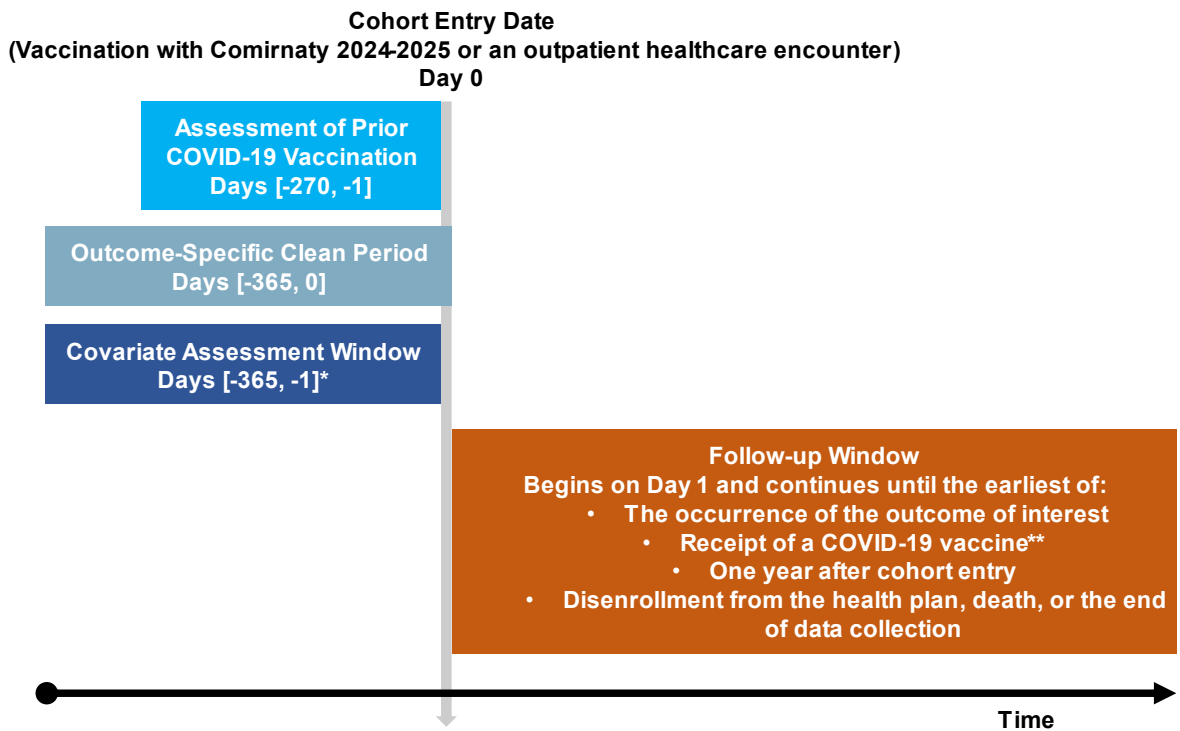
9.2.2.2. Exclusion Criteria

Patients meeting any of the following criteria will not be included in Phase 2 of the study:

1. Are of unknown sex.
2. Have a missing month and year of birth.
3. Have received any COVID-19 vaccine in the 270 days prior to cohort entry date (as defined in Section 9.2.3).
4. Have received both the COMIRNATY 2024-2025 Formula and a COVID-19 vaccine other than the COMIRNATY 2024-2025 Formula on the cohort entry date (defined in Section 9.2.3).

In both phases of the study, when creating the analytic population for each specific safety outcome of interest, individuals will be excluded if they experienced that safety outcome during the portion of the baseline period designated as the clean period (Section 9.2.4). Figure 3 depicts the cohort study design using the outcome of Guillain-Barré syndrome, using the clean periods as shown in Table 2, as an example.

Figure 3. Cohort study design for the outcome of Guillain-Barré syndrome



*Prior COVID-19 vaccination will be identified using all available data.

**For COMIRNATY 2024-2025 Formula recipients, follow-up will end upon receipt of a COVID-19 vaccine other than the COMIRNATY 2024-2025 Formula. For comparators whose qualifying healthcare encounter is



for a non-COMIRNATY 2024-2025 Formula COVID-19 vaccination, follow-up will end upon receipt of a different brand of COVID-19 vaccine from cohort entry; receipt of the COMIRNATY 2024-2025 Formula will censor follow-up in the comparator cohort and the patient may then be eligible for inclusion in the exposed cohort. Among individuals meeting inclusion criteria due to receipt of a COVID-19 vaccine and later receive a second COVID-19 vaccine of the same brand more than 8 weeks following their first dose, follow-up will end upon receipt of the second vaccination.

9.2.3. Vaccination Date and Cohort Entry Date

In the Phase 1 SCRI analysis, the date of first vaccination with the COMIRNATY 2024-2025 Formula will be set as the vaccination date. For the analysis assessing individuals who receive more than one dose of the COMIRNATY 2024-2025 Formula, each vaccination with the COMIRNATY 2024-2025 Formula will be set as a new vaccination date.

In the Phase 2 cohort analysis, the cohort entry date will be the date individuals in the COMIRNATY group receive their first recorded dose of the COMIRNATY 2024-2025 Formula. For individuals in the comparator cohort, the cohort entry date will be set as the date of first qualifying healthcare encounter. PS-matched comparators will also be matched on age group and calendar time. Regarding age, matching will be performed between patients within age groups (eg, 6 months–4 years, 5–11 years, 12–17 years, 18–64 years, and ≥ 65 years). Regarding calendar time, patients will be matched within 14-day windows (eg, 01 September 2024 to 14 September 2024, 15 September 2024 to 28 September 2024) in which individuals in the exposed cohort will have received vaccination with the COMIRNATY 2024-2025 Formula and individuals in the unexposed cohort will have had an outpatient healthcare encounter but no recorded vaccination with the COMIRNATY 2024-2025 Formula. Alternate calendar periods (eg, one month) may be empirically explored.

For matched comparators, the cohort entry date will be the date within the matched 14-day calendar period on which they had an outpatient healthcare encounter.

9.2.4. Baseline Period

The baseline period will consist of all continuously enrolled available time up to one year (365 days) prior to the vaccination date (SCRI) or cohort entry date (cohort study), except for assessment of prior COVID-19 vaccination, which will use all available data. Recognizing that narrower or specific windows of assessment may better capture select patient attributes of interest, specific covariates may be assessed using alternate time period(s). In this study, all individuals are required to have a minimum of 365 days of continuous health plan enrollment prior to the vaccination or cohort entry date ([Sections 9.2.1.1](#) and [9.2.2.1](#)), or continuous enrollment since birth if the vaccination or cohort entry date occurred at < 1 year of age.



In both study designs, some or all of the baseline period will be used to exclude individuals with prevalent outcomes prior to vaccination or cohort entry date. This portion of the baseline period will be referred to as the ‘clean period.’ For a list of outcome-specific clean periods, please see [Section 9.3.2](#).

9.2.5. Follow-Up Period

9.2.5.1. SCRI

In the SCRI analysis, follow-up for the risk period will begin upon (for the outcomes of ADEM, anaphylaxis, and convulsions/seizures) or one day after (for all other outcomes) receipt of the COMIRNATY 2024-2025 Formula ([Table 2](#)) and continue until the earliest of:

- Receipt of a COVID-19 vaccine other than the COMIRNATY 2024-2025 Formula;
- The end of the outcome-specific risk interval as defined in [Section 9.3.2](#);
- Disenrollment from the health plan, death, or the end of data collection.

After the outcome-specific pre-specified washout period following the risk interval, follow-up for the control period will begin and continue until the earliest of:

- Receipt of a COVID-19 vaccine other than the COMIRNATY 2024-2025 Formula;
- The end of the control period as defined in [Section 9.3.2](#);
- Disenrollment from the health plan, death, or the end of data collection.

Individuals will be followed for each safety outcome during both the risk and control periods, such that events observed during the risk period or washout period will not censor follow-up for the control period.

9.2.5.2. Cohort Study

In the cohort study (Phase 2), depending on the safety outcome of interest, follow-up will begin on cohort entry or the day following cohort entry ([Table 2](#)) and extend until the earliest of:

- The occurrence of an outcome of interest ([Section 9.3.2](#));
- For COMIRNATY 2024-2025 Formula recipients, receipt of a COVID-19 vaccine other than the COMIRNATY 2024-2025 Formula; for comparators whose qualifying healthcare encounter is for a non-COMIRNATY 2024-2025 Formula COVID-19 vaccination, receipt of a different brand of COVID-19 vaccine from cohort entry;



- Among individuals meeting inclusion criteria due to receipt of a COVID-19 vaccine and later receive a second COVID-19 vaccine of the same brand more than 8 weeks following their first dose, the date of second vaccination;
- One year after cohort entry;
- Disenrollment from the health plan, death, or the end of data collection;

Those comparators who later receive a dose of COMIRNATY 2024-2025 Formula may be eligible for inclusion in the COMIRNATY 2024-2025 Formula cohort if they meet the eligibility criteria for cohort entry.

9.3. Variables

9.3.1. Exposures

9.3.1.1. COMIRNATY 2024-2025 Formula

The SCRI analysis and the cohort analysis will include individuals with exposure to the COMIRNATY 2024-2025 Formula. The code list to define exposure is available in [Annex 2 \(Appendix I\)](#).

9.3.1.2. Comparator Cohort

A comparator cohort will be created for the cohort study; the SCRI analysis does not require a comparator cohort because vaccinated patients will serve as their own controls. The Phase 2 cohort study will include comparators with no recorded vaccination for the COMIRNATY 2024-2025 Formula. To improve comparability with the COMIRNATY 2024-2025 Formula vaccinated cohort, patients included in the comparator cohort will be required to have a code indicative of an outpatient healthcare encounter, including one of the following:

- Presence of a code for a non-COVID-19 vaccine;
- Presence of a code for a COVID-19 vaccine other than the COMIRNATY 2024-2025 Formula;
- Presence of a code indicative of an outpatient physician visit.

A secondary analysis will stratify results according to the type of comparator outpatient healthcare encounter as follows:

- Comparators who, on cohort entry, received a 2024-2025 formulation of a COVID-19 vaccine other than COMIRNATY (ie, Moderna or Novavax);
- Comparators who received a non-COVID-19 vaccine on cohort entry;



- Comparators who did not receive a vaccine on cohort entry but had an outpatient physician encounter.

Codes relating to other vaccines or outpatient visits are provided in [Annex 2 \(Appendix II\)](#).

9.3.2. Outcomes

In both the SCRI and cohort studies, the pre-specified safety outcomes of interest will include the following:

- ADEM
- TM
- Encephalitis/myelitis/encephalomyelitis (not ADEM or TM)
- Anaphylaxis
- Bell's palsy
- CVST
- Convulsions/seizures (non-febrile)
- Glomerulonephritis
- Guillain-Barré syndrome
- Herpes zoster
- Immune-mediated myositis
- Immune thrombocytopenia
- Kawasaki disease
- Multi inflammatory syndrome (in children and adults)
- MS
- MI
- Myocarditis/pericarditis
- PE
- Stroke, hemorrhagic
- Stroke, ischemic



In addition, in Phase 2 of the study, the following pregnancy outcomes will be assessed in pregnant women or their infants, if sample size permits:

- Major congenital malformations
- Preterm birth
- SGA
- Spontaneous abortion
- Stillbirth

Code lists for the safety outcomes of interest are provided in [Annex 2 \(Appendix III\)](#). Corresponding site of care requirements are listed in [Table 2](#). When possible, outcomes will be defined using a validated claims-based algorithm with high performance ([CBER, 2021](#)).

If a safety signal is detected in the interim report, then medical records will be retrieved for a subset of participants to confirm the presence of that study outcome. A safety signal that requires confirmation through medical record review will be defined as a rate ratio of > 3.0 and a corresponding P value of < 0.01 in the primary analysis of the SCRI design (details in [Section 9.7.1.1](#)). Additionally, medical record review may be conducted for analyses beyond the primary SCRI analysis if a safety signal (defined as a rate ratio of > 3.0 and a corresponding P value of < 0.01) is detected in the interim or final report. Medical records may also be retrieved for AESIs with estimates approaching the pre-specified safety signal threshold.



Table 2. Clean periods and risk intervals for safety outcomes of interest

Outcome	Clean Period*	Vaccine Risk Interval*	Care Setting
ADEM	Days -365 to -1	Days 0 to 21	IP
TM	Days -365 to 0	Days 1 to 42	IP, ED
Encephalitis/myelitis/encephalomyelitis (not ADEM or TM)	Days -365 to 0	Days 1 to 42	IP
Anaphylaxis	Days -365 to -1	Days 0 to 1	IP, ED
Bell's palsy	Days -365 to 0	Days 1 to 42	IP, OP
CVST	Days -365 to 0	Days 1 to 28	IP, OP
Convulsions/seizures, non-febrile	Days -365 to -1	Days 0 to 21	IP, OP
Glomerulonephritis	Days -365 to 0**	Days 1 to 42**	IP, OP
Guillain-Barré syndrome	Days -365 to 0	Days 1 to 42	IP-primary position only
Herpes zoster	Days -365 to 0	Days 1 to 30	IP, OP
Immune-mediated myositis	Days -365 to 0**	Days 1 to 28	IP, OP
Immune thrombocytopenia	Days -365 to 0	Days 1 to 42	IP, OP
Kawasaki disease	Days -365 to 0	Days 1 to 21	IP, OP
Multi inflammatory syndrome	Days -365 to 0	Days 1 to 42	IP, ED
MS	Days -365 to 0	Days 1 to 42**	IP, OP
MI	Days -365 to 0	Days 1 to 28	IP
Myocarditis/pericarditis	Days -365 to 0	Days 1 to 21	IP, OP
PE	Days -365 to 0	Days 1 to 28	IP, OP
Stroke, hemorrhagic	Days -365 to 0	Days 1 to 28	IP
Stroke, ischemic	Days -365 to 0	Days 1 to 28	IP

*Expressed in relation to the day of vaccination or cohort entry (Day 0). When more than one vaccine risk interval had been cited in the prior literature, the present risk interval was chosen from the literature using the following order of priority for all outcomes other than myocarditis/pericarditis: 1) [CBER 2021](#); 2) the most frequently cited risk interval in prior literature; and 3) the shortest risk interval cited in prior literature. The risk interval for myocarditis/pericarditis was chosen based on [CBER 2022](#).

**Could not be determined from the literature, so modeled after other outcome intervals in [CBER 2021](#). ADEM, acute disseminated encephalomyelitis; CVST, cerebral venous sinus thrombosis; ED, Emergency department visit; IP, Inpatient; MI, myocardial infarction; MS, multiple sclerosis; OP, Outpatient facility claims and professional/provider claims; PE, pulmonary embolism; TM, transverse myelitis.

9.3.2.1. Outcome-Specific Risk and Control Periods

The SCRI design ([Section 9.1.1](#)) requires that clean periods, risk intervals, washout periods, and control intervals be specified for every study outcome. The lengths of the clean periods and risk intervals are listed in Table 2. The washout period for all outcomes will begin immediately after the end of the risk interval and continue for 30 days ([Akpan et al., 2022](#)); the control period will follow the washout period and be equivalent in length to the risk interval. Interval lengths were determined based on prior vaccine literature, including COVID-19 vaccine studies conducted as part of the FDA's Center for

090177e1a617ace1\Approved\Approved On: 18-May-2026 22:07 (GMT)



Biologics Evaluation and Research (CBER) Biologics Effectiveness and Safety (BEST) System (Akpanak et al., 2022; Barda et al., 2021; CBER, 2021; Joy et al., 2023; Klein et al., 2021; Liu et al., 2023; Martin et al., 2021; McCarthy et al., 2013; Wack et al., 2021).

9.3.3. Covariates

All individuals included in the SCRI and cohort analyses will be described according to covariates identified in the claims data. Demographic attributes will be determined on the vaccination/cohort entry date and prior COVID-19 vaccination will be assessed using all available data, while other factors will be assessed in the one year (365 days) prior to the cohort entry date. Unless specified as being for descriptive purposes only, the covariates listed will be included in the PS models. All variables are binary unless otherwise specified.

Demographic Attributes

- Sex
- Age (categorical); for the purposes of matching the exposed and unexposed cohorts in Phase 2, we will use the following age groups: 6 months–4 years, 5–11 years, 12–17 years, 18–64 years, and ≥ 65 years
- Calendar month of the vaccination date or cohort entry date (categorical)
- Geographic region (categorical)

Comorbidities

- Asthma
- Non-malignant blood disorders, including sickle cell disease
- Chronic lung disease, including chronic obstructive pulmonary disease (COPD)
- Down syndrome
- Heart disease
- History of SARS-CoV-2 infection
- Immunocompromised status (ie, history of human immunodeficiency virus [HIV]; organ, bone marrow or stem cell transplant; use of immunosuppressant medication)
- Kidney disorders, including chronic kidney disease
- Liver disorders
- Neurological or neurodevelopmental conditions
- Malignant neoplasms
- Obesity
- Type 2 diabetes



Prior COVID-19 Vaccination

- Receipt of COVID-19 vaccine doses (any brand) prior to 2024-2025
 - Because COVID-19 vaccination in the 270 days prior to cohort entry is an exclusion criterion ([Section 9.2.2.2](#)), this variable will capture COVID-19 vaccinations from all available data through 271 days prior to cohort entry.
- Days from the most recent prior COVID-19 vaccine dose (any brand) to first vaccination with 2024-2025 formulations (for all Phase 1 individuals, as well as for Phase 2 individuals receiving COMIRNATY or another 2024-2025 formulation) (continuous)

Healthcare Utilization

- Number of hospitalizations in prior year (continuous)
- Number of emergency room visits in prior year (continuous)
- Number of outpatient encounters in prior year (continuous)
- Number of non-COVID-19 vaccinations in the prior year (eg, seasonal influenza, respiratory syncytial virus [RSV]) (continuous)

Medication and Vaccination History

- Systemic immunomodulators
- Oral Corticosteroids
- Antivirals
- Antibiotics
- Recorded vaccinations administered in prior year
 - Seasonal influenza
 - RSV
 - Any other non-COVID-19 vaccine (besides seasonal influenza and RSV)
- Non-COVID-19 vaccinations received on day of cohort entry
 - Seasonal influenza
 - RSV

In addition to the covariates listed above, baseline attributes will be identified on an empiric basis by examining the 25 most frequently occurring diagnoses, drugs dispensed, and procedures (including other baseline vaccinations, as captured through NDC and CPT codes) performed among individuals with and without COMIRNATY 2024-2025 Formula exposure. These empiric covariates will be considered for inclusion in the PS models if they are potential confounders.

Current COVID-19 Vaccination – Descriptive only (not for inclusion in PS model)

- Site of vaccination (eg, outpatient, pharmacy)
- Source of vaccination information (eg, CPT code, NDC)
- Average number of days between doses of COMIRNATY 2024-2025 Formula, among those with multiple doses



Code lists for covariates are included in [Appendix IV](#).

9.4. Data Sources

The patients included in this study will be drawn from the Optum pre-adjudicated claims database for the interim reporting to expedite the identification of vaccinated patients, and from the ORD for the final reporting. These data sources are described below.

9.4.1. Optum Pre-Adjudicated Claims Database

The database includes pre-adjudicated medical claims, supplemented with adjudicated pharmacy claims and health plan enrollment information. As claims for pharmacy services are typically submitted electronically by the pharmacy at the time prescriptions are filled or vaccinations are administered and are updated in the underlying database on a weekly basis, they are not included in the pre-adjudicated feed. The pre-adjudicated medical claims encompass hospital and physician claims that are submitted and processed daily from a large US commercial health plan. The individuals included in the pre-adjudicated medical claims database are fully insured by the health plan, which provides reimbursement of medical and pharmacy services regardless of site of care, and individuals are geographically diverse within the US. The claims adjudication process involves numerous assessments and adjustments and may result in claims being returned to the provider for revision or sent for payment processing. The pre-adjudicated claims are maintained in a database that allows for the capture of up to three years of prior data. These pre-adjudicated claims have been used for research previously, and for federally funded public health surveillance ([Dore et al., 2012](#); [FDA, 2021b](#); [Moll et al., 2023](#); [Schneider et al., 2023](#)).

The data include demographics, details from pharmacy claims (reflecting dispensings), and all pre-adjudicated medical and facility claims, including information on the types of services or procedures and their accompanying diagnoses. The coding of medical claims conforms to insurance industry standards, including:

- Use of designated claims forms (eg, physicians use the Centers for Medicare and Medicaid Services [CMS]-1500 format and hospitals use the UB-04 format)
- International Classification of Diseases, 10th Revision, Clinical Modification (ICD-10-CM) diagnosis codes
- International Classification of Diseases, 10th Revision, Procedure Coding System (ICD-10-PCS)
- CPT-4® codes
- CMS Healthcare Common Procedure Coding System (HCPCS) codes



Claims for pharmacy services are typically submitted electronically by the pharmacy at the time prescriptions are filled. These data allow for longitudinal tracking of medication refill patterns and changes in medications and include:

- NDC
- Drug name
- Dosage form
- Drug strength
- Fill date
- Days of supply
- Cost information
- De-identified patient and prescriber codes

9.4.2. Optum Research Database

The ORD is a proprietary research database containing eligibility and adjudicated pharmacy and medical claims data from a large US health plan affiliated with Optum. The individuals covered by this health plan are geographically diverse across the US. As early as 1993, medical and pharmacy claims data are available for 70 million individuals with both medical and pharmacy benefit coverage. In 2022, data were available for approximately 12 million individuals with medical and pharmacy coverage. Optum research activities use de-identified data from the research database. In limited instances, patient identifiers may be accessed where applicable law allows the use of patient-identifiable data, and when the study obtains appropriate approvals for accessing data that are not de-identified.

9.5. Study Size

The sample size achieved will depend on the number of recipients of the COMIRNATY 2024-2025 Formula in the databases. All individuals who meet the study's eligibility criteria during the study period will be included.

9.6. Data Management

All analyses will be conducted using Statistical Analysis System (SAS) version 9.4 (SAS Institute Inc., Cary, North Carolina) and SAS Enterprise Guide 6.1 or later. The data will be extracted once per report. All reports will utilize the structured data only. The interim report will include summarized results from the Optum pre-adjudicated claims database described in [Section 9.4.1](#). The final report will include results summarized from the ORD as described in [Section 9.4.2](#). The characteristics of patients to be included in each data extract (eg, required vaccine codes) and the specific timeframes of each data extract will reflect the study inclusion/exclusion criteria described in [Section 9.2](#), the baseline and follow-up periods in [Sections 9.2.4](#) and [9.2.5](#), and the study variables in [Section 9.3](#). All reports and deliverables will contain aggregated results only and will not identify individual patients, physicians, or facilities.



9.7. Data Analysis

9.7.1. SCRI

9.7.1.1. Primary Analysis

Descriptive statistics will be used to summarize the baseline characteristics (see [Section 9.3.3](#)) of those who receive the COMIRNATY 2024-2025 Formula. Counts of each safety outcome of interest will be reported within pre-specified risk and control windows. The observed incidence rates of the pre-specified AESIs will be estimated in the risk window and the control window. Among the individuals who experience an outcome of interest in either the risk or control window (but not both), an exact conditional Poisson regression model with the natural logarithm of the person-time as the offset will be used to calculate the relative incidence (rate ratio) and corresponding 95% confidence interval (CI) of events occurring during the risk period relative to the control period. With the self-controlled design, whereby each individual serves as their own comparator, this unadjusted analysis accounts for the factors that vary across but not within individuals (ie, time-invariant covariates).

Among individuals receiving seasonal influenza vaccine in the 2024-2025 season (01 August 2024 – 31 March 2025), the following subgroup analysis will be presented: 1) receipt of seasonal influenza vaccination from 30 days prior to COVID-19 vaccination through the day before COVID-19 vaccination, and 2) receipt of seasonal influenza vaccination on the same day as COVID-19 vaccination. Additionally, a subgroup analysis will be conducted among children age < 18 years for the AESIs with at least 5 pediatric events in either the risk or control window.

The results from the SCRI utilizing the Optum pre-adjudicated claims database will be presented in the interim report, while results from the SCRI utilizing the ORD will be presented in the final report.

9.7.2. Cohort Study

9.7.2.1. Propensity Score Modeling and Matching

The COMIRNATY 2024-2025 Formula-exposed and the unexposed comparator cohorts will be created as described in [Section 9.2.3](#). Each cohort member will be described with respect to baseline covariates as described in [Section 9.3.3](#). These cohort members will be included in the PS modeling and matching.

This study will use a single PS model that encompasses risk factors for multiple outcomes, an approach demonstrated in other studies conducted to fulfill post-licensure regulatory commitments and requirements to the FDA and other regulatory agencies ([Seeger et al., 2023](#); [Ziyadeh et al., 2020](#)). While not all risk factors may be associated with all outcomes to the same degree, adjusting for covariates that are weakly or not at all associated with a given outcome is expected to result in negligible bias if residual



confounding is small (Brookhart et al., 2006; Myers et al., 2011). Incorporating a wide array of outcome predictors (Section 9.3.3) into the PS is expected to minimize residual confounding, producing groups with similar patterns of both measured and unmeasured factors (Guertin et al., 2016).

The PS model will consist of a logistic regression model that incorporates the pre-specified demographic and comorbidity covariates, prior COVID-19 vaccination, healthcare utilization, medication and vaccination history, and calendar month of vaccination or cohort entry as independent variables (see Section 9.3.3), and an indicator for receipt of the COMIRNATY 2024-2025 Formula as the dependent variable. Two-way interactions of all variables with calendar month of vaccination or cohort entry, or empirically defined variables that are potential confounders, may also be considered for inclusion in the following model:

$$\begin{aligned} & \text{logit}\{P(T_i = 1 | \mathbf{X}_i)\} \\ &= \beta_0 + \beta_1 \text{Sex (binary)}_i + \beta_2 \text{Age (categorical)}_i \\ &+ \beta_3 \text{Calendar month (categorical)}_i + \beta_4 \text{Geographic region (categorical)}_i \\ &+ \beta_5 \text{Asthma (binary)}_i + \beta_6 \text{Non-malignant blood disorders (binary)}_i \\ &+ \beta_7 \text{Chronic lung disease (binary)}_i + \beta_8 \text{Down syndrome (binary)}_i \\ &+ \beta_9 \text{Heart disease (binary)}_i \\ &+ \beta_{10} \text{History of SARS-CoV-2 infection (binary)}_i \\ &+ \beta_{11} \text{Immunocompromised status (binary)}_i \\ &+ \beta_{12} \text{Kidney disorders (binary)}_i + \beta_{13} \text{Liver disorders (binary)}_i \\ &+ \beta_{14} \text{Neurological or neurodevelopmental conditions (binary)}_i \\ &+ \beta_{15} \text{Malignant neoplasms (binary)}_i + \beta_{16} \text{Obesity (binary)}_i \\ &+ \beta_{17} \text{Type II diabetes (binary)}_i \\ &+ \beta_{18} \text{Prior COVID-19 vaccination (binary)}_i \\ &+ \beta_{19} \text{Days from prior COVID-19 vaccination (continuous)}_i \\ &+ \beta_{20} \text{Number of hospitalizations in prior year (continuous)}_i \\ &+ \beta_{21} \text{Number of emergency room visits in prior year (continuous)}_i \\ &+ \beta_{22} \text{Number of outpatient encounters in prior year (continuous)}_i \\ &+ \beta_{23} \text{Number of non-COVID-19 vaccinations in prior year (continuous)}_i \\ &+ \beta_{24} \text{Systemic immunomodulators (binary)}_i \\ &+ \beta_{25} \text{Oral corticosteroids (binary)}_i + \beta_{26} \text{Antivirals (binary)}_i \\ &+ \beta_{27} \text{Antibiotics (binary)}_i + \beta_{28} \text{Seasonal influenza vaccination (binary)}_i \\ &+ \beta_{29} \text{RSV vaccination (binary)}_i \\ &+ \beta_{30} \text{Other non-COVID-19 vaccinations (binary)}_i \\ &+ \beta_{31} \text{Identified empiric variables (binary)}_i, \end{aligned}$$



where T_i denotes exposure status for individual i , with $T_i = 1$ indicating a recorded vaccination of the COMIRNATY 2024-2025 Formula and $T_i = 0$ indicating no recorded vaccination of the COMIRNATY 2024-2025 Formula.

A greedy digit-based matching algorithm will be used, in which patients exposed to the COMIRNATY 2024-2025 Formula are matched without replacement to comparator patients at a given level of precision defined by the number of digits of the PS (Parsons, 2001), to a maximum of 8 decimal places. When no further matches are available at a given level of precision, the number of digits is sequentially reduced until a maximum allowable caliper of 0.1 is reached, thereby ensuring that the matched cohorts are comparable with respect to the underlying measured risk factors. Matching by PS will be conducted within strata defined by age group and calendar period. A matching ratio (eg, up to 1:10) may be implemented.

PS matching will produce a single matched cohort (the master cohort) that will be used to conduct all primary, secondary, and subgroup analyses for the study outcomes. Balance between the PS-matched cohorts will be evaluated by overlaying graphs of the PS distributions in COMIRNATY-exposed and comparator cohorts before and after PS matching. Additionally, standardized differences between the PS-matched cohorts for each covariate in the model will also be assessed. Variables with an absolute standardized difference less than 0.1 will be considered balanced (Austin, 2009). If a variable has a standardized difference that is greater than 0.1, further PS model modifications (eg, addition of interaction terms) or inclusion of the imbalanced covariates in an outcome model will be considered (Normand et al., 2001). If there are confounders identified that would only be appropriate to include for one outcome and not the others, a separate PS model for the specific outcome will be considered.

Outcome-specific exclusion criteria will be applied to the master cohort after PS matching but before the outcome specific analysis; the matched cohort that remains will be the analytic cohort for that specific outcome. The matched comparators of COMIRNATY 2024-2025 Formula-exposed individuals who are excluded due to outcome-specific exclusion criteria will also be excluded from the outcome-specific analysis, such that only PS-matched sets will be included in the analysis.

9.7.2.2. Primary Analysis

Once the matched cohorts have been created, the incidence rate of each safety outcome will be estimated among the COMIRNATY 2024-2025 Formula-exposed group and its matched comparator group. The rate ratio will be estimated using unconditional Poisson regression that accounts for both the matching ratio (ie, a weight representing the number of COMIRNATY 2024-2025 recipients divided by the number of comparators in each individual strata) and individuals who are included in both study cohorts (ie, using a REPEATED statement with an independent working correlation structure). If standardized



differences show covariate imbalances in the matched cohorts, imbalanced covariates may be included in the unconditional Poisson models.

9.7.2.3. Secondary Analysis

The main analysis will compare the occurrence of safety outcomes in the COMIRNATY 2024-2025 Formula-exposed group to that of the matched comparator group. Secondary analyses will conduct this comparison separately, including recalculation of the matching ratio and accounting for individuals who are included in both study cohorts for various subsets of the matched comparator group, including:

- Comparators who, on cohort entry, received a 2024-2025 formulation of a COVID-19 vaccine other than COMIRNATY (ie, Moderna or Novavax);
- Comparators who received a non-COVID-19 vaccine on cohort entry;
- Comparators who did not receive a vaccine on cohort entry but had an outpatient physician encounter.

9.7.2.4. Subgroup Analysis

If sample size permits, the main analysis will be restricted to the following subgroups:

- Individuals with concomitant administration of a non-COVID-19 vaccine (eg, seasonal influenza, RSV) on cohort entry date; specific analyses will be performed among individuals receiving seasonal influenza vaccine and those receiving RSV vaccine
- Immunocompromised individuals ([Section 17.4.1.7](#))
- Individuals with specific baseline comorbidities, such as a chronic lung, heart, kidney or liver condition; cancer; Down syndrome or other neurological or neurodevelopmental disorders; and blood disorders ([Section 17.4.1](#))
- Individuals with prior SARS-CoV-2 infection
- Individuals with prior COVID-19 vaccination
- Pregnant individuals
- Individuals aged 6 months to 4 years
- Individuals aged < 18 years
- Individuals aged ≥ 65 years

For the subgroup analysis, the PS will be included in the model as a covariate, given that some matched strata may be broken by restricting both the COMIRNATY 2024-2025 Formula cohort and the comparator cohort by the above attributes. As with the primary analysis, unconditional Poisson regression will be used, and the model will account for individuals who are included in both groups.



Lastly, a descriptive analysis of the matched cohorts will focus specifically on outcomes related to pregnancy (spontaneous abortion, stillbirth, preterm birth, major congenital malformations and SGA). Recipients of the COMIRNATY 2024-2025 Formula and comparators who are pregnant at cohort entry will be identified, and the timing of their vaccination in relation to their last menstrual period (LMP) will be characterized. Baseline characteristics will be described among the pregnant COMIRNATY 2024-2025 Formula recipients and comparators. Among COMIRNATY 2024-2025 Formula recipients who are pregnant at cohort entry, as well as among pregnant comparators, the incidence of pregnancy outcomes (spontaneous abortion, stillbirth, preterm birth) during follow-up will be described. For those individuals whose pregnancy results in a live birth, the prevalence of major congenital malformations and SGA in their infants will be descriptively reported. Prevalence estimates will be reported separately for infants whose mothers received the COMIRNATY 2024-2025 Formula when pregnant and infants whose mothers do not have a recorded vaccination of COMIRNATY 2024-2025. Due to the relatively short length of follow-up, comparative analyses relating to pregnancy and infant outcomes will not be performed.

All results from Phase 2 analyses will be presented in the Final Report.

9.8. Quality Control

For the final reporting, this study will use ORD data derived from claims submitted for payment. Although the health insurance claims data represent financial transactions and are not research records, the financial transactions related to the services provided create financial incentives to record them correctly and fully, so the billable medical services represented in the database are likely to be complete. The validity of this claims research database for epidemiologic research (as compared with data abstracted from medical records) has been widely published ([Dore et al., 2011](#); [Eng et al., 2012](#); [Laughlin, 2011](#); [Quam et al., 1993](#)).

The study will be carried out according to Optum Epidemiology's internal standard operating procedures (SOPs) that are consistent with the Guidelines for Good Pharmacoepidemiology Practices (GPP) published by the European Medicines Agency (EMA) and International Society for Pharmacoepidemiology ([European Medicines Agency, 2017](#); [Public Policy Committee, International Society of Pharmacoepidemiology, 2016](#)) as well as the FDA's Best Practices for Conducting and Reporting Pharmacoepidemiologic Safety Studies Using Electronic Healthcare Data ([FDA, 2013](#)).

Programming for this project will be conducted by a primary analyst and reviewed by a separate analyst (validation analyst). Validation of all statistical programs and results consists of a combination of visual checks (ie, examination of the programming log, visual printouts before and after data management steps, etc.) and computational checks (ie, repeating calculations for comparison purposes) performed by a validation analyst. In addition, an epidemiologist and a senior scientist will perform a substantive review of all study



deliverables. All validation and quality control procedures are conducted in accordance with Optum SOPs, which prescribe that processes and deliverables are documented, reviewed, and validated in sufficient detail to allow for subsequent re-examination or replication.

9.9. Limitations of the Research Methods

The proposed project is based on analysis of automated medical and prescription claims, including pre-adjudicated (interim reporting) and fully adjudicated claims (final reporting).

For the interim report, the SCRI analysis will be based on automated and prospectively collected pre-adjudicated medical and adjudicated prescription claims. A strength of pre-adjudicated medical claims is the shorter lag time between the receipt of care and the appearance of the claim, while the accompanying limitation is that these pre-adjudicated claims may be subject to revision during the adjudication process. A limitation of the SCRI design may be its limited ability to assess chronic outcomes such as MS. Thus, the cohort analysis will be used as the primary analysis for chronic outcomes.

While adjudicated claims data are extremely valuable for the efficient and effective examination of healthcare outcomes, treatment patterns, healthcare resource utilization, and costs, all claims databases have certain inherent limitations because the claims are collected for the purpose of payment, not research. The presence of a diagnosis code on a medical claim is not confirmation of disease, as the diagnosis code may be incorrectly coded or included as rule-out criteria rather than actual disease.

Another limitation of claims data relates to potential misclassification of exposure covariates. For instance, vaccines that are administered as part of a government program or an office-based or school-based vaccination clinic may not be captured in the study database if insurance information was not provided during the vaccine encounter. This potential exposure misclassification is minimized in the self-controlled design in Phase 1; misclassification of exposure in Phase 2 would be expected to bias the results towards the null (CDC, 2023d). Furthermore, the presence of a claim for a filled prescription does not indicate that the medication was consumed or that it was taken as prescribed. Medications paid for out-of-pocket, as well as those not dispensed through a pharmacy, will not be observed in the claims data. Similarly, we may not have complete history of comorbidity or treatment for individuals who choose to switch in health plan insurer or who choose not to seek medical care for their condition. For example, milder SARS-CoV-2 infections that do not lead to a healthcare encounter may not be captured.

The study power may be limited by the short duration of accrual and a limited follow-up period, particularly during Phase 1. Because the COMIRNATY 2024-2025 Formula was approved in late August 2024, the study may be underpowered to conduct comparisons at the interim report stage.

090177e1a617ace1\Approved\Approved On: 18-May-2026 22:07 (GMT)



Lastly, in all observational studies, treatment is not randomly assigned, and there is potential for residual confounding by factors not captured or poorly measured in claims databases. As often used in pharmacoepidemiology, a one-year covariate assessment period prior to cohort entry will be used to control for potential baseline confounding in Phase 2. Use of a longer covariate assessment period may increase the capture of chronic conditions. However, most individuals with a chronic condition are expected to interact with the healthcare system at least once per year, suggesting that a one-year covariate assessment period may be sufficient for capturing chronic conditions. Nevertheless, those without a visit in the one-year baseline period may be missed.

A strength of the current study is its incorporation of a self-controlled design, which eliminates the concern of confounding by time-fixed characteristics that vary across individuals. Similarly, in Phase 2, PS matching of the COMIRNATY and comparator cohorts is expected to minimize residual confounding in the cohort analysis. Finally, capture of current COVID-19 vaccines is likely better within the commercially insured population as compared to prior years, when there were more opportunities for individuals to receive a COVID-19 for free without utilizing their insurance ([CDC, 2023d](#)).

9.10. Other Aspects

Not applicable.

10. PROTECTION OF HUMAN PARTICIPANTS

10.1. Patient Information

This study involves data that exist in deidentified/anonymized structured format and contain no patient personal information.

10.2. Patient Consent

As this study involves deidentified/anonymized structured data, which according to applicable legal requirements do not contain data subject to privacy laws, obtaining informed consent from patients by Pfizer is not required.

10.3. Institutional Review Board (IRB)/Ethics Committee (EC)

Optum will prepare and submit the appropriate documents to a central IRB for Optum's conduct of the project. Optum will communicate directly with the IRB to address any questions and/or provide any additional information in connection with the review. Pfizer shall provide any necessary assistance or documents required for the submission to the IRB. Approval from an IRB for this project is not guaranteed. This project will be undertaken only after the study combined protocol/SAP has been approved by the IRB or granted an Exemption Determination Letter from the IRB. The IRB will monitor the study for the life of the project and may require formal re-review and approval on an annual basis. Changes to the project may also require re-review and approval by the IRB.



There must be prospective approval of the study protocol, protocol amendments, and other relevant documents (eg, informed consent forms if applicable) from the relevant IRBs/ECs. All correspondence with the IRB/EC must be retained. Copies of IRB/EC approvals must be forwarded to Pfizer.

10.4. 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 follow generally accepted research practices described in the following guidance documents:

- Guidelines for GPP. Public Policy Committee, International Society of Pharmacoepidemiology. Pharmacoepidemiology and Drug Safety 2015; 25:2-10;
- FDA Guidance for Industry and FDA Staff: Best Practices for Conducting and Reporting Pharmacoepidemiologic Safety Studies Using Electronic Healthcare Data, May 2013.

11. MANAGEMENT AND REPORTING OF ADVERSE EVENTS/ADVERSE REACTIONS

This study involves data that exist as structured data by the time of study start. 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 (ie, identifiable patient, identifiable reporter, a suspect product, and event) cannot be met.

12. PLANS FOR DISSEMINATING AND COMMUNICATING STUDY RESULTS

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 Optum becomes aware of any new information which might influence the evaluation of the benefits and risks of a Pfizer product, Pfizer should be informed immediately.

13. REFERENCES

- Akpanak, I., Miller, D. C., Sun, Y., Arnold, B. F., Kelly, J. D., & Acharya, N. R. (2022). Assessment of Herpes Zoster Risk Among Recipients of COVID-19 Vaccine. *JAMA Network Open*, 5(11), e2242240. <https://doi.org/10.1001/jamanetworkopen.2022.42240>
- Austin, P. C. (2009). Balance diagnostics for comparing the distribution of baseline covariates between treatment groups in propensity-score matched samples. *Statistics in Medicine*, 28(25), 3083–3107. <https://doi.org/10.1002/sim.3697>
- Baker, M. A., Lieu, T. A., Li, L., Hua, W., Qiang, Y., Kawai, A. T., Fireman, B. H., Martin, D. B., & Nguyen, M. D. (2015). A vaccine study design selection framework for the postlicensure rapid immunization safety monitoring program. *American Journal of Epidemiology*, 181(8), 608–618. <https://doi.org/10.1093/aje/kwu322>
- Barda, N., Dagan, N., Ben-Shlomo, Y., Kepten, E., Waxman, J., Ohana, R., Hernán, M. A., Lipsitch, M., Kohane, I., Netzer, D., Reis, B. Y., & Balicer, R. D. (2021). Safety of the BNT162b2 mRNA Covid-19 Vaccine in a Nationwide Setting. *The New England Journal of Medicine*, 385(12), 1078–1090. <https://doi.org/10.1056/NEJMoa2110475>
- Brookhart, M. A., Schneeweiss, S., Rothman, K. J., Glynn, R. J., Avorn, J., & Stürmer, T. (2006). Variable selection for propensity score models. *American Journal of Epidemiology*, 163(12), 1149–1156. <https://doi.org/10.1093/aje/kwj149>
- CBER. (2022). *Center for Biologics Evaluation and Research (CBER) Biologics Effectiveness and Safety (BEST) Initiative: Safety Assessment of 3rd Dose/Booster of COVID-19 mRNA Vaccines: Master Protocol*. U.S. Food and Drug Administration. <https://bestinitiative.org/wp-content/uploads/2022/09/C19-Post-Booster-Dose-AESI-Risk-Protocol-2022.pdf>
- CBER. (2021). *Center for Biologics Evaluation and Research (CBER) Biologics Effectiveness and Safety (BEST) System COVID-19 Vaccine Safety Surveillance: Active Monitoring Master Protocol*. U.S. Food and Drug Administration. <https://bestinitiative.org/wp-content/uploads/2021/02/C19-Vaccine-Safety-Protocol-2021.pdf>
- CDC. (2023a). *Metropolitan Atlanta Congenital Defects Program (MACDP)*. Centers for Disease Control and Prevention. <https://www.cdc.gov/ncbddd/birthdefects/macdp.html>
- CDC. (2023b). *Immunization Information Systems COVID-19 Vaccine-Related Codes: Preview Posting of COVID-19 Vaccine Codes and Crosswalk for Currently*



- Authorized Vaccines and Anticipation of Potential Vaccine Availability under Emergency Use Authorization (EUA).*
<https://www.cdc.gov/vaccines/programs/iis/COVID-19-related-codes.html>
- CDC. (2023c). *Immunization Information Systems (IIS) Code Sets.*
<https://www.cdc.gov/vaccines/programs/iis/code-sets.html>
- CDC. (2023d). *HHS Launches Bridge Access Program to Safeguard Free COVID-19 Vaccination for Uninsured and Underinsured Adults.*
<https://www.cdc.gov/media/releases/2023/p0914-uninsured-vaccination.html>
- CDC. (2024a). *COVID Data Tracker.* US Department of Health and Human Services, CDC. 2024, September 11. <https://covid.cdc.gov/covid-data-tracker>
- CDC. (2024b). *COVIDVaxView.* US Department of Health and Human Services, CDC. 2024, September 11. <https://cdc.gov/vaccines/imz-managers/coverage/covidvaxview/index.html>
- Chomistek, A. K., Phiri, K., Doherty, M. C., Calderbank, J. F., Chiuve, S. E., McIlroy, B. H., Snabes, M. C., Enger, C., & Seeger, J. D. (2023). Development and Validation of ICD-10-CM-based Algorithms for Date of Last Menstrual Period, Pregnancy Outcomes, and Infant Outcomes. *Drug Safety*, 46(2), 209–222.
<https://doi.org/10.1007/s40264-022-01261-5>
- Dore, D. D., Bloomgren, G. L., Wenten, M., Hoffman, C., Clifford, C. R., Quinn, S. G., Braun, D. K., Noel, R. A., & Seeger, J. D. (2011). A cohort study of acute pancreatitis in relation to exenatide use. *Diabetes, Obesity & Metabolism*, 13(6), 559–566.
<https://doi.org/10.1111/j.1463-1326.2011.01376.x>
- Dore, D. D., Turnbull, B. R., & Seeger, J. D. (2012). Vaccine discontinuation and switching following regulatory interventions in response to rotavirus vaccine contamination with porcine circovirus DNA fragments. *Pharmacoepidemiology and Drug Safety*, 21(4), 415–419. <https://doi.org/10.1002/pds.3217>
- Eng, P. M., Mast, T. C., Loughlin, J., Clifford, C. R., Wong, J., & Seeger, J. D. (2012). Incidence of intussusception among infants in a large commercially insured population in the United States. *The Pediatric Infectious Disease Journal*, 31(3), 287–291. <https://doi.org/10.1097/INF.0b013e31824213b1>
- EUROCAT. (2020). *EUROCAT Subgroups of Congenital Anomalies (Version 2014; implemented in EDMP December 2014, used for website prevalence tables from December 2014).* European Network of Population-Based Registries for the Epidemiological Surveillance of Congenital Anomalies, European Platform on Rare



- Disease Registration, European Commission. <https://eu-rd-platform.jrc.ec.europa.eu/sites/default/files/JRC-EUROCAT-Section-3.3-23-9-2020.pdf>
- European Medicines Agency. (2017). *Guideline on good pharmacovigilance practices (GVP)—Module VI – Collection, management and submission of reports of suspected adverse reactions to medicinal products (Rev 2)*.
- FDA. (2013). *Best Practices for Conducting and Reporting Pharmacoepidemiologic Safety Studies Using Electronic Healthcare Data*. U.S. Department of Health and Human Services. <https://www.fda.gov/media/79922/download>
- FDA. (2023a). Janssen COVID-19 Vaccine. FDA. <https://www.fda.gov/vaccines-blood-biologics/coronavirus-covid-19-cber-regulated-biologics/janssen-covid-19-vaccine>
- FDA. (2020a). *FDA Takes Key Action in Fight Against COVID-19 By Issuing Emergency Use Authorization for First COVID-19 Vaccine*. FDA; FDA. <https://www.fda.gov/news-events/press-announcements/fda-takes-key-action-fight-against-covid-19-issuing-emergency-use-authorization-first-covid-19>
- FDA. (2020b). *FDA Takes Additional Action in Fight Against COVID-19 By Issuing Emergency Use Authorization for Second COVID-19 Vaccine*. FDA; FDA. <https://www.fda.gov/news-events/press-announcements/fda-takes-additional-action-fight-against-covid-19-issuing-emergency-use-authorization-second-covid>
- FDA. (2021a). *FDA Issues Emergency Use Authorization for Third COVID-19 Vaccine*. FDA; FDA. <https://www.fda.gov/news-events/press-announcements/fda-issues-emergency-use-authorization-third-covid-19-vaccine>
- FDA. (2021b). *Vaccines and Related Biological Products Advisory Committee June 10, 2021 Meeting Presentation: FDA Updates of COVID-19 Vaccine Safety Activities*. <https://www.fda.gov/media/150051/download>
- FDA. (2022a). *Coronavirus (COVID-19) Update: FDA Authorizes Emergency Use of Novavax COVID-19 Vaccine, Adjuvanted*. FDA; FDA. <https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-fda-authorizes-emergency-use-novavax-covid-19-vaccine-adjuvanted>
- FDA. (2022b). *Coronavirus (COVID-19) Update: FDA Authorizes Moderna, Pfizer-BioNTech Bivalent COVID-19 Vaccines for Use as a Booster Dose*. FDA; FDA. <https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-fda-authorizes-moderna-pfizer-biontech-bivalent-covid-19-vaccines-use>



- FDA. (2022c). *Coronavirus (COVID-19) Update: FDA Authorizes Moderna and Pfizer-BioNTech Bivalent COVID-19 Vaccines for Use as a Booster Dose in Younger Age Groups*. FDA; FDA. <https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-fda-authorizes-moderna-and-pfizer-biontech-bivalent-covid-19-vaccines>
- FDA. (2022d). *Coronavirus (COVID-19) Update: FDA Authorizes Updated (Bivalent) COVID-19 Vaccines for Children Down to 6 Months of Age*. FDA; FDA. <https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-fda-authorizes-updated-bivalent-covid-19-vaccines-children-down-6-months>
- FDA. (2023b). *FDA Takes Action on Updated mRNA COVID-19 Vaccines to Better Protect Against Currently Circulating Variants*. FDA; FDA. <https://www.fda.gov/news-events/press-announcements/fda-takes-action-updated-mrna-covid-19-vaccines-better-protect-against-currently-circulating>
- FDA. (2024). *Pfizer-BioNTech COVID-19 Vaccine (2024-2025 Formula) Authorized For Individuals 6 Months Through 11 Years of Age*. FDA; FDA. <https://www.fda.gov/vaccines-blood-biologics/coronavirus-covid-19-cber-regulated-biologics-pfizer-biontech-covid-19-vaccine>
- Guertin, J. R., Rahme, E., & LeLorier, J. (2016). Performance of the high-dimensional propensity score in adjusting for unmeasured confounders. *European Journal of Clinical Pharmacology*, 72(12), 1497–1505. <https://doi.org/10.1007/s00228-016-2118-x>
- Janssen Pharmaceutical Companies. (2023). *Janssen COVID-19 Vaccine: Fact Sheet for Healthcare Providers Administering Vaccine (Vaccination Providers)*. <https://www.fda.gov/media/146304/download?attachment>
- Joy, M., Agrawal, U., Fan, X., Robertson, C., Anand, S. N., Ordonez-Mena, J., Byford, R., Goudie, R., Jamie, G., Kar, D., Williams, J., Marsden, G. L., Tzortziou-Brown, V., Sheikh, S. A., Hobbs, F. D. R., & de Lusignan, S. (2023). Thrombocytopenic, thromboembolic and haemorrhagic events following second dose with BNT162b2 and ChAdOx1: Self-controlled case series analysis of the English national sentinel cohort. *The Lancet Regional Health - Europe*, 32, 100681. <https://doi.org/10.1016/j.lanep.2023.100681>
- Klein, N. P., Lewis, N., Goddard, K., Fireman, B., Zerbo, O., Hanson, K. E., Donahue, J. G., Kharbanda, E. O., Naleway, A., Nelson, J. C., Xu, S., Yih, W. K., Glanz, J. M., Williams, J. T. B., Hambidge, S. J., Lewin, B. J., Shimabukuro, T. T., DeStefano, F.,



- & Weintraub, E. S. (2021). Surveillance for Adverse Events After COVID-19 mRNA Vaccination. *JAMA*, 326(14), 1–10. <https://doi.org/10.1001/jama.2021.15072>
- Laughlin, L. L. (2011). *Maternity leave and employment patterns of first-time mothers: 1961-2008*. U.S. Dept. of Commerce, Economics and Statistics Administration, U.S. Census Bureau.
- Law, B., & Sturkenboom, M. (2020). *Priority list of adverse events of special interest: COVID-19. 2020*. Safety Platform for Emergency Vaccines (SPEAC). https://brightoncollaboration.us/wp-content/uploads/2020/06/SPEAC_D2.3_V2.0_COVID-19_20200525_public.pdf
- Liu, J., Cao, F., Luo, C., Guo, Y., & Yan, J. (2023). Stroke Following COVID-19 Vaccination: Evidence Based on Different Designs of Real-World Studies. *The Journal of Infectious Diseases*, jiad306. <https://doi.org/10.1093/infdis/jiad306>
- Martin, T. J., Fahey, M., Easton, M., Clothier, H. J., Samuel, R., Crawford, N. W., & Buttery, J. P. (2021). Acute disseminated encephalomyelitis and routine childhood vaccinations—A self-controlled case series. *Human Vaccines & Immunotherapeutics*, 17(8), 2578–2585. <https://doi.org/10.1080/21645515.2021.1901544>
- McCarthy, N. L., Gee, J., Lin, N. D., Thyagarajan, V., Pan, Y., Su, S., Turnbull, B., Chan, K. A., & Weintraub, E. (2013). Evaluating the safety of influenza vaccine using a claims-based health system. *Vaccine*, 31(50), 5975–5982. <https://doi.org/10.1016/j.vaccine.2013.10.031>
- Moderna US, Inc. (2023). *SPIKEVAX Prescribing Information*. <https://www.fda.gov/media/155675/download?attachment>
- Moll, K., Lufkin, B., Fingar K., Zhou, C. K., Tworowski, E., Shi, C., Hobbix, S., Hu, M., Sheng, M., McCarty, J., Shangguan, S., Burrell, T., Chillarige, Y., Beers, J., Saunders-Hastings, P., Edwards, K., Muthuri, S., Black, S., Kelman, J., Reich, C., Amend, K. L., Beachler, D., Ogilvie, R. P., Secora, A., McMahill-Walracenm C. N., Seeger, J. D., Lloyd, P., Thompson, D., Dimova, R., MaCurdy, T., Obidi, J., Anderson, S. A., Forshee, R., Wong, HL., Shoaibim A. (2023). Events of special interest for COVID-19 vaccine safety monitoring in the United States, 2019-2020. *Vaccine*, 41(2), 333-353.
- Myers, J. A., Rassen, J. A., Gagne, J. J., Huybrechts, K. F., Schneeweiss, S., Rothman, K. J., Joffe, M. M., & Glynn, R. J. (2011). Effects of adjusting for instrumental variables on bias and precision of effect estimates. *American Journal of Epidemiology*, 174(11), 1213–1222. <https://doi.org/10.1093/aje/kwr364>



- Nabizadeh, F., Noori, M., Rahmani, S., & Hosseini, H. (2023). Acute disseminated encephalomyelitis (ADEM) following COVID-19 vaccination: A systematic review. *Journal of Clinical Neuroscience: Official Journal of the Neurosurgical Society of Australasia*, *111*, 57–70. <https://doi.org/10.1016/j.jocn.2023.03.008>
- New York State Department of Health Birth Defects Registry. (2021). *New York State Department of Health Congenital Malformations Registry ICD-10 Coding Manual: List of all Reportable Congenital Malformations*. https://www.health.ny.gov/diseases/birth_defects/docs/icd.pdf
- Normand, S. T., Landrum, M. B., Guadagnoli, E., Ayanian, J. Z., Ryan, T. J., Cleary, P. D., & McNeil, B. J. (2001). Validating recommendations for coronary angiography following acute myocardial infarction in the elderly: A matched analysis using propensity scores. *Journal of Clinical Epidemiology*, *54*(4), 387–398. [https://doi.org/10.1016/s0895-4356\(00\)00321-8](https://doi.org/10.1016/s0895-4356(00)00321-8)
- Parsons, L. S. (2001). Reducing Bias in a Propensity Score Matched-Pair Sample Using Greedy Matching Techniques. *Proceedings of the Twenty-Sixth Annual SAS Users Group International Conference*.
- Pfizer Inc/BioNTech. (2024). *COMIRNATY Prescribing Information*. <https://www.fda.gov/media/151707/download?attachment>
- Public Policy Committee, International Society of Pharmacoepidemiology. (2016). Guidelines for good pharmacoepidemiology practice (GPP). *Pharmacoepidemiology and Drug Safety*, *25*(1), 2–10. <https://doi.org/10.1002/pds.3891>
- Quam, L., Ellis, L. B., Venus, P., Clouse, J., Taylor, C. G., & Leatherman, S. (1993). Using claims data for epidemiologic research. The concordance of claims-based criteria with the medical record and patient survey for identifying a hypertensive population. *Medical Care*, *31*(6), 498–507.
- Schneider, K. L., Bell, E. J., Zhou, C. K., Yang, G., Lloyd, P., Clarke, T. C., Wilkinson, M., Myers, E. E., Amend, K. L., Seeger, J. D., Chillarige, Y., Forshee, R., Shoabi, A., Anderson, S. A., Wong, HL. Immunization information systems to improve ascertainment of COVID-19 vaccinations for claims-based vaccine safety and effectiveness studies. (2023). *JAMA Network Open*, *6*(5), e2313512.
- Seeger, J. D., Amend, K. L., Turnbull, B. R., Zhou, L., Marks, M. A., Velicer, C., & Saddier, P. (2023). Incident autoimmune conditions among males receiving quadrivalent human papillomavirus vaccine in the United States. *Vaccine*, *41*(11), 1826–1833. <https://doi.org/10.1016/j.vaccine.2022.10.050>



- Vaccine Adverse Event Reporting System (VAERS)*. (2023). [CDC WONDER On-line Database.]. United States Department of Health and Human Services (DHHS), Public Health Service (PHS), Centers for Disease Control (CDC), Food and Drug Administration (FDA). <http://wonder.cdc.gov/vaers.html>
- Wack, S., Patton, T., & Ferris, L. K. (2021). COVID-19 vaccine safety and efficacy in patients with immune-mediated inflammatory disease: Review of available evidence. *Journal of the American Academy of Dermatology*, 85(5), 1274–1284. <https://doi.org/10.1016/j.jaad.2021.07.054>
- Xu, S., Hong, V., Sy, L. S., Glenn, S. C., Ryan, D. S., Morrissette, K. L., Nelson, J. C., Hambidge, S. J., Crane, B., Zerbo, O., DeSilva, M. B., Glanz, J. M., Donahue, J. G., Liles, E., Duffy, J., & Qian, L. (2022). Changes in incidence rates of outcomes of interest in vaccine safety studies during the COVID-19 pandemic. *Vaccine*, 40(23), 3150–3158. <https://doi.org/10.1016/j.vaccine.2022.04.037>
- Ziyadeh, N. J., Geldhof, A., Noël, W., Otero-Lobato, M., Esslinger, S., Chakravarty, S. D., Wang, Y., & Seeger, J. D. (2020). Post-approval Safety Surveillance Study of Golimumab in the Treatment of Rheumatic Disease Using a United States Healthcare Claims Database. *Clinical Drug Investigation*, 40(11), 1021–1040. <https://doi.org/10.1007/s40261-020-00959-7>



14. LIST OF TABLES

Table 1. Study design and data sources for interim and final reporting23
Table 2. Clean periods and risk intervals for safety outcomes of interest34

15. LIST OF FIGURES

Figure 1. Self-controlled risk interval design.....24
Figure 2. Self-controlled risk interval design for the outcome of Guillain-Barré syndrome.....27
Figure 3. Cohort study design for the outcome of Guillain-Barré syndrome28

090177e1a617ace1\Approved\Approved On: 18-May-2026 22:07 (GMT)



16. ANNEX 1. LIST OF STANDALONE DOCUMENTS

None.



17. ANNEX 2. CODE LISTS

CPT copyright 2025 American Medical Association (AMA). All rights reserved.

Fee schedules, relative value units, conversion factors and/or related components are not assigned by the AMA, are not part of CPT, and the AMA is not recommending their use. The AMA does not directly or indirectly practice medicine or dispense medical services. The AMA assumes no liability for data contained or not contained herein.

CPT is a registered trademark of the American Medical Association.

17.1. Appendix I – COMIRNATY 2024-2025 Formula

The following CPT and NDC codes are sourced from the Immunization Information Systems (IIS) at the Center for Disease Control and Prevention ([CDC, 2024c](#)). Other codes will be included as they become available.

17.1.1. CPT Codes

- | | |
|-------|---|
| 91318 | Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (coronavirus disease [COVID-19]) vaccine, mRNA-LNP, spike protein, 3 mcg/0.3 mL dosage, tris-sucrose formulation, for intramuscular use |
| 91319 | Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (coronavirus disease [COVID-19]) vaccine, mRNA-LNP, spike protein, 10 mcg/0.3 mL dosage, tris-sucrose formulation, for intramuscular use |
| 91320 | Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (coronavirus disease [COVID-19]) vaccine, mRNA-LNP, spike protein, 30 mcg/0.3 mL dosage, tris-sucrose formulation, for intramuscular use |

17.1.2. NDC Codes

00069-2432-01 Ages 12 years and older; SYRINGE, PRE-FILLED, GLASS, 30 mcg/0.3 mL – DO NOT FREEZE

59267-4338-01 Ages 5 through 11 years; VIAL, SINGLE-DOSE, 10 mcg/0.3 mL DO NOT DILUTE

59267-4426-01 Ages 6 months through 4 years; VIAL, MULTI-DOSE, 3 DOSES, 3mcg / 0.3 mL AFTER DILUTION



17.2. Appendix II – Comparator Codes

17.2.1. COVID-19 Vaccine 2024-2025 Formulations Other than the COMIRNATY 2024-2025 Formula

17.2.1.1. Moderna Spikevax

17.2.1.1.1. CPT Codes

91322 -- Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (coronavirus disease [COVID-19]) vaccine, mRNA-LNP, 50 mcg/0.5 mL dosage, for intramuscular use

91321 -- Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (coronavirus disease [COVID-19]) vaccine, mRNA-LNP, 25 mcg/0.25 mL dosage, for intramuscular use

17.2.1.1.2. NDC Codes

80777-0110-01 -- Ages 12 years and older; SYRINGE, PRE-FILLED, 50 mcg/0.5 mL

80777-0291-09 -- Ages 6 months through 11 years; SYRINGE, PRE-FILLED, 25 mcg/0.25 mL

17.2.1.2. Novavax COVID-19 Vaccine, Adjuvanted

17.2.1.2.1. CPT codes

91304 -- Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (coronavirus disease [COVID-19]) vaccine, recombinant spike protein nanoparticle, saponin-based adjuvant, preservative free, 5 mcg/0.5 mL dosage, for intramuscular use

17.2.1.2.2. NDC Codes

80631-0107-01 -- Ages 12 years and older; SYRINGE, PRE-FILLED, 50 mcg/0.5 mL DO NOT FREEZE

17.2.2. Other Vaccines

CPT and NDC codes are sourced from the IIS at the Center for Disease Control and Prevention ([CDC, 2023c](#)). Other codes will be included as they become available.



17.2.2.1. CPT Codes

90630, 90653-90664, 90666-90668, 90672-90674, 90682-90689, 90694, 90724, 90756	Influenza virus vaccine
90380-90381, 90678-90679, 96380-96381	Respiratory syncytial virus vaccine
90470	H1N1 immunization
90476-90477	Adenovirus vaccine
90581	Anthrax vaccine
90585, 90728	Tuberculosis BGC vaccine
90611, 90622	Smallpox/monkeypox vaccine
90619-90621, 90644, 90733-90734	Meningococcal vaccine
90625, 90725	Cholera vaccine
90626-90627, 90738	Tick-borne/Japanese encephalitis virus vaccine
90632-90636, 90730	Hepatitis A vaccine
90636, 90739-90740, 90743-90748, 90759, 90731	Hepatitis B vaccine
90645-90648, 90737	Hemophilus influenza type B vaccine
90649-90651	Human Papillomavirus vaccine
90665	Lyme disease vaccine
90669-90671, 90732	Pneumococcal vaccine
90675-90676, 90726	Rabies vaccine
90680-90681	Rotavirus vaccine
90690-90693	Typhoid vaccine

090177e1a617ace1\Approved\Approved On: 18-May-2026 22:07 (GMT)



90696-90702, 90714-90715, 90720-90723	Diphtheria vaccine
90696-90703, 90714-90715, 90723	Tetanus vaccine
90696-90698, 90700, 90715, 90723	Pertussis vaccine
90704, 90707, 90709-90710	Mumps vaccine
90705, 90707-90708, 90710	Measles vaccine
90706, 90707-90710	Rubella vaccine
90696-90698, 90712-90713	Poliovirus vaccine
90710, 90716	Varicella virus vaccine
90717	Yellow fever vaccine
90727	Plague vaccine
90736, 90750	Zoster (shingles) vaccine
90758	Ebolavirus vaccine
90584, 90587	Dengue vaccine



17.2.2.2. NDC Codes

The below list includes generic vaccine names classified by therapeutic use. Codes for generic vaccines are based on the Hierarchical Ingredient Code List (HICL) system proprietary to First Databank. All associated NDC codes will be utilized. Other vaccines will be included as they become available.

Adenovirus vaccine, live
Anthrax vaccine
Anthrax vaccine, adsorbed
BCG vaccine
BCG vaccine, live
Cholera vaccine
Dengue vaccine
Diphtheria, pertussis, tetanus, and haemophilus influenzae type B vaccine
Hepatitis A virus vaccine
Hepatitis A virus and hepatitis B virus vaccine
Hepatitis B and haemophilus influenzae type B vaccine
Hepatitis B, diphtheria, and poliomyelitis virus vaccine
Hepatitis B, haemophilus influenzae type B, and meningococcal vaccine
Hepatitis B virus vaccine
HPV vaccine
Influenza A (H1N1) vaccine
Influenza A (H1N1) vaccine, live
Influenza virus vaccine
Influenza virus vaccine, trivalent
Influenza virus vaccine, trivalent, live
Japanese encephalitis vaccine
Measles and rubella vaccine
Measles, mumps, and rubella vaccine
Measles vaccine, live, attenuated
Mumps vaccine, live



Plague vaccine
Poliomyelitis vaccine, killed
Poliomyelitis vaccine, live
Rabies vaccine
Rabies vaccine, human diploid
Rotavirus vaccine, live
Rubella and mumps vaccine
Rubella vaccine
Smallpox, monkeypox, live
Smallpox vaccine, live
Staphylococcus vaccine
Typhoid vaccine
Varicella virus vaccine, live
Yellow fever vaccine
Zoster vaccine, live

17.2.3. Outpatient Physician Evaluation and Management CPT Codes

99201-99205
99211-99215
99241-99245
99354-99355
99381-99387
99391-99397

17.3. Appendix III – Safety Outcomes of Interest

All codes are ICD-10-CM diagnosis codes; all outcomes will be defined based on the presence of a single code unless otherwise specified. In order to qualify as an outcome, the outcome-specific codes must be identified during emergency department visits, inpatient hospitalizations, or outpatient visits, as detailed in [Table 2](#). Outpatient visits are defined through physician evaluation and management codes (Section 17.2.3).



Outcome codes marked with a dagger (†) are based on COVID-19 vaccine studies conducted as part of the FDA's CBER BEST system.

An asterisk (*) following an ICD-10-CM code indicates how many additional decimal places may be included, though not required, in the wildcard, including the number listed. For example, B02.** includes B02, B02.X, and B02.XX.

- Acute disseminated encephalomyelitis (ADEM) †
 - G04.00 – Acute disseminated encephalitis and encephalomyelitis, unspecified
- Anaphylaxis †
 - T80.52XA – Anaphylactic reaction due to vaccination, initial encounter
 - T78.2XXA – Anaphylactic shock, unspecified, initial encounter
- Bell's palsy †
 - G51.0 – Bell's palsy
 - G51.8 – Other disorders of facial nerve
 - G51.9 – Disorder of facial nerve, unspecified
- Cerebral venous sinus thrombosis (CVST)
 - I67.6 – Nonpyogenic thrombosis of intracranial venous system
 - I63.6 – Cerebral infarction due to cerebral venous thrombosis, nonpyogenic
- Convulsions/seizures (non-febrile)
 - G40.001 – Localization-related (focal) (partial) idiopathic epilepsy and epileptic syndromes with seizures of localized onset, not intractable, with status epilepticus
 - G40.009 – Localization-related (focal) (partial) idiopathic epilepsy and epileptic syndromes with seizures of localized onset, not intractable, without status epilepticus
 - G40.011 – Localization-related (focal) (partial) idiopathic epilepsy and epileptic syndromes with seizures of localized onset, intractable, with status epilepticus
 - G40.019 – Localization-related (focal) (partial) idiopathic epilepsy and epileptic syndromes with seizures of localized onset, intractable, without status epilepticus
 - G40.101 – Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with simple partial seizures, not intractable, with status epilepticus



- G40.109 – Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with simple partial seizures, not intractable, without status epilepticus
- G40.111 – Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with simple partial seizures, intractable, with status epilepticus
- G40.119 – Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with simple partial seizures, intractable, without status epilepticus
- G40.201 – Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with complex partial seizures, not intractable, with status epilepticus
- G40.209 – Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with complex partial seizures, not intractable, without status epilepticus
- G40.211 – Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with complex partial seizures, intractable, with status epilepticus
- G40.219 – Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with complex partial seizures, intractable, without status epilepticus
- G40.301 – Generalized idiopathic epilepsy and epileptic syndromes, not intractable, with status epilepticus
- G40.309 – Generalized idiopathic epilepsy and epileptic syndromes, not intractable, without status epilepticus
- G40.311 – Generalized idiopathic epilepsy and epileptic syndromes, intractable, with status epilepticus
- G40.319 – Generalized idiopathic epilepsy and epileptic syndromes, intractable, without status epilepticus
- G40.401 – Other generalized epilepsy and epileptic syndromes, not intractable, with status epilepticus
- G40.409 – Other generalized epilepsy and epileptic syndromes, not intractable, without status epilepticus
- G40.411 – Other generalized epilepsy and epileptic syndromes, intractable, with status epilepticus



- G40.419 – Other generalized epilepsy and epileptic syndromes, intractable, without status epilepticus
- G40.501 – Epileptic seizures related to external causes, not intractable, with status epilepticus
- G40.509 – Epileptic seizures related to external causes, not intractable, without status epilepticus
- G40.801 – Other epilepsy, not intractable, with status epilepticus
- G40.802 – Other epilepsy, not intractable, without status epilepticus
- G40.803 – Other epilepsy, intractable, with status epilepticus
- G40.804 – Other epilepsy, intractable, without status epilepticus
- G40.811 – Lennox-Gastaut syndrome, not intractable, with status epilepticus
- G40.812 – Lennox-Gastaut syndrome, not intractable, without status epilepticus
- G40.813 – Lennox-Gastaut syndrome, intractable, with status epilepticus
- G40.814 – Lennox-Gastaut syndrome, intractable, without status epilepticus
- G40.821 – Epileptic spasms, not intractable, with status epilepticus
- G40.822 – Epileptic spasms, not intractable, without status epilepticus
- G40.823 – Epileptic spasms, intractable, with status epilepticus
- G40.824 – Epileptic spasms, intractable, without status epilepticus
- G40.89 – Other seizures
- G40.901 – Epilepsy, unspecified, not intractable, with status epilepticus
- G40.909 – Epilepsy, unspecified, not intractable, without status epilepticus
- G40.911 – Epilepsy, unspecified, intractable, with status epilepticus
- G40.919 – Epilepsy, unspecified, intractable, without status epilepticus
- G40.A01 – Absence epileptic syndrome, not intractable, with status epilepticus
- G40.A09 – Absence epileptic syndrome, not intractable, without status epilepticus
- G40.A11 – Absence epileptic syndrome, intractable, with status epilepticus
- G40.A19 – Absence epileptic syndrome, intractable, without status epilepticus
- G40.B01 – Juvenile myoclonic epilepsy, not intractable, with status epilepticus



- G40.B09 – Juvenile myoclonic epilepsy, not intractable, without status epilepticus
- G40.B11 – Juvenile myoclonic epilepsy, intractable, with status epilepticus
- G40.B19 – Juvenile myoclonic epilepsy, intractable, without status epilepticus
- R56.1 – Post traumatic seizures
- R56.9 – Unspecified convulsions
- Encephalitis/myelitis/encephalomyelitis (not ADEM or TM)†
 - G04.02 – Postimmunization acute disseminated encephalitis, myelitis, and encephalomyelitis
 - G04.00 – Acute disseminated encephalitis and encephalomyelitis, unspecified
 - G04.81 – Other encephalitis and encephalomyelitis
 - G04.90 – Encephalitis and encephalomyelitis
 - G05.3 – Encephalitis and encephalomyelitis in diseases classified elsewhere
- Glomerulonephritis
 - N06.A Isolated proteinuria with C3 glomerulonephritis
 - N06.7 Isolated proteinuria with diffuse crescentic glomerulonephritis
 - N06.5 Isolated proteinuria with diffuse mesangiocapillary glomerulonephritis
 - N06.4 Isolated proteinuria with diffuse endocapillary proliferative glomerulonephritis
 - N04.A Nephrotic syndrome with C3 glomerulonephritis
 - N04.2 Nephrotic syndrome with diffuse membranous glomerulonephritis
 - N04.7 Nephrotic syndrome with diffuse crescentic glomerulonephritis
 - N04.5 Nephrotic syndrome with diffuse mesangiocapillary glomerulonephritis
 - N04.3 Nephrotic syndrome with diffuse mesangial proliferative glomerulonephritis
 - N04.4 Nephrotic syndrome with diffuse endocapillary proliferative glomerulonephritis
 - N05.A Unspecified nephritic syndrome with C3 glomerulonephritis
 - N05.7 Unspecified nephritic syndrome with diffuse crescentic glomerulonephritis
 - N05.2 Unspecified nephritic syndrome with diffuse membranous glomerulonephritis



- N05.5 Unspecified nephritic syndrome with diffuse mesangiocapillary glomerulonephritis
- N03.A Chronic nephritic syndrome with C3 glomerulonephritis
- N03.7 Chronic nephritic syndrome with diffuse crescentic glomerulonephritis
- N03.2 Chronic nephritic syndrome with diffuse membranous glomerulonephritis
- N03.5 Chronic nephritic syndrome with diffuse mesangiocapillary glomerulonephritis
- N00.A Acute nephritic syndrome with C3 glomerulonephritis
- N00.2 Acute nephritic syndrome with diffuse membranous glomerulonephritis
- N00.5 Acute nephritic syndrome with diffuse mesangiocapillary glomerulonephritis
- N00.7 Acute nephritic syndrome with diffuse crescentic glomerulonephritis
- N07.A Hereditary nephropathy, not elsewhere classified with C3 glomerulonephritis
- N02.7 Recurrent and persistent hematuria with diffuse crescentic glomerulonephritis
- N02.A Recurrent and persistent hematuria with C3 glomerulonephritis
- Guillain-Barré syndrome†
 - G61.0 – Guillain-Barré syndrome
- Herpes zoster
 - B02.** Zoster [herpes zoster]
- Immune-mediated myositis
 - G72.41 – Inclusion body myositis [IBM]
 - M33 – Dermatopolymyositis
 - M33.0 – Juvenile dermatomyositis
 - M33.00 – Juvenile dermatomyositis, organ involvement unspecified
 - M33.01 – Juvenile dermatomyositis with respiratory involvement
 - M33.02 – Juvenile dermatomyositis with myopathy
 - M33.03 – Juvenile dermatomyositis without myopathy
 - M33.09 – Juvenile dermatomyositis with other organ involvement



- M33.1 – Other dermatomyositis
- M33.10 – Other dermatomyositis, organ involvement unspecified
- M33.11 – Other dermatomyositis with respiratory involvement
- M33.12 – Other dermatomyositis with myopathy
- M33.13 – Other dermatomyositis without myopathy
- M33.19 – Other dermatomyositis with other organ involvement
- M33.2 – Polymyositis
- M33.20 – Polymyositis, organ involvement unspecified
- M33.21 – Polymyositis with respiratory involvement
- M33.22 – Polymyositis with myopathy
- M33.29 – Polymyositis with other organ involvement
- M33.9 – Dermatopolymyositis, unspecified
- M33.90 – Dermatopolymyositis, unspecified, organ involvement unspecified
- M33.91 – Dermatopolymyositis, unspecified with respiratory involvement
- M33.92 – Dermatopolymyositis, unspecified with myopathy
- M33.93 – Dermatopolymyositis, unspecified without myopathy
- M33.99 – Dermatopolymyositis, unspecified with other organ involvement
- G72.0 – Drug-induced myopathy
- G72.2 – Myopathy due to other toxic agents
- G72.49 – Other inflammatory and immune myopathies, not elsewhere classified
- G72.8* – Other specified myopathies
- G72.9 – Myopathy, unspecified
- G73.7 – Myopathy in diseases classified elsewhere
- M36.0 – Dermato(poly)myositis in neoplastic disease
- I42.7 – Cardiomyopathy due to drug and external agent
- I42.9 – Cardiomyopathy, unspecified
- I43 – Cardiomyopathy in diseases classified elsewhere
- I42 – Cardiomyopathy
- M79.1* – Myalgia



- M79.7 – Fibromyalgia
- I42.5 – Other restrictive cardiomyopathy
- I42.8 – Other cardiomyopathies
- Immune thrombocytopenia†
 - D69.3 – Immune thrombocytopenic purpura
- Kawasaki disease†
 - M30.3 – Mucocutaneous lymph node syndrome [Kawasaki]
- Multi inflammatory syndrome (in children and adults)†
 - U07.1 – COVID-19 **and one of the following:**
 - M35.8 – Other specified systemic involvement of connective tissue
 - M35.81 – Multisystem inflammatory syndrome
 - M35.89 – Other specified systemic involvement of connective tissue
- Multiple sclerosis
 - G35 – Multiple sclerosis
- Myocardial infarction†
 - I21.01 – ST elevation (STEMI) myocardial infarction involving left main coronary artery
 - I21.02 – ST elevation (STEMI) myocardial infarction involving left anterior descending coronary artery
 - I21.09 – ST elevation (STEMI) myocardial infarction involving other coronary artery of anterior wall
 - I21.11 – ST elevation (STEMI) myocardial infarction involving right coronary artery
 - I21.19 – ST elevation (STEMI) myocardial infarction involving other coronary artery of inferior wall
 - I21.21 – ST elevation (STEMI) myocardial infarction involving left circumflex coronary artery
 - I21.29 – ST elevation (STEMI) myocardial infarction involving other sites
 - I21.3 – ST elevation (STEMI) myocardial infarction of unspecified site
 - I21.4 – Non-ST elevation (NSTEMI) myocardial infarction
 - I21.9 – Acute myocardial infarction, unspecified



- I21.A1 – Myocardial infarction type 2
- I21.A9 – Other myocardial infarction type
- I22.0 – Subsequent ST elevation (STEMI) myocardial infarction of anterior wall
- I22.1 – Subsequent ST elevation (STEMI) myocardial infarction of inferior wall
- I22.2 – Subsequent non-ST elevation (NSTEMI) myocardial infarction
- I22.8 – Subsequent ST elevation (STEMI) myocardial infarction of other sites
- I22.9 – Subsequent ST elevation (STEMI) myocardial infarction of unspecified site
- Myocarditis/pericarditis†
 - B33.22 – Viral myocarditis
 - B33.23 – Viral pericarditis
 - I30.0 – Acute nonspecific idiopathic pericarditis
 - I30.1 – Infective pericarditis
 - I30.8 – Other forms of acute pericarditis
 - I30.9 – Acute pericarditis, unspecified
 - I32 – Pericarditis in diseases classified elsewhere
 - I41 – Myocarditis in diseases classified elsewhere
 - I40.0 – Infective myocarditis
 - I40.1 – Isolated myocarditis
 - I40.8 – Other acute myocarditis
 - I40.9 – Acute myocarditis, unspecified
 - I51.4 – Myocarditis, unspecified
- Pulmonary embolism†
 - I26.02 – Saddle embolus of pulmonary artery with acute cor pulmonale
 - I26.09 – Other pulmonary embolism with acute cor pulmonale
 - I26.92 – Saddle embolus of pulmonary artery without acute cor pulmonale
 - I26.93 – Single subsegmental pulmonary embolism without acute cor pulmonale



- I26.94 – Multiple subsegmental pulmonary emboli without acute cor pulmonale
- I26.99 – Other pulmonary embolism without acute cor pulmonale
- Stroke, hemorrhagic†
 - I61.0 – Nontraumatic intracerebral hemorrhage in hemisphere, subcortical
 - I61.1 – Nontraumatic intracerebral hemorrhage in hemisphere, cortical
 - I61.2 – Nontraumatic intracerebral hemorrhage in hemisphere, unspecified
 - I61.3 – Nontraumatic intracerebral hemorrhage in brain stem
 - I61.4 – Nontraumatic intracerebral hemorrhage in cerebellum
 - I61.5 – Nontraumatic intracerebral hemorrhage, intraventricular
 - I61.6 – Nontraumatic intracerebral hemorrhage, multiple localized
 - I61.8 – Other nontraumatic intracerebral hemorrhage
 - I61.9 – Nontraumatic intracerebral hemorrhage, unspecified
 - I62.00 – Nontraumatic subdural hemorrhage, unspecified
 - I62.01 – Nontraumatic acute subdural hemorrhage
 - I62.02 – Nontraumatic subacute subdural hemorrhage
 - I62.9 – Nontraumatic intracranial hemorrhage, unspecified
- Stroke, ischemic†
 - I63.00 – Cerebral infarction due to thrombosis of unspecified precerebral artery
 - I63.011 – Cerebral infarction due to thrombosis of right vertebral artery
 - I63.012 – Cerebral infarction due to thrombosis of left vertebral artery
 - I63.013 – Cerebral infarction due to thrombosis of bilateral vertebral arteries
 - I63.019 – Cerebral infarction due to thrombosis of unspecified vertebral artery
 - I63.02 – Cerebral infarction due to thrombosis of basilar artery
 - I63.031 – Cerebral infarction due to thrombosis of right carotid artery
 - I63.032 – Cerebral infarction due to thrombosis of left carotid artery
 - I63.033 – Cerebral infarction due to thrombosis of bilateral carotid arteries
 - I63.039 – Cerebral infarction due to thrombosis of unspecified carotid artery
 - I63.09 – Cerebral infarction due to thrombosis of other precerebral artery



- I63.10 – Cerebral infarction due to embolism of unspecified precerebral artery
- I63.111 – Cerebral infarction due to embolism of right vertebral artery
- I63.112 – Cerebral infarction due to embolism of left vertebral artery
- I63.113 – Cerebral infarction due to embolism of bilateral vertebral arteries
- I63.119 – Cerebral infarction due to embolism of unspecified vertebral artery
- I63.12 – Cerebral infarction due to embolism of basilar artery
- I63.131 – Cerebral infarction due to embolism of right carotid artery
- I63.132 – Cerebral infarction due to embolism of left carotid artery
- I63.133 – Cerebral infarction due to embolism of bilateral carotid arteries
- I63.139 – Cerebral infarction due to embolism of unspecified carotid artery
- I63.19 – Cerebral infarction due to embolism of other precerebral artery
- I63.20 – Cerebral infarction due to unspecified occlusion or stenosis of unspecified precerebral arteries
- I63.211 – Cerebral infarction due to unspecified occlusion or stenosis of right vertebral arteries
- I63.212 – Cerebral infarction due to unspecified occlusion or stenosis of left vertebral arteries
- I63.213 – Cerebral infarction due to unspecified occlusion or stenosis of bilateral vertebral arteries
- I63.219 – Cerebral infarction due to unspecified occlusion or stenosis of unspecified vertebral arteries
- I63.22 – Cerebral infarction due to unspecified occlusion or stenosis of basilar arteries
- I63.231 – Cerebral infarction due to unspecified occlusion or stenosis of right carotid arteries
- I63.232 – Cerebral infarction due to unspecified occlusion or stenosis of left carotid arteries
- I63.233 – Cerebral infarction due to unspecified occlusion or stenosis of bilateral carotid arteries
- I63.239 – Cerebral infarction due to unspecified occlusion or stenosis of unspecified carotid arteries
- I63.29 – Cerebral infarction due to unspecified occlusion or stenosis of other precerebral arteries



- I63.30 – Cerebral infarction due to thrombosis of unspecified cerebral artery
- I63.311 – Cerebral infarction due to thrombosis of right middle cerebral artery
- I63.312 – Cerebral infarction due to thrombosis of left middle cerebral artery
- I63.313 – Cerebral infarction due to thrombosis of bilateral middle cerebral arteries
- I63.319 – Cerebral infarction due to thrombosis of unspecified middle cerebral artery
- I63.321 – Cerebral infarction due to thrombosis of right anterior cerebral artery
- I63.322 – Cerebral infarction due to thrombosis of left anterior cerebral artery
- I63.323 – Cerebral infarction due to thrombosis of bilateral anterior cerebral arteries
- I63.329 – Cerebral infarction due to thrombosis of unspecified anterior cerebral artery
- I63.331 – Cerebral infarction due to thrombosis of right posterior cerebral artery
- I63.332 – Cerebral infarction due to thrombosis of left posterior cerebral artery
- I63.333 – Cerebral infarction due to thrombosis of bilateral posterior cerebral arteries
- I63.339 – Cerebral infarction due to thrombosis of unspecified posterior cerebral artery
- I63.341 – Cerebral infarction due to thrombosis of right cerebellar artery
- I63.342 – Cerebral infarction due to thrombosis of left cerebellar artery
- I63.343 – Cerebral infarction due to thrombosis of bilateral cerebellar artery
- I63.349 – Cerebral infarction due to thrombosis of unspecified cerebellar artery
- I63.39 – Cerebral infarction due to thrombosis of other cerebral artery
- I63.40 – Cerebral infarction due to embolism of unspecified cerebral artery
- I63.411 – Cerebral infarction due to embolism of right middle cerebral artery
- I63.412 – Cerebral infarction due to embolism of left middle cerebral artery
- I63.413 – Cerebral infarction due to embolism of bilateral middle cerebral artery



- I63.419 – Cerebral infarction due to embolism of unspecified middle cerebral arteries
- I63.421 – Cerebral infarction due to embolism of right anterior cerebral artery
- I63.422 – Cerebral infarction due to embolism of left anterior cerebral artery
- I63.423 – Cerebral infarction due to embolism of bilateral anterior cerebral arteries
- I63.429 – Cerebral infarction due to embolism of unspecified anterior cerebral artery
- I63.431 – Cerebral infarction due to embolism of right posterior cerebral artery
- I63.432 – Cerebral infarction due to embolism of left posterior cerebral artery
- I63.433 – Cerebral infarction due to embolism of bilateral anterior cerebral arteries
- I63.439 – Cerebral infarction due to embolism of unspecified posterior cerebral artery
- I63.441 – Cerebral infarction due to embolism of right cerebellar artery
- I63.442 – Cerebral infarction due to embolism of left cerebellar artery
- I63.443 – Cerebral infarction due to embolism of bilateral cerebellar arteries
- I63.449 – Cerebral infarction due to embolism of unspecified cerebellar artery
- I63.49 – Cerebral infarction due to embolism of other cerebellar artery
- I63.50 – Cerebral infarction due to embolism of unspecified cerebral artery
- I63.511 – Cerebral infarction due to embolism of right middle cerebral artery
- I63.512 – Cerebral infarction due to embolism of left middle cerebral artery
- I63.513 – Cerebral infarction due to embolism of bilateral middle cerebral arteries
- I63.519 – Cerebral infarction due to embolism of unspecified middle cerebral artery
- I63.521 – Cerebral infarction due to embolism of right anterior cerebral artery
- I63.522 – Cerebral infarction due to embolism of left anterior cerebral artery
- I63.523 – Cerebral infarction due to embolism of bilateral anterior cerebral artery
- I63.529 – Cerebral infarction due to embolism of unspecified anterior cerebral artery



- I63.531 – Cerebral infarction due to embolism of right posterior cerebral artery
- I63.532 – Cerebral infarction due to embolism of left posterior cerebral artery
- I63.533 – Cerebral infarction due to embolism of bilateral posterior cerebral arteries
- I63.539 – Cerebral infarction due to embolism of unspecified posterior cerebral artery
- I63.541 – Cerebral infarction due to embolism of right cerebellar artery
- I63.542 – Cerebral infarction due to embolism of left cerebellar artery
- I63.543 – Cerebral infarction due to embolism of bilateral cerebellar arteries
- I63.549 – Cerebral infarction due to embolism of unspecified cerebellar artery
- I63.59 – Cerebral infarction due to embolism of other cerebellar artery
- I63.6 – Cerebral infarction due to cerebral venous thrombosis, nonpyogenic
- I63.81 – Other cerebral infarction due to occlusion or stenosis of small artery
- I63.89 – Other cerebral infarction
- I63.9 – Cerebral infarction, unspecified
- Transverse myelitis†
 - G37.3 – Acute transverse myelitis in demyelinating disease of central nervous system

In Phase 2 of the study, the following pregnancy outcomes will be assessed in pregnant individuals or their infants, if sample size permits:

- Spontaneous abortion ([Chomistek et al., 2023](#))
 - O02.1 – Missed abortion
 - O03.** Spontaneous abortion
 - O03.0 – Genital tract and pelvic infection following incomplete spontaneous abortion
 - O03.1 – Delayed or excessive hemorrhage following incomplete spontaneous abortion
 - O03.2 – Embolism following incomplete spontaneous abortion
 - O03.30 – Unspecified complication following incomplete spontaneous abortion
 - O03.31 – Shock following incomplete spontaneous abortion



- O03.32 – Renal failure following incomplete spontaneous abortion
- O03.33 – Metabolic disorder following incomplete spontaneous abortion
- O03.34 – Damage to pelvic organs following incomplete spontaneous abortion
- O03.35 – Other venous complications following incomplete spontaneous abortion
- O03.36 – Cardiac arrest following incomplete spontaneous abortion
- O03.37 – Sepsis following incomplete spontaneous abortion
- O03.38 – Urinary tract infection following incomplete spontaneous abortion
- O03.39 – Incomplete spontaneous abortion with other complications
- O03.4 – Incomplete spontaneous abortion without complication
- O03.5 – Genital tract and pelvic infection following complete or unspecified spontaneous abortion
- O03.6 – Delayed or excessive hemorrhage following complete or unspecified spontaneous abortion
- O03.7 – Embolism following complete or unspecified spontaneous abortion
- O03.80 – Unspecified complication following complete or unspecified spontaneous abortion
- O03.81 – Shock following complete or unspecified spontaneous abortion
- O03.82 – Renal failure following complete or unspecified spontaneous abortion
- O03.83 – Metabolic disorder following complete or unspecified spontaneous abortion
- O03.84 – Damage to pelvic organs following complete or unspecified spontaneous abortion
- O03.85 – Other venous complications following complete or unspecified spontaneous abortion
- O03.86 – Cardiac arrest following complete or unspecified spontaneous abortion
- O03.87 – Sepsis following complete or unspecified spontaneous abortion
- O03.88 – Urinary tract infection following complete or unspecified spontaneous abortion



- O03.89 – Complete or unspecified spontaneous abortion with other complications
- O03.9 – Complete or unspecified spontaneous abortion without complication
- O31.1 – Continuing pregnancy after spontaneous abortion of one fetus or more
- O31.2 – Continuing pregnancy after intrauterine death of one fetus or more
- O36.4 – Maternal care for intrauterine death
- CPT 59800 – Treatment of spontaneous abortion, first trimester
- CPT 59801 – Treatment of spontaneous abortion, first trimester
- CPT 59810 – Treatment of spontaneous abortion, second trimester
- CPT 59811 – Treatment of spontaneous abortion, second trimester
- CPT 59812 – Treatment of spontaneous abortion, dilation and curettage
- CPT 59820 – Treatment of spontaneous abortion, first trimester
- CPT 59821 – Treatment of spontaneous abortion, second trimester
- Stillbirth
 - O31.2 – Continuing pregnancy after intrauterine death of one fetus or more
 - O36.4 – Maternal care for intrauterine death
 - P95 – Stillbirth
 - Z37.1 – Single stillbirth
 - Z37.3 – Twins, one liveborn and one stillborn
 - Z37.4 – Twins, both stillborn
 - Z37.60 – Multiple births, unspecified, some liveborn
 - Z37.61 – Triplets, some liveborn
 - Z37.62 – Quadruplets, some liveborn
 - Z37.63 – Quintuplets, some liveborn
 - Z37.64 – Sextuplets, some liveborn
 - Z37.69 – Other multiple births, some liveborn
 - Z37.7 – Other multiple births, all stillborn



- Preterm birth
 - O60.1 – Preterm labor with preterm delivery
 - P07.2 – Extreme immaturity of newborn
 - P07.3 – Preterm [premature] newborn [other]
 - P07.30 – Preterm newborn, unspecified weeks of gestation
 - P07.31 – Preterm newborn, gestational age 28 completed weeks
 - P07.32 – Preterm newborn, gestational age 29 completed weeks
 - P07.33 – Preterm newborn, gestational age 30 completed weeks
 - P07.34 – Preterm newborn, gestational age 31 completed weeks
 - P07.35 – Preterm newborn, gestational age 32 completed weeks
 - P07.36 – Preterm newborn, gestational age 33 completed weeks
 - P07.37 – Preterm newborn, gestational age 34 completed weeks
 - P07.38 – Preterm newborn, gestational age 35 completed weeks
 - P07.39 – Preterm newborn, gestational age 36 completed weeks
- Small for gestational age
 - P05.10 to P05.19 – Newborn small for gestational age



- Major congenital malformations

The following list of congenital malformation subcategories and codes is based on the European Surveillance of Congenital Anomalies (EUROCAT) Guide 1.4 dated 28 December 2018 (EUROCAT, 2020) and the New York State Department of Health Congenital Malformations Registry coding manual dated 22 October 2019 (New York State Department of Health Birth Defects Registry, 2021), consistent with those tracked by the Metropolitan Atlanta Congenital Defects Program (CDC, 2023a). Minor congenital malformations will be excluded.

EUROCAT subgroups	ICD-10-CM code
All anomalies	Q-chapter, D21.5, D82.1, P35.0, P35.1, P37.1
Nervous system	Q00*, Q01*, Q02, Q03*, Q04*, Q05*, Q06*, Q07**
Neural tube defects	Q00*, Q01*, Q05*
Anencephaly and similar malformations	Q00*
Encephalocele	Q01*
Spina bifida	Q05*
Hydrocephalus	Q03*
Microcephaly	Q02
Arhinencephaly/holoprosencephaly	Q04.1, Q04.2
Eye	Q10*, Q11*, Q12*, Q13**, Q14*, Q15*
Anophthalmos/micropthalmos	Q11.0, Q11.1, Q11.2
Anophthalmos	Q11.0, Q11.1
Congenital cataract	Q12.0
Congenital glaucoma	Q15.0
Ear, face, and neck	Q16*-Q18*
Anotia	Q16.0
Circulatory System	Q20*, Q21**, Q22*, Q23**, Q24*, Q25**, Q26*, Q27**, Q28*
Severe congenital heart defects	Q20.0, Q20.1, Q20.3, Q20.4, Q21.2*, Q21.3, Q22.0, Q22.4, Q22.5, Q22.6, Q23.0, Q23.2, Q23.3, Q23.4, Q25.1, Q25.2*, Q26.2
Common arterial truncus	Q20.0
Double outlet right ventricle	Q20.1
Transposition of great vessels	Q20.3
Single ventricle	Q20.4
Ventricular septal defect (VSD)	Q21.0
Atrial septal defect (ASD)	Q21.1*
Atrioventricular septal defect (AVSD)	Q21.2*
Tetralogy of Fallot	Q21.3
Tricuspid atresia and stenosis	Q22.4
Ebstein's anomaly	Q22.5
Pulmonary valve stenosis	Q22.1
Pulmonary valve atresia	Q22.0
Aortic valve atresia/stenosis	Q23.0
Mitral valve anomalies	Q23.2, Q23.3
Hypoplastic left heart	Q23.4

090177e1a617ace1\Approved\Approved On: 18-May-2026 22:07 (GMT)



EUROCAT subgroups	ICD-10-CM code
Hypoplastic right heart	Q22.6
Coarctation of aorta	Q25.1
Aortic atresia / interrupted aortic arch	Q25.2*
Total anomalous pulmonary venous return (TAPVR)	Q26.2
Patent ductus arteriosus (PDA) as only congenital heart disease (CHD) in term infants (gestational age +37 weeks)	Q25.0
Respiratory	Q30*-Q34*
Choanal atresia	Q30.0
Cystic adenomatoid malformation of lung	Q33.0
Oro-facial clefts	Q35*-Q37*
Cleft lip with or without cleft palate	Q36*, Q37*
Cleft palate	Q35*
Digestive system	Q38*-Q44**, Q45*, Q79.0
Esophageal atresia with or without trachea-esophageal fistula	Q39.0, Q39.1
Duodenal atresia or stenosis	Q41.0
Atresia or stenosis of other parts of small intestine	Q41.1-Q41.8
Ano-rectal atresia and stenosis	Q42.0-Q42.3
Hirschsprung's disease	Q43.1
Atresia of bile ducts	Q44.2
Annular pancreas	Q45.1
Diaphragmatic hernia	Q79.0
Abdominal wall defects	Q79.2, Q79.3, Q79.5*
Gastroschisis	Q79.3
Omphalocele	Q79.2
Urinary	Q60*, Q61**, Q62**, Q63*, Q64**, Q79.4
Bilateral renal agenesis including Potter syndrome	Q60.1, Q60.6
Multicystic renal dysplasia	Q61.4
Congenital hydronephrosis	Q62.0
Bladder exstrophy and/or epispadias	Q64.0, Q64.1*
Posterior urethral valve and/or prune belly	Q64.2, Q79.4
Genital	Q50**, Q51***, Q52***, Q54*, Q55**, Q56*
Hypospadias	Q54*
Indeterminate sex	Q56*
Musculoskeletal	Q65**, Q66***, Q67*, Q68*, Q69*, Q70**, Q71***, Q72***, Q73*, Q74*, Q75*, Q76***, Q77*, Q78*, Q79**
Limb reduction defects	Q71***, Q72***, Q73*
Club foot – talipes equinovarus	Q66.0*
Hip dislocation and/or dysplasia	Q65.0*, Q65.1, Q65.2, Q65.80, Q65.81
Polydactyly	Q69*
Syndactyly	Q70**
Other anomalies/syndromes	
Skeletal dysplasias	Q74.0, Q77*, Q78.0, Q78.2-Q78.8
Craniosynostosis	Q75.0
Congenital constriction bands/amniotic band	Q79.8
Situs inversus	Q89.3

090177e1a617ace1\Approved\Approved On: 18-May-2026 22:07 (GMT)



EUROCAT subgroups	ICD-10-CM code
Conjoined twins	Q89.4
Congenital skin disorders	Q80*-Q82*
VATER/VACTERL	Q87.2
Laterality anomalies	Q20.6, Q24.0, Q33.8, Q89.0, Q89.3
Teratogenic syndromes with malformations	Q86*, P35.0, P35.1, P37.1
Fetal alcohol syndrome	Q86.0
Valproate syndrome	Q86.8
Maternal infections resulting in malformations	P35.0, P35.1, P37.1
Genetic syndromes and microdeletions	Q44.71, Q61.9, Q74.8, Q75.1, Q75.4, Q75.8, Q87**, Q93.51, D82.1

EUROCAT, European Surveillance of Congenital Anomalies; ICD-10-CM, International Classification of Diseases, 10th Revision, Clinical Modification

* Indicates how many additional decimal places may be included though not required in the wildcard, including the number listed. For instance, Q93** should include the following: Q93 (non-billable), Q93.0, Q93.1, Q93.2, Q93.3, Q93.4, Q93.5 (non-billable), Q93.51, Q93.59, Q93.7, Q93.8 (non-billable), Q93.81, Q93.82, Q93.88, Q93.89, Q93.9.

Chromosomal disorders are not included in the outcomes of interest.



17.4. Appendix IV – Covariate Codes

17.4.1. Comorbidities

17.4.1.1. Asthma

17.4.1.1.1. ICD-10-CM Codes

J45.20	Mild intermittent asthma, uncomplicated
J45.21	Mild intermittent asthma with (acute) exacerbation
J45.22	Mild intermittent asthma with status asthmaticus
J45.30	Mild persistent asthma, uncomplicated
J45.31	Mild persistent asthma with (acute) exacerbation
J45.32	Mild persistent asthma with status asthmaticus
J45.40	Moderate persistent asthma, uncomplicated
J45.41	Moderate persistent asthma with (acute) exacerbation
J45.42	Moderate persistent asthma with status asthmaticus
J45.50	Severe persistent asthma, uncomplicated
J45.51	Severe persistent asthma with (acute) exacerbation
J45.52	Severe persistent asthma with status asthmaticus
J45.901	Unspecified asthma with (acute) exacerbation
J45.902	Unspecified asthma with status asthmaticus
J45.909	Unspecified asthma, uncomplicated
J45.991	Cough variant asthma
J45.998	Other asthma
J82.83	Eosinophilic asthma



17.4.1.2. Non-Malignant Blood Disorders

17.4.1.2.1. ICD-10-CM Codes

D55.0	Anemia due to G6PD deficiency
D55.1	Anemia due to other disorders of glutathione metabolism
D55.21	Anemia due to pyruvate kinase deficiency
D55.29	Anemia due to other disorders of glycolytic enzymes
D55.3	Anemia due to disorders of nucleotide metabolism
D55.8	Other anemias due to enzyme disorders
D55.9	Anemia due to enzyme disorder, unspecified
D56.0	Alpha thalassemia
D56.1	Beta thalassemia
D56.2	Delta-beta thalassemia
D56.3	Thalassemia minor
D56.4	Hereditary persistence of fetal hemoglobin [HPFH]
D56.5	Hemoglobin E-beta thalassemia
D56.8	Other thalassemias
D56.9	Thalassemia, unspecified
D57.00	Hb-SS disease w/ crisis, unspecified
D57.01	Hb-SS disease w/ acute chest syndrome
D57.02	Hb-SS disease w/ splenic sequestration
D57.03	Hb-SS disease with cerebral vascular involvement
D57.04	Hb-SS disease with dactylitis
D57.09	Hb-SS disease with crisis with other specified complication



D57.1	Sickle cell disease w/o crisis
D57.20	Sickle cell/Hb-C disease w/o crisis
D57.21	Sickle cell/Hb-C disease w/ crisis
D57.211	Sickle cell/Hb-C disease w/ acute chest syndrome
D57.212	Sickle cell/Hb-C disease w/ splenic sequestration
D57.213	Sickle-cell/Hb-C disease with cerebral vascular involvement
D57.214	Sickle-cell/Hb-C disease with dactylitis
D57.218	Sickle-cell/Hb-C disease with crisis with other specified complication
D57.219	Sickle cell/Hb-C disease w/ crisis, unspecified
D57.3	Sickle cell trait
D57.40	Sickle cell thalassemia w/o crisis
D57.41	Sickle-cell thalassemia w/ crisis
D57.411	Sickle cell thalassemia w/ acute chest syndrome
D57.412	Sickle cell thalassemia w/ splenic sequestration
D57.413	Sickle-cell thalassemia, unspecified, with cerebral vascular involvement
D57.414	Sickle-cell thalassemia, unspecified, with dactylitis
D57.418	Sickle-cell thalassemia, unspecified, with crisis with other specified complication
D57.419	Sickle cell thalassemia w/ crisis, unspecified
D57.42	Sickle-cell thalassemia beta zero without crisis
D57.431	Sickle-cell thalassemia beta zero with acute chest syndrome
D57.432	Sickle-cell thalassemia beta zero with splenic sequestration



D57.433	Sickle-cell thalassemia beta zero with cerebral vascular involvement
D57.434	Sickle-cell thalassemia beta zero with dactylitis
D57.438	Sickle-cell thalassemia beta zero with crisis with other specified complication
D57.439	Sickle-cell thalassemia beta zero with crisis, unspecified
D57.44	Sickle-cell thalassemia beta plus without crisis
D57.451	Sickle-cell thalassemia beta plus with acute chest syndrome
D57.452	Sickle-cell thalassemia beta plus with splenic sequestration
D57.454	Sickle-cell thalassemia beta plus with dactylitis
D57.458	Sickle-cell thalassemia beta plus with crisis with other specified complication
D57.459	Sickle-cell thalassemia beta plus with crisis, unspecified
D57.80	Other sickle cell disorders w/o crisis
D57.811	Other sickle cell disorders w/ acute chest syndrome
D57.812	Other sickle cell disorders w/ splenic sequestration
D57.813	Other sickle-cell disorders with cerebral vascular involvement
D57.814	Other sickle-cell disorders with dactylitis
D57.818	Other sickle-cell disorders with crisis with other specified complication
D57.819	Other sickle cell disorders w/ crisis, unspecified
D58.0	Hereditary spherocytosis
D58.1	Hereditary elliptocytosis
D58.2	Other hemoglobinopathies
D58.8	Other specified hereditary hemolytic anemias



D58.9	Hereditary hemolytic anemia, unspecified
D59.0	Drug-induced autoimmune hemolytic anemia
D59.10	Autoimmune hemolytic anemia, unspecified
D59.11	Warm autoimmune hemolytic anemia
D59.12	Cold autoimmune hemolytic anemia
D59.13	Mixed type autoimmune hemolytic anemia
D59.19	Other autoimmune hemolytic anemia
D59.2	Drug-induced nonautoimmune hemolytic anemia
D59.30	Hemolytic-uremic syndrome, unspecified
D59.31	Infection-associated hemolytic-uremic syndrome
D59.32	Hereditary hemolytic-uremic syndrome
D59.39	Other hemolytic-uremic syndrome
D59.4	Other nonautoimmune hemolytic anemias
D59.5	Paroxysmal nocturnal hemoglobinuria [Marchiafava-Micheli]
D59.6	Hemoglobinuria due to hemolysis from other external causes
D59.8	Other acquired hemolytic anemias
D59.9	Acquired hemolytic anemia, unspecified
D60.0	Chronic acquired pure red cell aplasia
D60.1	Transient acquired pure red cell aplasia
D60.8	Other acquired pure red cell aplasias
D60.9	Acquired pure red cell aplasia, unspecified
D61.01	Constitutional (pure) red blood cell aplasia
D61.02	Shwachman-Diamond syndrome



D61.09	Other constitutional aplastic anemia
D61.1	Drug-induced aplastic anemia
D61.2	Aplastic anemia due to other external agents
D61.3	Idiopathic aplastic anemia
D61.810	Antineoplastic chemotherapy induced pancytopenia
D61.811	Other drug-induced pancytopenia
D61.818	Other pancytopenia
D61.82	Myelophthisis
D61.89	Other specified aplastic anemias and other bone marrow failure syndromes
D61.9	Aplastic anemia, unspecified
D62	Acute posthemorrhagic anemia
D63.0	Anemia in neoplastic disease
D63.1	Anemia in chronic kidney disease
D63.8	Anemia in other chronic diseases classified elsewhere
D64.0	Hereditary sideroblastic anemia
D64.1	Secondary sideroblastic anemia due to disease
D64.2	Secondary sideroblastic anemia due to drugs and toxins
D64.3	Other sideroblastic anemias
D64.4	Congenital dyserythropoietic anemia
D64.81	Anemia due to antineoplastic chemotherapy
D64.89	Other specified anemias
D64.9	Anemia, unspecified



D65	Disseminated intravascular coagulation
D66	Hereditary factor VIII deficiency
D67	Hereditary factor IX deficiency
D68.00	Von Willebrand disease, unspecified
D68.1	Hereditary factor XI deficiency
D68.01	Von Willebrand disease, type 1
D68.020	Von Willebrand disease, type 2A
D68.021	Von Willebrand disease, type 2B
D68.022	Von Willebrand disease, type 2M
D68.023	Von Willebrand disease, type 2N
D68.029	Von Willebrand disease, type 2, unspecified
D68.03	Von Willebrand disease, type 3
D68.04	Acquired von Willebrand disease
D68.09	Other von Willebrand disease
D68.1	Hereditary factor XI deficiency
D68.2	Hereditary deficiency of other clotting factors
D68.311	Acquired hemophilia
D68.312	Antiphospholipid antibody with hemorrhagic disorder
D68.318	Other hemorrhagic disorder due to intrinsic circulating anticoagulants, antibodies, or inhibitors
D68.32	Hemorrhagic disorder due to extrinsic circulating anticoagulants
D68.4	Acquired coagulation factor deficiency
D68.51	Activated protein C resistance



D68.52	Prothrombin gene mutation
D68.59	Other primary thrombophilia
D68.61	Antiphospholipid syndrome
D68.62	Lupus anticoagulant syndrome
D68.69	Other thrombophilia
D68.8	Other specified coagulation defects
D68.9	Coagulation defect, unspecified
D69.0	Allergic purpura
D69.1	Qualitative platelet defects
D69.2	Other nonthrombocytopenic purpura
D69.3	Immune thrombocytopenic purpura
D69.41	Evans syndrome
D69.42	Congenital and hereditary thrombocytopenia purpura
D69.49	Other primary thrombocytopenia
D69.51	Post-transfusion purpura
D69.59	Other secondary thrombocytopenia
D69.6	Thrombocytopenia, unspecified
D69.8	Other specified hemorrhagic conditions
D69.9	Hemorrhagic condition, unspecified
D70.0	Congenital agranulocytosis
D70.1	Agranulocytosis secondary to cancer chemotherapy
D70.2	Other drug-induced agranulocytosis
D70.3	Neutropenia due to infection



D70.4	Cyclic neutropenia
D70.8	Other neutropenia
D70.9	Neutropenia, unspecified,
D71	Functional disorders of polymorphonuclear neutrophils
D72.0	Genetic anomalies of leukocytes
D72.10	Eosinophilia, unspecified
D72.110	Idiopathic hypereosinophilic syndrome [IHES]
D72.111	Lymphocytic Variant Hypereosinophilic Syndrome [LHES]
D72.118	Other hypereosinophilic syndrome
D72.119	Hypereosinophilic syndrome [HES], unspecified
D72.12	Drug rash with eosinophilia and systemic symptoms syndrome
D72.18	Eosinophilia in diseases classified elsewhere
D72.19	Other eosinophilia
D72.810	Lymphocytopenia
D72.818	Other decreased white blood cell count
D72.819	Decreased white blood cell count, unspecified
D72.820	Lymphocytosis (symptomatic)
D72.821	Monocytosis (symptomatic)
D72.822	Plasmacytosis
D72.823	Leukemoid reaction
D72.824	Basophilia
D72.825	Bandemia
D72.828	Other elevated white blood cell count



D72.829	Elevated white blood cell count, unspecified
D72.89	Other specified disorders of white blood cells
D72.9	Disorder of white blood cells, unspecified

17.4.1.3. Chronic Lung Disease

17.4.1.3.1. ICD-10-CM Codes

P27.0	Wilson-Mikity syndrome
P27.1	Bronchopulmonary dysplasia originating in the perinatal period
P27.8	Other chronic respiratory diseases originating in the perinatal period
P27.9	Unspecified chronic respiratory disease originating in the perinatal period
E84.0	Cystic fibrosis with pulmonary manifestations
E84.11	Meconium ileus in cystic fibrosis
E84.19	Cystic fibrosis with other intestinal manifestations
E84.8	Cystic fibrosis with other manifestations
E84.9	Cystic fibrosis, unspecified
I27.0	Primary pulmonary hypertension
I27.1	Kyphoscoliotic heart disease
I27.20	Pulmonary hypertension, unspecified
I27.21	Secondary pulmonary arterial hypertension
I27.22	Pulmonary hypertension due to left heart disease
I27.23	Pulmonary hypertension due to lung diseases and hypoxia
I27.24	Chronic thromboembolic pulmonary hypertension
I27.29	Other secondary pulmonary hypertension
I27.81	Cor pulmonale (chronic)



- I27.82 Chronic pulmonary embolism
- I27.83 Eisenmenger's syndrome
- I27.89 Other specified pulmonary heart diseases
- I27.9 Pulmonary heart disease, unspecified
- I28.0 Arteriovenous fistula of pulmonary vessels
- I28.1 Aneurysm of pulmonary artery
- I28.8 Other diseases of pulmonary vessels
- I28.9 Disease of pulmonary vessels, unspecified
- J41 Simple and mucopurulent chronic bronchitis
- J41.0 Simple chronic bronchitis
- J41.1 Mucopurulent chronic bronchitis
- J41.8 Mixed simple and mucopurulent chronic bronchitis
- J42 Unspecified chronic bronchitis
- J43.0 Unilateral pulmonary emphysema [MacLeod's syndrome]
- J43.1 Panlobular emphysema
- J43.2 Centrilobular emphysema
- J43.8 Other emphysema
- J43.9 Emphysema, unspecified
- J44.0 Chronic obstructive pulmonary disease with (acute) lower respiratory infection
- J44.1 Chronic obstructive pulmonary disease with (acute) exacerbation
- J44.81 Bronchiolitis obliterans and bronchiolitis obliterans syndrome
- J44.89 Other specified chronic obstructive pulmonary disease



J44.9	Chronic obstructive pulmonary disease, unspecified
J60	Coal worker's pneumoconiosis
J61	Pneumoconiosis due to asbestos and other mineral fibers
J62.0	Pneumoconiosis due to talc dust
J62.8	Pneumoconiosis due to other dust containing silica
J63.0	Aluminosis (of lung)
J63.1	Bauxite fibrosis (of lung)
J63.2	Berylliosis
J63.3	Graphite fibrosis (of lung)
J63.4	Siderosis
J63.5	Stannosis
J63.6	Pneumoconiosis due to other specified inorganic dusts
J64	Unspecified pneumoconiosis
J65	Pneumoconiosis associated with tuberculosis
J66.0	Byssinosis
J66.1	Flax-dressers' disease
J66.2	Cannabinosis
J66.8	Airway disease due to other specific organic dusts
J67	Hypersensitivity pneumonitis due to organic dust
J67.0	Farmer's lung
J67.1	Bagassosis
J67.2	Bird fancier's lung
J67.3	Suberosis



- J67.4 Maltworker's lung
- J67.5 Mushroom-worker's lung
- J67.6 Maple-bark-stripper's lung
- J67.7 Air conditioner and humidifier lung
- J67.8 Hypersensitivity pneumonitis due to other organic dusts
- J67.9 Hypersensitivity pneumonitis due to unspecified organic dust
- J68.4 Chronic respiratory conditions due to chemicals, gases, fumes and vapors
- J68.8 Other respiratory conditions due to chemicals, gases, fumes and vapors
- J68.9 Unspecified respiratory condition due to chemicals, gases, fumes and vapors
- J70.1 Chronic and other pulmonary manifestations due to radiation
- J70.3 Chronic drug-induced interstitial lung disorders
- J70.5 Respiratory conditions due to smoke inhalation
- J81.1 Chronic pulmonary edema
- J82.81 Chronic eosinophilic pneumonia
- J84.01 Alveolar proteinosis
- J84.02 Pulmonary alveolar microlithiasis
- J84.03 Idiopathic pulmonary hemosiderosis
- J84.09 Other alveolar and parieto-alveolar conditions
- J84.10 Pulmonary fibrosis, unspecified
- J84.111 Idiopathic interstitial pneumonia, not otherwise specified
- J84.112 Idiopathic pulmonary fibrosis
- J84.113 Idiopathic non-specific interstitial pneumonitis



- J84.115 Respiratory bronchiolitis interstitial lung disease
- J84.116 Cryptogenic organizing pneumonia
- J84.117 Desquamative interstitial pneumonia
- J84.170 Interstitial lung disease with progressive fibrotic phenotype in diseases classified elsewhere
- J84.178 Other interstitial pulmonary diseases with fibrosis in diseases classified elsewhere
- J84.2 Lymphoid interstitial pneumonia
- J84.81 Lymphangioleiomyomatosis
- J84.82 Adult pulmonary Langerhans cell histiocytosis
- J84.83 Surfactant mutations of the lung
- J84.841 Neuroendocrine cell hyperplasia of infancy
- J84.842 Pulmonary interstitial glycogenosis
- J84.843 Alveolar capillary dysplasia with vein misalignment
- J84.848 Other interstitial lung diseases of childhood
- J84.89 Other specified interstitial pulmonary diseases
- J84.9 Interstitial pulmonary disease, unspecified
- Z77.090 Contact with and (suspected) exposure to asbestos
- J85.0 Gangrene and necrosis of lung
- J93.81 Chronic pneumothorax



17.4.1.4. Down Syndrome

17.4.1.4.1. ICD-10-CM Codes

- Q90.0 Trisomy 21, nonmosaicism (meiotic nondisjunction)
- Q90.1 Trisomy 21, mosaicism (mitotic nondisjunction)
- Q90.2 Trisomy 21, translocation
- Q90.9 Down syndrome, unspecified

17.4.1.5. Heart Disease

17.4.1.5.1. ICD-10-CM Codes

- I01.0 Acute rheumatic pericarditis
- I01.1 Acute rheumatic endocarditis
- I01.2 Acute rheumatic myocarditis
- I01.8 Other acute rheumatic heart disease
- I01.9 Acute rheumatic heart disease, unspecified
- I02.0 Rheumatic chorea with heart involvement
- I05.0 Rheumatic mitral stenosis
- I05.1 Rheumatic mitral insufficiency
- I05.2 Rheumatic mitral stenosis with insufficiency
- I05.8 Other rheumatic mitral valve diseases
- I05.9 Rheumatic mitral valve disease, unspecified
- I06.0 Rheumatic aortic stenosis
- I06.1 Rheumatic aortic insufficiency
- I06.2 Rheumatic aortic stenosis with insufficiency
- I07.0 Rheumatic tricuspid stenosis
- I07.1 Rheumatic tricuspid insufficiency



- I07.2 Rheumatic tricuspid stenosis and insufficiency
- I07.8 Other rheumatic tricuspid valve diseases
- I07.9 Rheumatic tricuspid valve disease, unspecified
- I06.8 Other rheumatic aortic valve diseases
- I06.9 Rheumatic aortic valve disease, unspecified
- I08.0 Rheumatic disorders of both mitral and aortic valves
- I08.1 Rheumatic disorders of both mitral and tricuspid valves
- I08.2 Rheumatic disorders of both aortic and tricuspid valves
- I08.3 Combined rheumatic disorders of mitral, aortic and tricuspid valves
- I08.8 Other rheumatic multiple valve diseases
- I08.9 Rheumatic multiple valve disease, unspecified
- I09.0 Rheumatic myocarditis
- I09.1 Rheumatic diseases of endocardium, valve unspecified
- I09.2 Chronic rheumatic pericarditis
- I09.81 Rheumatic heart failure
- I09.89 Other specified rheumatic heart diseases
- I09.9 Rheumatic heart disease, unspecified
- I11.0 Hypertensive heart disease with heart failure
- I11.9 Hypertensive heart disease without heart failure
- I13.0 Hypertensive heart and chronic kidney disease with heart failure and stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease
- I13.10 Hypertensive heart and chronic kidney disease without heart failure, with stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease



- I13.11 Hypertensive heart and chronic kidney disease without heart failure, with stage 5 chronic kidney disease, or end stage renal disease
- I13.2 Hypertensive heart and chronic kidney disease with heart failure and with stage 5 chronic kidney disease, or end stage renal disease
- I20.0 Unstable angina
- I20.1 Angina pectoris with documented spasm
- I20.8 Other forms of angina pectoris
- I21.01 ST elevation (STEMI) myocardial infarction involving left main coronary artery
- I21.02 ST elevation (STEMI) myocardial infarction involving left anterior descending coronary artery
- I21.09 ST elevation (STEMI) myocardial infarction involving other coronary artery of anterior wall
- I21.11 ST elevation (STEMI) myocardial infarction involving right coronary artery
- I21.19 ST elevation (STEMI) myocardial infarction involving other coronary artery of inferior wall
- I21.21 ST elevation (STEMI) myocardial infarction involving left circumflex coronary artery
- I21.29 ST elevation (STEMI) myocardial infarction involving other sites
- I21.3 ST elevation (STEMI) myocardial infarction of unspecified site
- I21.4 Non-ST elevation (NSTEMI) myocardial infarction
- I21.9 Acute myocardial infarction, unspecified
- I21.A1 Myocardial infarction type 2
- I21.A9 Other myocardial infarction type
- I22.0 Subsequent ST elevation (STEMI) myocardial infarction of anterior wall



- I22.1 Subsequent ST elevation (STEMI) myocardial infarction of inferior wall
- I22.2 Subsequent non-ST elevation (NSTEMI) myocardial infarction
- I22.8 Subsequent ST elevation (STEMI) myocardial infarction of other sites
- I22.9 Subsequent ST elevation (STEMI) myocardial infarction of unspecified site
- I23.0 Hemopericardium as current complication following acute myocardial infarction
- I23.1 Atrial septal defect as current complication following acute myocardial infarction
- I23.2 Ventricular septal defect as current complication following acute myocardial infarction
- I23.3 Rupture of cardiac wall without hemopericardium as current complication following acute myocardial infarction
- I23.4 Rupture of chordae tendineae as current complication following acute myocardial infarction
- I23.5 Rupture of papillary muscle as current complication following acute myocardial infarction
- I23.6 Thrombosis of atrium, auricular appendage, and ventricle as current complications following acute myocardial infarction
- I23.7 Postinfarction angina
- I23.8 Other current complications following acute myocardial infarction
- I24.0 Acute coronary thrombosis not resulting in myocardial infarction
- I24.1 Dressler's syndrome
- I24.8 Other forms of acute ischemic heart disease
- I24.9 Acute ischemic heart disease, unspecified
- I25.10 Atherosclerotic heart disease of native coronary artery without angina pectoris



- I25.110 Atherosclerotic heart disease of native coronary artery with unstable angina pectoris
- I25.111 Atherosclerotic heart disease of native coronary artery with angina pectoris with documented spasm
- I25.118 Atherosclerotic heart disease of native coronary artery with other forms of angina pectoris
- I25.119 Atherosclerotic heart disease of native coronary artery with unspecified angina pectoris
- I25.3 Aneurysm of heart
- I25.41 Coronary artery aneurysm
- I25.42 Coronary artery dissection
- I25.5 Ischemic cardiomyopathy
- I25.6 Silent myocardial ischemia
- I25.700 Atherosclerosis of coronary artery bypass graft(s), unspecified, with unstable angina pectoris
- I25.701 Atherosclerosis of coronary artery bypass graft(s), unspecified, with angina pectoris with documented spasm
- I25.708 Atherosclerosis of coronary artery bypass graft(s), unspecified, with other forms of angina pectoris
- I25.709 Atherosclerosis of coronary artery bypass graft(s), unspecified, with unspecified angina pectoris
- I25.710 Atherosclerosis of autologous vein coronary artery bypass graft(s) with unstable angina pectoris
- I25.711 Atherosclerosis of autologous vein coronary artery bypass graft(s) with angina pectoris with documented spasm
- I25.718 Atherosclerosis of autologous vein coronary artery bypass graft(s) with other forms of angina pectoris



- I25.719 Atherosclerosis of autologous vein coronary artery bypass graft(s) with unspecified angina pectoris
- I25.720 Atherosclerosis of autologous artery coronary artery bypass graft(s) with unstable angina pectoris
- I25.721 Atherosclerosis of autologous artery coronary artery bypass graft(s) with angina pectoris with documented spasm
- I25.728 Atherosclerosis of autologous artery coronary artery bypass graft(s) with other forms of angina pectoris
- I25.729 Atherosclerosis of autologous artery coronary artery bypass graft(s) with unspecified angina pectoris
- I25.730 Atherosclerosis of nonautologous biological coronary artery bypass graft(s) with unstable angina pectoris
- I25.731 Atherosclerosis of nonautologous biological coronary artery bypass graft(s) with angina pectoris with documented spasm
- I25.738 Atherosclerosis of nonautologous biological coronary artery bypass graft(s) with other forms of angina pectoris
- I25.739 Atherosclerosis of nonautologous biological coronary artery bypass graft(s) with unspecified angina pectoris
- I25.750 Atherosclerosis of native coronary artery of transplanted heart with unstable angina
- I25.751 Atherosclerosis of native coronary artery of transplanted heart with angina pectoris with documented spasm
- I25.758 Atherosclerosis of native coronary artery of transplanted heart with other forms of angina pectoris
- I25.759 Atherosclerosis of native coronary artery of transplanted heart with unspecified angina pectoris
- I25.760 Atherosclerosis of bypass graft of coronary artery of transplanted heart with unstable angina
- I25.761 Atherosclerosis of bypass graft of coronary artery of transplanted heart with angina pectoris with documented spasm



- I25.768 Atherosclerosis of bypass graft of coronary artery of transplanted heart with other forms of angina pectoris
- I25.769 Atherosclerosis of bypass graft of coronary artery of transplanted heart with unspecified angina pectoris
- I25.790 Atherosclerosis of other coronary artery bypass graft(s) with unstable angina pectoris
- I25.791 Atherosclerosis of other coronary artery bypass graft(s) with angina pectoris with documented spasm
- I25.798 Atherosclerosis of other coronary artery bypass graft(s) with other forms of angina pectoris
- I25.799 Atherosclerosis of other coronary artery bypass graft(s) with unspecified angina pectoris
- I25.810 Atherosclerosis of coronary artery bypass graft(s) without angina pectoris
- I25.811 Atherosclerosis of native coronary artery of transplanted heart without angina pectoris
- I25.812 Atherosclerosis of bypass graft of coronary artery of transplanted heart without angina pectoris
- I25.82 Chronic total occlusion of coronary artery
- I25.83 Coronary atherosclerosis due to lipid rich plaque
- I25.84 Coronary atherosclerosis due to calcified coronary lesion
- I25.89 Other forms of chronic ischemic heart disease
- I25.9 Chronic ischemic heart disease, unspecified
- I26.01 Septic pulmonary embolism with acute cor pulmonale
- I26.02 Saddle embolus of pulmonary artery with acute cor pulmonale
- I26.09 Other pulmonary embolism with acute cor pulmonale
- I27.1 Kyphoscoliotic heart disease



- I27.22 Pulmonary hypertension due to left heart disease
- I27.81 Cor pulmonale (chronic)
- I27.83 Eisenmenger's syndrome
- I27.9 Pulmonary heart disease, unspecified
- I30.0 Acute nonspecific idiopathic pericarditis
- I30.1 Infective pericarditis
- I30.8 Other forms of acute pericarditis
- I30.9 Acute pericarditis, unspecified
- I31.0 Chronic adhesive pericarditis
- I31.1 Chronic constrictive pericarditis
- I31.2 Hemopericardium, not elsewhere classified
- I31.3 Pericardial effusion (noninflammatory)
- I31.4 Cardiac tamponade
- I31.8 Other specified diseases of pericardium
- I31.9 Disease of pericardium, unspecified
- I33.0 Acute and subacute infective endocarditis
- I33.9 Acute and subacute endocarditis, unspecified
- I34.0 Nonrheumatic mitral (valve) insufficiency
- I34.1 Nonrheumatic mitral (valve) prolapse
- I34.2 Nonrheumatic mitral (valve) stenosis
- I34.8 Other nonrheumatic mitral valve disorders
- I34.9 Nonrheumatic mitral valve disorder, unspecified
- I35.0 Nonrheumatic aortic (valve) stenosis



- I35.1 Nonrheumatic aortic (valve) insufficiency
- I35.2 Nonrheumatic aortic (valve) stenosis with insufficiency
- I35.8 Other nonrheumatic aortic valve disorders
- I35.9 Nonrheumatic aortic valve disorder, unspecified
- I36.0 Nonrheumatic tricuspid (valve) stenosis
- I36.1 Nonrheumatic tricuspid (valve) insufficiency
- I36.2 Nonrheumatic tricuspid (valve) stenosis with insufficiency
- I36.8 Other nonrheumatic tricuspid valve disorders
- I36.9 Nonrheumatic tricuspid valve disorder, unspecified
- I37.0 Nonrheumatic pulmonary valve stenosis
- I37.1 Nonrheumatic pulmonary valve insufficiency
- I37.2 Nonrheumatic pulmonary valve stenosis with insufficiency
- I37.8 Other nonrheumatic pulmonary valve disorders
- I37.9 Nonrheumatic pulmonary valve disorder, unspecified
- I38 Endocarditis, valve unspecified
- I39 Endocarditis and heart valve disorders in diseases classified elsewhere
- I40.0 Infective myocarditis
- I40.1 Isolated myocarditis
- I40.8 Other acute myocarditis
- I40.9 Acute myocarditis, unspecified
- I41 Myocarditis in diseases classified elsewhere
- I42.0 Dilated cardiomyopathy
- I42.1 Obstructive hypertrophic cardiomyopathy



- I42.2 Other hypertrophic cardiomyopathy
- I42.3 Endomyocardial (eosinophilic) disease
- I42.4 Endocardial fibroelastosis
- I42.5 Other restrictive cardiomyopathy
- I42.6 Alcoholic cardiomyopathy
- I42.7 Cardiomyopathy due to drug and external agent
- I42.8 Other cardiomyopathies
- I42.9 Cardiomyopathy, unspecified
- I43 Cardiomyopathy in diseases classified elsewhere
- I44.0 Atrioventricular block, first degree
- I44.1 Atrioventricular block, second degree
- I44.2 Atrioventricular block, complete
- I44.3 Other and unspecified atrioventricular block
- I44.30 Unspecified atrioventricular block
- I44.39 Other atrioventricular block
- I44.4 Left anterior fascicular block
- I44.5 Left posterior fascicular block
- I44.60 Unspecified fascicular block
- I44.69 Other fascicular block
- I44.7 Left bundle-branch block, unspecified
- I45.0 Right fascicular block
- I45.10 Unspecified right bundle-branch block
- I45.19 Other right bundle-branch block



- I45.2 Bifascicular block
- I45.3 Trifascicular block
- I45.4 Nonspecific intraventricular block
- I45.5 Other specified heart block
- I45.6 Pre-excitation syndrome
- I45.81 Long QT syndrome
- I45.89 Other specified conduction disorders
- I45.9 Conduction disorder, unspecified
- I46.2 Cardiac arrest due to underlying cardiac condition
- I46.8 Cardiac arrest due to other underlying condition
- I46.9 Cardiac arrest, cause unspecified
- I47.0 Re-entry ventricular arrhythmia
- I47.1 Supraventricular tachycardia
- I47.2 Ventricular tachycardia
- I47.9 Paroxysmal tachycardia, unspecified
- I48.0 Paroxysmal atrial fibrillation
- I48.11 Longstanding persistent atrial fibrillation
- I48.19 Other persistent atrial fibrillation
- I48.20 Chronic atrial fibrillation, unspecified
- I48.21 Permanent atrial fibrillation
- I48.3 Typical atrial flutter
- I48.4 Atypical atrial flutter
- I48.91 Unspecified atrial fibrillation



I48.92	Unspecified atrial flutter
I49.01	Ventricular fibrillation
I49.02	Ventricular flutter
I49.1	Atrial premature depolarization
I49.2	Junctional premature depolarization
I49.3	Ventricular premature depolarization
I49.40	Unspecified premature depolarization
I49.49	Other premature depolarization
I49.5	Sick sinus syndrome
I49.8	Other specified cardiac arrhythmias
I49.9	Cardiac arrhythmia, unspecified
I50.1	Left ventricular failure, unspecified
I50.21	Acute systolic (congestive) heart failure
I50.22	Chronic systolic (congestive) heart failure
I50.23	Acute on chronic systolic (congestive) heart failure
I50.30	Unspecified diastolic (congestive) heart failure
I50.31	Acute diastolic (congestive) heart failure
I50.32	Chronic diastolic (congestive) heart failure
I50.33	Acute on chronic diastolic (congestive) heart failure
I50.40	Unspecified combined systolic (congestive) and diastolic (congestive) heart failure
I50.41	Acute combined systolic (congestive) and diastolic (congestive) heart failure



- I50.42 Chronic combined systolic (congestive) and diastolic (congestive) heart failure
- I50.43 Acute on chronic combined systolic (congestive) and diastolic (congestive) heart failure
- I50.810 Right heart failure, unspecified
- I50.811 Acute right heart failure
- I50.812 Chronic right heart failure
- I50.813 Acute on chronic right heart failure
- I50.814 Right heart failure due to left heart failure
- I50.82 Biventricular heart failure
- I50.83 High output heart failure
- I50.84 End stage heart failure
- I50.89 Other heart failure
- I50.9 Heart failure, unspecified
- I51.0 Cardiac septal defect, acquired
- I51.1 Rupture of chordae tendineae, not elsewhere classified
- I51.2 Rupture of papillary muscle, not elsewhere classified
- I51.3 Intracardiac thrombosis, not elsewhere classified
- I51.4 Myocarditis, unspecified
- I51.5 Myocardial degeneration
- I51.7 Cardiomegaly
- I51.81 Takotsubo syndrome
- I51.89 Other ill-defined heart diseases
- I51.9 Heart disease, unspecified



I52 Other heart disorders in diseases classified elsewhere

17.4.1.6. History of SARS-CoV-2 Infection

17.4.1.6.1. ICD-10-CM Codes

- U07.1 COVID-19, virus identified
- B97.29 Other coronavirus as the cause of diseases classified elsewhere
- J12.82 Pneumonia due to coronavirus disease 2019
- Z86.16 Personal history of COVID-19

17.4.1.7. Immunocompromised Status

17.4.1.7.1. ICD-10-CM Codes

- D80.0 Hereditary hypogammaglobulinemia
- D80.1 Nonfamilial hypogammaglobulinemia
- D80.2 Selective deficiency of immunoglobulin A [IgA]
- D80.3 Selective deficiency of immunoglobulin G [IgG] subclasses
- D80.4 Selective deficiency of immunoglobulin M [IgM]
- D80.5 Immunodeficiency with increased immunoglobulin M [IgM]
- D80.6 Antibody deficiency with near-normal immunoglobulins or with hyperimmunoglobulinemia
- D80.7 Transient hypogammaglobulinemia of infancy
- D80.8 Other immunodeficiencies with predominantly antibody defects
- D80.9 Immunodeficiency with predominantly antibody defects, unspecified
- D81.0 Severe combined immunodeficiency [SCID] with reticular dysgenesis
- D81.1 Severe combined immunodeficiency [SCID] with low T- and B-cell numbers
- D81.2 Severe combined immunodeficiency [SCID] with low or normal B-cell numbers



- D81.30 Adenosine deaminase deficiency, unspecified
- D81.31 Severe combined immunodeficiency due to adenosine deaminase deficiency
- D81.32 Adenosine deaminase 2 deficiency
- D81.39 Other adenosine deaminase deficiency
- D81.4 Nezelof's syndrome
- D81.5 Purine nucleoside phosphorylase [PNP] deficiency
- D81.6 Major histocompatibility complex class I deficiency
- D81.7 Major histocompatibility complex class II deficiency
- D81.8 Other combined immunodeficiencies
- D81.81 Biotin-dependent carboxylase deficiency
- D81.810 Biotinidase deficiency
- D81.818 Other biotin-dependent carboxylase deficiency
- D81.819 Biotin-dependent carboxylase deficiency, unspecified
- D81.89 Other combined immunodeficiencies
- D81.9 Combined immunodeficiency, unspecified
- D82.0 Wiskott-Aldrich syndrome
- D82.1 Di George's syndrome
- D82.2 Immunodeficiency with short-limbed stature
- D82.3 Immunodeficiency following hereditary defective response to Epstein-Barr virus
- D82.4 Hyperimmunoglobulin E [IgE] syndrome
- D82.8 Immunodeficiency associated with other specified major defects
- D82.9 Immunodeficiency associated with major defect, unspecified



D83	Common variable immunodeficiency
D83.0	Common variable immunodeficiency with predominant abnormalities of B-cell numbers and function
D83.1	Common variable immunodeficiency with predominant immunoregulatory T-cell disorders
D83.2	Common variable immunodeficiency with autoantibodies to B- or T-cells
D83.8	Other common variable immunodeficiencies
D83.9	Common variable immunodeficiency, unspecified
D84.0	Lymphocyte function antigen-1 [LFA-1] defect
D84.1	Defects in the complement system
D84.8	Other specified immunodeficiencies
D84.9	Immunodeficiency, unspecified
B20	Human immunodeficiency virus [HIV] disease
Z21	Asymptomatic human immunodeficiency virus [HIV] infection status
O98.7	Human immunodeficiency virus [HIV] disease complicating pregnancy, childbirth and the puerperium
B97.35	Human immunodeficiency virus, type 2 [HIV 2] as the cause of diseases classified elsewhere
Z94.0	Kidney transplant status
Z94.1	Heart transplant status
Z94.2	Lung transplant status
Z94.3	Heart and lungs transplant status
Z94.4	Liver transplant status
Z94.5	Skin transplant status



Z94.6	Bone transplant status
Z94.7	Corneal transplant status
Z94.81	Bone marrow transplant status
Z94.82	Intestine transplant status
Z94.83	Pancreas transplant status
Z94.84	Stem cells transplant status
Z94.89	Other transplanted organ and tissue status
Z94.9	Transplanted organ and tissue status, unspecified

17.4.1.7.2. CPT Codes

33935	Heart-lung transplant with recipient cardiectomy-pneumonectomy
33945	Heart transplant, with or without recipient cardiectomy
80158	Cyclosporine
80197	Tacrolimus
80195	Sirolimus
80180	Mycophenolate (mycophenolic acid)

17.4.1.7.3. HCPCS Codes

J0485	Injection, belatacept, 1 mg
J7500	Azathioprine, oral, 50 mg
J7501	Azathioprine, parenteral, 100 mg
J7502	Cyclosporine, oral, 100 mg
J7503	Tacrolimus, extended release, (Envarsus XR), oral, 0.25 mg
J7504	Lymphocyte immune globulin, antithymocyte globulin, equine, parenteral, 250 mg
J7505	Muromonab-CD3, parenteral, 5 mg



J7507	Tacrolimus, immediate release, oral, 1 mg
J7508	Tacrolimus, extended release, (Astagraf XL), oral, 0.1 mg
J7509	Methylprednisolone oral, per 4 mg
J7510	Prednisolone oral, per 5 mg
J7511	Lymphocyte immune globulin, antithymocyte globulin, rabbit, parenteral, 25 mg
J7512	Prednisone, immediate release or delayed release, oral, 1 mg
J7513	Daclizumab, parenteral, 25 mg
J7515	Cyclosporine, oral, 25 mg
J7516	Cyclosporin, parenteral, 250 mg
J7517	Mycophenolate mofetil, oral, 250 mg
J7518	Mycophenolic acid, oral, 180 mg
J7519	Injection, mycophenolate mofetil, 10 mg
J7520	Sirolimus, oral, 1 mg
J7525	Tacrolimus, parenteral, 5 mg
J7527	Everolimus, oral, 0.25 mg
J7599	Immunosuppressive drug, not otherwise classified
J8530	Cyclophosphamide; oral, 25 mg
J8610	Methotrexate; oral, 2.5 mg



17.4.1.7.4. NDC Codes

NDC codes corresponding to the above immunosuppressant medications will be utilized where applicable.

17.4.1.8. Kidney Disorders

17.4.1.8.1. ICD-10-CM Codes

N00.0	Acute nephritic syndrome with minor glomerular abnormality
N00.1	Acute nephritic syndrome with focal and segmental glomerular lesions
N00.2	Acute nephritic syndrome with diffuse membranous glomerulonephritis
N00.3	Acute nephritic syndrome with diffuse mesangial proliferative glomerulonephritis
N00.4	Acute nephritic syndrome with diffuse endocapillary proliferative glomerulonephritis
N00.5	Acute nephritic syndrome with diffuse mesangiocapillary glomerulonephritis
N00.6	Acute nephritic syndrome with dense deposit disease
N00.7	Acute nephritic syndrome with diffuse crescentic glomerulonephritis
N00.8	Acute nephritic syndrome with other morphologic changes
N00.9	Acute nephritic syndrome with unspecified morphologic changes
N01.0	Rapidly progressive nephritic syndrome with minor glomerular abnormality
N01.1	Rapidly progressive nephritic syndrome with focal and segmental glomerular lesions
N01.2	Rapidly progressive nephritic syndrome with diffuse membranous glomerulonephritis
N01.3	Rapidly progressive nephritic syndrome with diffuse mesangial proliferative glomerulonephritis



- N01.4 Rapidly progressive nephritic syndrome with diffuse endocapillary proliferative glomerulonephritis
- N01.5 Rapidly progressive nephritic syndrome with diffuse mesangiocapillary glomerulonephritis
- N01.6 Rapidly progressive nephritic syndrome with dense deposit disease
- N01.7 Rapidly progressive nephritic syndrome with diffuse crescentic glomerulonephritis
- N01.8 Rapidly progressive nephritic syndrome with other morphologic changes
- N01.9 Rapidly progressive nephritic syndrome with unspecified morphologic changes
- N02.0 Recurrent and persistent hematuria with minor glomerular abnormality
- N02.1 Recurrent and persistent hematuria with focal and segmental glomerular lesions
- N02.2 Recurrent and persistent hematuria with diffuse membranous glomerulonephritis
- N02.3 Recurrent and persistent hematuria with diffuse mesangial proliferative glomerulonephritis
- N02.4 Recurrent and persistent hematuria with diffuse endocapillary proliferative glomerulonephritis
- N02.5 Recurrent and persistent hematuria with diffuse mesangiocapillary glomerulonephritis
- N02.6 Recurrent and persistent hematuria with dense deposit disease
- N02.7 Recurrent and persistent hematuria with diffuse crescentic glomerulonephritis
- N02.8 Recurrent and persistent hematuria with other morphologic changes
- N02.9 Recurrent and persistent hematuria with unspecified morphologic changes



- N03.0 Chronic nephritic syndrome with minor glomerular abnormality
- N03.1 Chronic nephritic syndrome with focal and segmental glomerular lesions
- N03.2 Chronic nephritic syndrome with diffuse membranous glomerulonephritis
- N03.3 Chronic nephritic syndrome with diffuse mesangial proliferative glomerulonephritis
- N03.4 Chronic nephritic syndrome with diffuse endocapillary proliferative glomerulonephritis
- N03.5 Chronic nephritic syndrome with diffuse mesangiocapillary glomerulonephritis
- N03.6 Chronic nephritic syndrome with dense deposit disease
- N03.7 Chronic nephritic syndrome with diffuse crescentic glomerulonephritis
- N03.8 Chronic nephritic syndrome with other morphologic changes
- N03.9 Chronic nephritic syndrome with unspecified morphologic changes
- N04.0 Nephrotic syndrome with minor glomerular abnormality
- N04.1 Nephrotic syndrome with focal and segmental glomerular lesions
- N04.2 Nephrotic syndrome with diffuse membranous glomerulonephritis
- N04.3 Nephrotic syndrome with diffuse mesangial proliferative glomerulonephritis
- N04.4 Nephrotic syndrome with diffuse endocapillary proliferative glomerulonephritis
- N04.5 Nephrotic syndrome with diffuse mesangiocapillary glomerulonephritis
- N04.6 Nephrotic syndrome with dense deposit disease
- N04.7 Nephrotic syndrome with diffuse crescentic glomerulonephritis
- N04.8 Nephrotic syndrome with other morphologic changes



- N04.9 Nephrotic syndrome with unspecified morphologic changes
- N05.0 Unspecified nephritic syndrome with minor glomerular abnormality
- N05.1 Unspecified nephritic syndrome with focal and segmental glomerular lesions
- N05.2 Unspecified nephritic syndrome with diffuse membranous glomerulonephritis
- N05.3 Unspecified nephritic syndrome with diffuse mesangial proliferative glomerulonephritis
- N05.4 Unspecified nephritic syndrome with diffuse endocapillary proliferative glomerulonephritis
- N05.5 Unspecified nephritic syndrome with diffuse mesangiocapillary glomerulonephritis
- N05.6 Unspecified nephritic syndrome with dense deposit disease
- N05.7 Unspecified nephritic syndrome with diffuse crescentic glomerulonephritis
- N05.8 Unspecified nephritic syndrome with other morphologic changes
- N05.9 Unspecified nephritic syndrome with unspecified morphologic changes
- N06.0 Isolated proteinuria with minor glomerular abnormality
- N06.1 Isolated proteinuria with focal and segmental glomerular lesions
- N06.2 Isolated proteinuria with diffuse membranous glomerulonephritis
- N06.3 Isolated proteinuria with diffuse mesangial proliferative glomerulonephritis
- N06.4 Isolated proteinuria with diffuse endocapillary proliferative glomerulonephritis
- N06.5 Isolated proteinuria with diffuse mesangiocapillary glomerulonephritis
- N06.6 Isolated proteinuria with dense deposit disease

090177e1a617ace1\Approved\Approved On: 18-May-2026 22:07 (GMT)



- N06.7 Isolated proteinuria with diffuse crescentic glomerulonephritis
- N06.8 Isolated proteinuria with other morphologic lesion
- N06.9 Isolated proteinuria with unspecified morphologic lesion
- N07.0 Hereditary nephropathy, not elsewhere classified with minor glomerular abnormality
- N07.1 Hereditary nephropathy, not elsewhere classified with focal and segmental glomerular lesions
- N07.2 Hereditary nephropathy, not elsewhere classified with diffuse membranous glomerulonephritis
- N07.3 Hereditary nephropathy, not elsewhere classified with diffuse mesangial proliferative glomerulonephritis
- N07.4 Hereditary nephropathy, not elsewhere classified with diffuse endocapillary proliferative glomerulonephritis
- N07.5 Hereditary nephropathy, not elsewhere classified with diffuse mesangiocapillary glomerulonephritis
- N07.6 Hereditary nephropathy, not elsewhere classified with dense deposit disease
- N07.7 Hereditary nephropathy, not elsewhere classified with diffuse crescentic glomerulonephritis
- N07.8 Hereditary nephropathy, not elsewhere classified with other morphologic lesions
- N07.9 Hereditary nephropathy, not elsewhere classified with unspecified morphologic lesions
- N08 Glomerular disorders in diseases classified elsewhere
- N10 Acute pyelonephritis
- N11.0 Nonobstructive reflux-associated chronic pyelonephritis
- N11.1 Chronic obstructive pyelonephritis
- N11.8 Other chronic tubulo-interstitial nephritis



- N11.9 Chronic tubulo-interstitial nephritis, unspecified
- N12 Tubulo-interstitial nephritis, not specified as acute or chronic
- N13.0 Hydronephrosis with ureteropelvic junction obstruction
- N13.1 Hydronephrosis with ureteral stricture, not elsewhere classified
- N13.2 Hydronephrosis with renal and ureteral calculous obstruction
- N13.30 Unspecified hydronephrosis
- N13.39 Other hydronephrosis
- N13.4 Hydroureter
- N13.5 Crossing vessel and stricture of ureter without hydronephrosis
- N13.6 Pyonephrosis
- N13.70 Vesicoureteral-reflux, unspecified
- N13.71 Vesicoureteral-reflux without reflux nephropathy
- N13.721 Vesicoureteral-reflux with reflux nephropathy without hydroureter, unilateral
- N13.722 Vesicoureteral-reflux with reflux nephropathy without hydroureter, bilateral
- N13.729 Vesicoureteral-reflux with reflux nephropathy without hydroureter, unspecified
- N13.731 Vesicoureteral-reflux with reflux nephropathy with hydroureter, unilateral
- N13.732 Vesicoureteral-reflux with reflux nephropathy with hydroureter, bilateral
- N13.739 Vesicoureteral-reflux with reflux nephropathy with hydroureter, unspecified
- N13.8 Other obstructive and reflux uropathy
- N13.9 Obstructive and reflux uropathy, unspecified



- N14.0 Analgesic nephropathy
- N14.1 Nephropathy induced by other drugs, medicaments and biological substances
- N14.2 Nephropathy induced by unspecified drug, medicament or biological substance
- N14.3 Nephropathy induced by heavy metals
- N14.4 Toxic nephropathy, not elsewhere classified
- N15.0 Balkan nephropathy
- N15.1 Renal and perinephric abscess
- N15.8 Other specified renal tubulo-interstitial diseases
- N15.9 Renal tubulo-interstitial disease, unspecified
- N16 Renal tubulo-interstitial disorders in diseases classified elsewhere
- N17.0 Acute kidney failure with tubular necrosis
- N17.1 Acute kidney failure with acute cortical necrosis
- N17.2 Acute kidney failure with medullary necrosis
- N17.8 Other acute kidney failure
- N17.9 Acute kidney failure, unspecified
- N18.1 Chronic kidney disease, stage 1
- N18.2 Chronic kidney disease, stage 2 (mild)
- N18.3 Chronic kidney disease, stage 3 (moderate)
- N18.4 Chronic kidney disease, stage 4 (severe)
- N18.5 Chronic kidney disease, stage 5
- N18.6 End stage renal disease
- N18.9 Chronic kidney disease, unspecified



N19	Unspecified kidney failure
N20.0	Calculus of kidney
N20.1	Calculus of ureter
N20.2	Calculus of kidney with calculus of ureter
N20.9	Urinary calculus, unspecified
N23	Unspecified renal colic
N25.0	Renal osteodystrophy
N25.1	Nephrogenic diabetes insipidus
N25.81	Secondary hyperparathyroidism of renal origin
N25.89	Other disorders resulting from impaired renal tubular function
N25.9	Disorder resulting from impaired renal tubular function, unspecified
N26	Unspecified contracted kidney
N26.1	Atrophy of kidney (terminal)
N26.2	Page kidney
N26.9	Renal sclerosis, unspecified
N27.0	Small kidney, unilateral
N27.1	Small kidney, bilateral
N27.9	Small kidney, unspecified
N28.0	Ischemia and infarction of kidney
N28.1	Cyst of kidney, acquired
N28.81	Hypertrophy of kidney
N28.82	Megaloureter
N28.83	Nephroptosis



- N28.84 Pyelitis cystica
- N28.85 Pyeloureteritis cystica
- N28.86 Ureteritis cystica
- N28.89 Other specified disorders of kidney and ureter
- N28.9 Disorder of kidney and ureter, unspecified
- N29 Other disorders of kidney and ureter in diseases classified elsewhere

17.4.1.9. Liver Disorders

17.4.1.9.1. ICD-10-CM Codes

- K70.10 Alcoholic hepatitis without ascites
- K70.11 Alcoholic hepatitis with ascites
- K70.2 Alcoholic fibrosis and sclerosis of liver
- K70.30 Alcoholic cirrhosis of liver without ascites
- K70.31 Alcoholic cirrhosis of liver with ascites
- K70.40 Alcoholic hepatic failure without coma
- K70.41 Alcoholic hepatic failure with coma
- K70.9 Alcoholic liver disease, unspecified
- K71.0 Toxic liver disease with cholestasis
- K71.10 Toxic liver disease with hepatic necrosis, without coma
- K71.11 Toxic liver disease with hepatic necrosis, with coma
- K71.2 Toxic liver disease with acute hepatitis
- K71.3 Toxic liver disease with chronic persistent hepatitis
- K71.4 Toxic liver disease with chronic lobular hepatitis
- K71.50 Toxic liver disease with chronic active hepatitis without ascites



- K71.51 Toxic liver disease with chronic active hepatitis with ascites
- K71.6 Toxic liver disease with hepatitis, not elsewhere classified
- K71.7 Toxic liver disease with fibrosis and cirrhosis of liver
- K71.8 Toxic liver disease with other disorders of liver
- K71.9 Toxic liver disease, unspecified K72 Hepatic failure, not elsewhere classified Includes: fulminant hepatitis NEC, with hepatic failure
- K72.00 Acute and subacute hepatic failure without coma
- K72.01 Acute and subacute hepatic failure with coma
- K72.10 Chronic hepatic failure without coma
- K72.11 Chronic hepatic failure with coma
- K72.90 Hepatic failure, unspecified without coma
- K72.91 Hepatic failure, unspecified with coma
- K73.0 Chronic persistent hepatitis, not elsewhere classified
- K73.1 Chronic lobular hepatitis, not elsewhere classified
- K73.2 Chronic active hepatitis, not elsewhere classified
- K73.8 Other chronic hepatitis, not elsewhere classified
- K73.9 Chronic hepatitis, unspecified
- K74.0 Hepatic fibrosis
- K74.1 Hepatic sclerosis
- K74.2 Hepatic fibrosis with hepatic sclerosis
- K74.3 Primary biliary cirrhosis
- K74.4 Secondary biliary cirrhosis
- K74.5 Biliary cirrhosis, unspecified



- K74.60 Unspecified cirrhosis of liver
- K74.69 Other cirrhosis of liver
- K75.0 Abscess of liver
- K75.1 Phlebitis of portal vein
- K75.2 Nonspecific reactive hepatitis
- K75.3 Granulomatous hepatitis, not elsewhere classified
- K75.4 Autoimmune hepatitis
- K75.81 Nonalcoholic steatohepatitis (NASH)
- K75.89 Other specified inflammatory liver diseases
- K75.9 Inflammatory liver disease, unspecified
- K76.0 Fatty (change of) liver, not elsewhere classified
- K76.1 Chronic passive congestion of liver
- K76.2 Central hemorrhagic necrosis of liver
- K76.3 Infarction of liver
- K76.4 Peliosis hepatis
- K76.5 Hepatic veno-occlusive disease
- K76.6 Portal hypertension
- K76.7 Hepatorenal syndrome
- K76.81 Hepatopulmonary syndrome
- K76.89 Other specified diseases of liver
- K76.9 Liver disease, unspecified
- K77 Liver disorders in diseases classified elsewhere



17.4.1.10. Neurological or Neurodevelopmental Conditions

17.4.1.10.1. ICD-10-CM Codes

F70	Mild intellectual disabilities
F71	Moderate intellectual disabilities
F72	Severe intellectual disabilities
F73	Profound intellectual disabilities
F78	Other intellectual disabilities
F79	Unspecified intellectual disabilities
F80.0	Phonological disorder
F80.1	Expressive language disorder
F80.2	Mixed receptive-expressive language disorder
F80.4	Speech and language development delay due to hearing loss
F80.81	Childhood onset fluency disorder
F80.82	Social pragmatic communication disorder
F80.89	Other developmental disorders of speech and language
F80.9	Developmental disorder of speech and language, unspecified
F81.0	Specific reading disorder
F81.2	Mathematics disorder
F81.81	Disorder of written expression
F81.89	Other developmental disorders of scholastic skills
F81.9	Developmental disorder of scholastic skills, unspecified
F82	Specific developmental disorder of motor function
F84.0	Autistic disorder



- F84.2 Rett's syndrome
- F84.3 Other childhood disintegrative disorder
- F84.5 Asperger's syndrome
- F84.8 Other pervasive developmental disorders
- F84.9 Pervasive developmental disorder, unspecified
- F89 Unspecified disorder of psychological development

17.4.1.11. Malignant Neoplasms

17.4.1.11.1. ICD-10-CM Codes

- C00-C14 Malignant neoplasms of lip, oral cavity and pharynx
- C15-C26 Malignant neoplasms of digestive organs
- C30-C39 Malignant neoplasms of respiratory and intrathoracic organs
- C40-C41 Malignant neoplasms of bone and articular cartilage
- C43-C44 Melanoma and other malignant neoplasms of skin
- C45-C49 Malignant neoplasms of mesothelial and soft tissue
- C50 Malignant neoplasms of breast
- C51-C58 Malignant neoplasms of female genital organs
- C60-C63 Malignant neoplasms of male genital organs
- C64-C68 Malignant neoplasms of urinary tract
- C69-C72 Malignant neoplasms of eye, brain and other parts of central nervous system
- C73-C75 Malignant neoplasms of thyroid and other endocrine glands
- C7A Malignant neuroendocrine tumors
- C7B Secondary neuroendocrine tumors



C76-C80 Malignant neoplasms of ill-defined, other secondary and unspecified sites

C81-C96 Malignant neoplasms of lymphoid, hematopoietic and related tissue

17.4.1.12. Obesity

17.4.1.12.1. ICD-10-CM Codes

- E66.0 Obesity due to excess calories
- E66.01 Morbid (severe) obesity due to excess calories
- E66.09 Other obesity due to excess calories
- E66.1 Drug-induced obesity
- E66.2 Morbid (severe) obesity with alveolar hypoventilation
- E66.8 Other obesity
- E66.9 Obesity, unspecified

17.4.1.13. Type 2 Diabetes

17.4.1.13.1. ICD-10-CM Codes

- E11.00 Type 2 diabetes mellitus with hyperosmolarity without nonketotic hyperglycemic-hyperosmolar coma (NKHHC)
- E11.01 Type 2 diabetes mellitus with hyperosmolarity with coma
- E11.10 Type 2 diabetes mellitus with ketoacidosis without coma
- E11.11 Type 2 diabetes mellitus with ketoacidosis with coma
- E11.21 Type 2 diabetes mellitus with diabetic nephropathy
- E11.22 Type 2 diabetes mellitus with diabetic chronic kidney disease
- E11.29 Type 2 diabetes mellitus with other diabetic kidney complication
- E11.311 Type 2 diabetes mellitus with unspecified diabetic retinopathy with macular edema
- E11.319 Type 2 diabetes mellitus with unspecified diabetic retinopathy without macular edema



- E11.321 Type 2 diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema
- E11.329 Type 2 diabetes mellitus with mild nonproliferative diabetic retinopathy without macular edema
- E11.331 Type 2 diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema
- E11.339 Type 2 diabetes mellitus with moderate nonproliferative diabetic retinopathy without macular edema
- E11.341 Type 2 diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema
- E11.349 Type 2 diabetes mellitus with severe nonproliferative diabetic retinopathy without macular edema
- E11.351 Type 2 diabetes mellitus with proliferative diabetic retinopathy with macular edema
- E11.352 Type 2 diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment involving the macula
- E11.353 Type 2 diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment not involving the macula
- E11.354 Type 2 diabetes mellitus with proliferative diabetic retinopathy with combined traction retinal detachment and rhegmatogenous retinal detachment
- E11.355 Type 2 diabetes mellitus with stable proliferative diabetic retinopathy
- E11.359 Type 2 diabetes mellitus with proliferative diabetic retinopathy without macular edema
- E11.36 Type 2 diabetes mellitus with diabetic cataract
- E11.37 Type 2 diabetes mellitus with diabetic macular edema, resolved following treatment
- E11.39 Type 2 diabetes mellitus with other diabetic ophthalmic complication
- E11.40 Type 2 diabetes mellitus with diabetic neuropathy, unspecified



- E11.41 Type 2 diabetes mellitus with diabetic mononeuropathy
- E11.42 Type 2 diabetes mellitus with diabetic polyneuropathy
- E11.43 Type 2 diabetes mellitus with diabetic autonomic (poly)neuropathy
- E11.44 Type 2 diabetes mellitus with diabetic amyotrophy
- E11.49 Type 2 diabetes mellitus with other diabetic neurological complication
- E11.51 Type 2 diabetes mellitus with diabetic peripheral angiopathy without gangrene
- E11.52 Type 2 diabetes mellitus with diabetic peripheral angiopathy with gangrene
- E11.59 Type 2 diabetes mellitus with other circulatory complications
- E11.610 Type 2 diabetes mellitus with diabetic neuropathic arthropathy
- E11.618 Type 2 diabetes mellitus with other diabetic arthropathy
- E11.620 Type 2 diabetes mellitus with diabetic dermatitis
- E11.621 Type 2 diabetes mellitus with foot ulcer
- E11.628 Type 2 diabetes mellitus with other skin complications
- E11.630 Type 2 diabetes mellitus with periodontal disease
- E11.638 Type 2 diabetes mellitus with other oral complications
- E11.641 Type 2 diabetes mellitus with hypoglycemia with coma
- E11.649 Type 2 diabetes mellitus with hypoglycemia without coma
- E11.65 Type 2 diabetes mellitus with hyperglycemia
- E11.69 Type 2 diabetes mellitus with other specified complication
- E11.8 Type 2 diabetes mellitus with unspecified complications
- E11.9 Type 2 diabetes mellitus without complications



17.4.2. Medication History

17.4.2.1. Systemic Immunomodulators

The below list includes generic drug names classified by therapeutic use. All associated NDCs will be utilized. Additional therapies may be added as they are approved.



17.4.2.1.1. Immunomodulators

17.4.2.1.1.1. Colony-Stimulating Factors

ancestim
balugrastim
efbemalenograstim alfa
empegfilgrastim
filgrastim
lenograstim
lipegfilgrastim
molgramostim
pegfilgrastim
pegteograstim
sargramostim

17.4.2.1.1.2. Interferons

albinterferon alfa-2b
cepeginterferon alfa-2b
interferon alfa natural
interferon alfa-2a
interferon alfa-2b
interferon alfacon-1
interferon alfa-n1
interferon beta natural
interferon beta-1a
interferon beta-1b
interferon gamma
peginterferon alfa-2a
peginterferon alfa-2a, combinations
peginterferon alfa-2b
peginterferon alfa-2b, combinations
peginterferon alfacon-2
peginterferon beta-1a
ropeginterferon alfa-2b



17.4.2.1.1.3. Interleukins

aldesleukin
oprelvekin

17.4.2.1.1.4. Other Immunostimulants

BCG vaccine
cridanimod
dasiprotimut-T
elapegademase
glatiramer acetate
histamine dihydrochloride
immunocyanin
lentinan
melanoma vaccine
mifamurtide
pegademase
pidotimod
plerixafor
polyinosinic:polycytidylic acid (poly I:C)
poly ICLC
roquinimex
sipuleucel-T
tasonermin
thymopentin

17.4.2.1.2. Immunosuppressants

17.4.2.1.2.1. Selective Immunosuppressants

abatacept
abetimus
alefacept
alemtuzumab
anifrolumab
antilymphocyte immunoglobulin (horse)
antithymocyte immunoglobulin (rabbit)
apremilast
avacopan
baricitinib
begelomab



belatacept
belimumab
belumosudil
cladribine
deucravacitinib
eculizumab
efalizumab
efgartigimod alfa
emapalumab
everolimus
filgotinib
fingolimod
gusperimus
imlifidase
inebilizumab
itacitinib
leflunomide
muromonab-CD3
mycophenolic acid
natalizumab
ocrelizumab
ofatumumab
ozanimod
peficitinib
pegcetacoplan
ponesimod
ravulizumab
siponimod
sirolimus
sutimlimab
teprotumumab
teriflunomide
tofacitinib
ublituximab
upadacitinib
vedolizumab

090177e1a617ace1\Approved\Approved On: 18-May-2026 22:07 (GMT)



17.4.2.1.2.2. Tumor Necrosis Factor Alpha (TNF- α) Inhibitors

adalimumab
afelimomab
certolizumab pegol
etanercept
golimumab
infliximab
opinercept

17.4.2.1.2.3. Interleukin Inhibitors

anakinra
basiliximab
bimekizumab
briakinumab
brodalumab
canakinumab
daclizumab
guselkumab
ixekizumab
netakimab
olokizumab
rilonacept
risankizumab
sarilumab
satralizumab
secukinumab
siltuximab
sirukumab
spesolimab
tildrakizumab
tocilizumab
ustekinumab

17.4.2.1.2.4. Calcineurin Inhibitors

cyclosporine
tacrolimus
voclosporin



17.4.2.1.2.5. Other Immunosuppressants

azathioprine
darvadstrocel
dimethyl fumarate
diroximel fumarate
lenalidomide
methotrexate
pirfenidone
pomalidomide
thalidomide

17.4.2.1.3. Chemotherapeutic Agents

17.4.2.1.3.1. Alkylating Agents

chlorambucil
cisplatin
cyclophosphamide

17.4.2.1.3.2. Antimetabolite Agents

5-fluorouracil
6-mercaptopurine
cytarabine
methotrexate

17.4.2.1.3.3. Antitumor Antibiotics

bleomycin
doxorubicin
mitomycin C

17.4.2.1.3.4. Mitotic Inhibitors

paclitaxel
plant alkaloids (vinblastine, vincristine)

17.4.2.1.3.5. Topoisomerase Inhibitors

etoposide
irinotecan
opotecan



17.4.2.1.4. Myelosuppressive Agents

hydroxyurea

17.4.2.1.5. ICD-10-CM, ICD-10-PCS, CPT, and HCPCS Codes

In addition to NDC codes for the above, the following ICD-10-CM, ICD-10-PCS, CPT, and HCPCS codes will be used:

17.4.2.1.5.1. ICD-10-CM

T45.1***	Poisoning by, adverse effect of and underdosing of antineoplastic and immunosuppressive drugs
Z79.6	Long term (current) use of immunomodulators and immunosuppressants
Z79.60	Long term (current) use of unspecified immunomodulators and immunosuppressants
Z79.61	Long term (current) use of immunomodulator (apremilast, immunomodulatory imide drug, lenalidomide, pomalidomide)
Z79.62	Long term (current) use of immunosuppressant
Z79.620	Long term (current) use of immunosuppressive biologic (adalimumab, etanercept, infliximab, monoclonal antibodies)
Z79.621	Long term (current) use of calcineurin inhibitor (cyclosporine, tacrolimus)
Z79.622	Long term (current) use of Janus kinase inhibitor (tofacitinib)
Z79.623	Long term (current) use of mammalian target of rapamycin (mTOR) inhibitor (sirolimus)
Z79.624	Long term (current) use of inhibitors of nucleotide synthesis (azathioprine, mycophenolate, purine synthesis (IMDH) inhibitors)
Z79.63	Long term (current) use of chemotherapeutic agent
Z79.630	Long term (current) use of alkylating agent (chlorambucil, cisplatin, cyclophosphamide)



Z79.631	Long term (current) use of antimetabolite agent (5-fluorouracil, 6-mercaptopurine, cytarabine, methotrexate)
Z79.632	Long term (current) use of antitumor antibiotic (bleomycin, doxorubicin, mitomycin C)
Z79.633	Long term (current) use of mitotic inhibitor (paclitaxel, plant alkaloids, vinblastine, vincristine)
Z79.634	Long term (current) use of topoisomerase inhibitor (etoposide, irinotecan, topotecan)
Z79.64	Long term (current) use of myelosuppressive agent (hydroxyurea)
Z79.69	Long term (current) use of other immunomodulators and immunosuppressants

17.4.2.1.5.2. ICD-10-PCS

3E03302	Introduction of High-dose Interleukin-2 into Peripheral Vein, Percutaneous Approach
3E03303	Introduction of Low-dose Interleukin-2 into Peripheral Vein, Percutaneous Approach
3E04002	Introduction of High-dose Interleukin-2 into Central Vein, Open Approach
3E04003	Introduction of Low-dose Interleukin-2 into Central Vein, Open Approach
3E04302	Introduction of High-dose Interleukin-2 into Central Vein, Percutaneous Approach
3E04303	Introduction of Low-dose Interleukin-2 into Central Vein, Percutaneous Approach
3E05002	Introduction of High-dose Interleukin-2 into Peripheral Artery, Open Approach
3E05302	Introduction of High-dose Interleukin-2 into Peripheral Artery, Percutaneous Approach
3E050WK	Introduction of Immunostimulator into Peripheral Artery, Open

PFIZER CONFIDENTIAL



3E050WL	Introduction of Immunosuppressive into Peripheral Artery, Open
3E053WL	Introduction of Immunosuppressive into Peripheral Artery, Percutaneous
3E053WL	Introduction of Immunosuppressive into Peripheral Artery, Percutaneous
3E060WK	Introduction of Immunostimulator into Central Artery, Open
3E060WL	Introduction of Immunosuppressive into Central Artery, Open
3E063WK	Introduction of Immunostimulator into Central Artery, Percutaneous
3E063WL	Introduction of Immunosuppressive into Central Artery, Percutaneous
XW01397	Introduction of Satralizumab-mwge into Subcutaneous Tissue, Percutaneous Approach, New Technology Group 7
XW033C6	Introduction of Eculizumab into Peripheral Vein, Percutaneous Approach, New Technology Group 6
XW033H5	Introduction of Tocilizumab into Peripheral Vein, Percutaneous Approach, New Technology Group 5
XW033L6	Introduction of CD24Fc Immunomodulator into Peripheral Vein, Percutaneous Approach, New Technology Group 6
XW033L7	Introduction of Lifileucel Immunotherapy into Peripheral Vein, Percutaneous Approach, New Technology Group 7
XW033M7	Introduction of Brexucabtagene Autoleucel Immunotherapy into Peripheral Vein, Percutaneous Approach, New Technology Group 7
XW03308	Introduction of Spesolimab Monoclonal Antibody into Peripheral Vein, Percutaneous Approach, New Technology Group 8
XW03398	Introduction of Inebilizumab-cdon into Peripheral Vein, Percutaneous Approach, New Technology Group 8



XW04308	Introduction of Spesolimab Monoclonal Antibody into Central Vein, Percutaneous Approach, New Technology Group 8
XW04398	Introduction of Inebilizumab-cdon into Central Vein, Percutaneous Approach, New Technology Group 8
XW043G5	Introduction of Sarilumab into Central Vein, Percutaneous Approach, New Technology Group 5
XW043H5	Introduction of Tocilizumab into Central Vein, Percutaneous Approach, New Technology Group 5
XW043L6	Introduction of CD24Fc Immunomodulator into Central Vein, Percutaneous Approach, New Technology Group 6
XW0DXM6	Introduction of Baricitinib into Mouth and Pharynx, External Approach, New Technology Group 6
XW0G7M6	Introduction of Baricitinib into Upper GI, Via Natural or Artificial Opening, New Technology Group 6
XW0H7M6	Introduction of Baricitinib into Lower GI, Via Natural or Artificial Opening, New Technology Group 6

17.4.2.1.5.3. CPT

80145	Adalimumab
80158	Cyclosporine
80169	Everolimus
80180	Mycophenolate (mycophenolic acid)
80193	Leflunomide
80195	Sirolimus
80197	Tacrolimus
80180	Mycophenolate (mycophenolic acid)
80204	Methotrexate
80230	Infliximab



80280	Vedolizumab
90585	Bacillus Calmette-Guerin vaccine (BCG) for tuberculosis, live, for percutaneous use
90586	Bacillus Calmette-Guerin vaccine (BCG) for bladder cancer, live, for intravesical use

17.4.2.1.5.4. HCPCS

J0129	Injection, abatacept, 10 mg (code may be used for Medicare when drug administered under the direct supervision of a physician, not for use when drug is self-administered)
J0135	Injection, adalimumab, 20 mg
S0176	Hydroxyurea, oral, 500 mg
J0215	Injection, alefacept, 0.5 mg
J0202	Injection, alemtuzumab, 1 mg
J0480	Injection, basiliximab, 20 mg
J0485	Injection, belatacept, 1 mg
J0490	Injection, belimumab, 10 mg
J0491	Injection, anifrolumab-fnia, 1 mg
J0638	Injection, canakinumab, 1 mg
J0717	Injection, certolizumab pegol, 1 mg (code may be used for Medicare when drug administered under the direct supervision of a physician, not for use when drug is self-administered)
J1300	Injection, eculizumab, 10 mg
J1302	Injection, sutimlimab-jome, 10 mg
J1303	Injection, ravulizumab-cwvz, 10 mg
J1438	Injection, etanercept, 25 mg (code may be used for Medicare when drug administered under the direct supervision of a physician, not for use when drug is self-administered)



J1442	Injection, filgrastim (G-CSF), excludes biosimilars, 1 mcg
J1447	Injection, tbo-filgrastim, 1 mcg
J1449	Injection, eflapegrastim-xnst, 0.1 mg
J1595	Injection, glatiramer acetate, 20 mg
J1602	Injection, golimumab, 1 mg, for intravenous use
J1628	Injection, guselkumab, 1 mg
J1745	Injection, infliximab, excludes biosimilar, 10 mg
J1747	Injection, spesolimab-sbzo, 1 mg
J1823	Injection, inebilizumab-cdon, 1 mg
J1826	Injection, interferon beta-1a, 30 mcg
J1830	Injection interferon beta-1b, 0.25 mg (code may be used for Medicare when drug administered under the direct supervision of a physician, not for use when drug is self-administered)
J2323	Injection, natalizumab, 1 mg
J2327	Injection, risankizumab-rzaa, intravenous, 1 mg
J2329	Injection, ublituximab-xiyy, 1mg
J2350	Injection, ocrelizumab, 1 mg
J2355	Injection, oprelvekin, 5 mg
J2504	Injection, pegademase bovine, 25 IU
J2506	Injection, pegfilgrastim, excludes biosimilar, 0.5 mg
J2562	Injection, plerixafor, 1 mg
J2781	Injection, pegcetacoplan, intravitreal, 1 mg
J2793	Injection, rilonacept, 1 mg
J2820	Injection, sargramostim (GM-CSF), 50 mcg



J2860	Injection, siltuximab, 10 mg
J3241	Injection, teprotumumab-trbw, 10 mg
J3245	Injection, tildrakizumab, 1 mg J3380 Injection, vedolizumab, 1 mg
J3262	Injection, tocilizumab, 1 mg
J3357	Ustekinumab, for subcutaneous injection, 1 mg
J3358	Ustekinumab, for intravenous injection, 1 mg
J7500-J7599:	Immunosuppressive drugs
J8560	Etoposide, oral, 50 mg
J8610	Methotrexate, oral, 2.5 mg
J9000	Injection, doxorubicin HCl, 10 mg
J9015	Injection, aldesleukin, per single use vial
J9030	BCG live intravesical instillation, 1 mg
J9037	Injection, belantamab mafodotin-blmf, 0.5 mg
J9040	Injection, bleomycin sulfate, 15 units
J9060	Injection, cisplatin, powder or solution, 10 mg
J9065	Injection, cladribine, per 1 mg J9047 Injection, carfilzomib, 1 mg
J9070	Cyclophosphamide, 100 mg
J9071	Injection, cyclophosphamide, (AuroMedics), 5 mg
J9098	Injection, cytarabine liposome, 10 mg
J9100	Injection, cytarabine, 100 mg
J9145	Injection, daratumumab, 10 mg
J9144	Injection, daratumumab, 10 mg and hyaluronidase-fihj

PFIZER CONFIDENTIAL



J9153	Injection, liposomal, 1 mg daunorubicin and 2.27 mg cytarabine
J9176	Injection, elotuzumab, 1 mg
J9181	Injection, etoposide, 10 mg
J9190	Injection, fluorouracil, 500 mg
J9205	Injection, irinotecan liposome, 1 mg
J9206	Injection, irinotecan, 20 mg
J9210	Injection, emapalumab-lzsg, 1 mg
J9212	Injection, interferon alfacon-1, recombinant, 1 mcg
J9213	Injection, interferon, alfa-2a, recombinant, 3 million units
J9214	Injection, interferon, alfa-2b, recombinant, 1 million units
J9215	Injection, interferon, alfa-N3, (human leukocyte derived), 250,000 IU
J9216	Injection, interferon, gamma 1-b, 3 million units
J9247	Injection, melphalan flufenamide, 1 mg
J9250	Methotrexate sodium, 5 mg
J9259	Injection, paclitaxel protein-bound particles (American Regent) not therapeutically equivalent to J9264, 1 mg
J9260	Methotrexate sodium, 50 mg
J9264	Injection, paclitaxel protein-bound particles, 1 mg
J9267	Injection, paclitaxel, 1 mg
J9302	Injection, ofatumumab, 10 mg
J9331	Injection, sirolimus protein-bound particles, 1 mg
J9332	Injection, efgartigimod alfa-fcab, 2 mg



J9360	Injection, vinblastine sulfate, 1 mg
J9370	Vincristine sulfate, 1 mg
J9371	Injection, vincristine sulfate liposome, 1 mg
J9380	Injection, teclistamab-cqyv, 0.5 mg
M0249	Intravenous infusion, tocilizumab, for hospitalized adults and pediatric patients (2 years of age and older) with COVID-19 who are receiving systemic corticosteroids and require supplemental oxygen, non-invasive or invasive mechanical ventilation
M0250	Intravenous infusion, tocilizumab, for hospitalized adults and pediatric patients (2 years of age and older) with COVID-19 who are receiving systemic corticosteroids and require supplemental oxygen, non-invasive or invasive mechanical ventilation
Q0249	Injection, tocilizumab, for hospitalized adults and pediatric patients (2 years of age and older) with COVID-19 who are receiving systemic corticosteroids and require supplemental oxygen, non-invasive or invasive mechanical ventilation, or extracorporeal
Q0510	Pharmacy supply fee for initial immunosuppressive drug(s), first month following transplant
Q2043	Sipuleucel-T, minimum of 50 million autologous CD54+ cells activated with PAP-GM-CSF, including leukapheresis and all other preparatory procedures, per infusion
Q2049	Injection, doxorubicin HCl, liposomal, imported Lipodox, 10 mg
Q2050	Injection, doxorubicin HCl, liposomal, not otherwise specified, 10 mg
Q2056	Ciltacabtagene autoleucel, up to 100 million autologous B-cell maturation antigen (BCMA) directed CAR-positive T cells, including leukapheresis and dose preparation procedures, per therapeutic dose



Q2055	Idecabtagene vicleucel, up to 460 million autologous B-cell maturation antigen (BCMA) directed CAR-positive T cells, including leukapheresis and dose preparation procedures, per therapeutic dose
Q3027	Injection, interferon beta-1a, 1 mcg for intramuscular use
Q3028	Injection, interferon beta-1a, 1 mcg for subcutaneous use
Q5101	Injection, filgrastim-sndz, biosimilar, (Zarxio), 1 mcg
Q5103	Injection, infliximab-dyyb, biosimilar, (Inflectra), 10 mg
Q5104	Injection, infliximab-abda, biosimilar, (Renflexis), 10 mg
Q5108	Injection, pegfilgrastim-jmdb (Fulphila), biosimilar, 0.5 mg
Q5109	Injection, infliximab-qbtx, biosimilar, (Ixifi), 10 mg Injection, infliximab-axxq, biosimilar, (AVSOLA), 10 mg
Q5110	Injection, filgrastim-aafi, biosimilar, (Nivestym), 1 mcg
Q5111	Injection, pegfilgrastim-cbqv (Udenyca), biosimilar, 0.5 mg
Q5120	Injection, pegfilgrastim-bmez (ZIEXTENZO), biosimilar, 0.5 mg
Q5122	Injection, pegfilgrastim-apgf (Nyvepria), biosimilar, 0.5 mg
Q5125	Injection, filgrastim-ayow, biosimilar, (Releuko), 1 mcg
Q5127	Injection, pegfilgrastim-fpgk (Stimufend), biosimilar, 0.5 mg
Q5130	Injection, pegfilgrastim-pbbk (Fylnetra), biosimilar, 0.5 mg
Q5131	Injection, adalimumab-aacf (Idacio), biosimilar, 20 mg
S0145	Injection, PEGylated interferon alfa-2A, 180 mcg per ml
S0148	Injection, PEGylated interferon alfa-2B, 10 mcg
S0172	Chlorambucil, oral, 2 mg



17.4.2.2. Corticosteroids

AHFS 680400* Adrenals, restricted to oral routes of administration

17.4.2.2.1. ICD-10-CM, CPT and HCPCS Codes

In addition to AHFS code for the above, the following ICD-10-CM, CPT and HCPCS codes will be used:

17.4.2.2.1.1. ICD-10-CM

T38.0**	Poisoning by, adverse effect of and underdosing of glucocorticoids and synthetic analogues
T50.OX*	Poisoning by, adverse effect of and underdosing of mineralocorticoids and their antagonists

17.4.2.2.1.2. CPT

4135F	Systemic corticosteroids Rx
4136F	Systemic corticosteroids not Rx
4194F	Patient receiving =>10 mg daily prednisone (or equivalent) for longer than 6 months, and improvement or no change in disease activity (RA)

17.4.2.2.1.3. HCPCS

G2113	Patient receiving >5 mg daily prednisone (or equivalent) for longer than 6 months, and improvement or no change in disease activity
J7509	Methylprednisolone, oral, per 4 mg
J7510	Prednisolone, oral, per 5 mg
J7512	Prednisone, immediate release or delayed release, oral, 1 mg
J8540	Dexamethasone, oral, 0.25 mg



17.4.2.3. . Antivirals

The below list includes generic drug names. All associated NDC codes will be utilized. Additional therapies may be added as they are approved

17.4.2.3.1. Topical

acyclovir
docosanol
penciclovir

17.4.2.3.2. Eye

fomivirsen
ganciclovir
idoxuridine
trifluridine
vidarabine

17.4.2.3.3. General Antivirals

acyclovir
baloxavir marboxil
brincidofovir
cidofovir
famciclovir
foscarnet
ganciclovir
letermovir
maribavir
oseltamivir
peramivir
ribavirin
rimantadine
tecovirimat
valacyclovir
zanamivir



17.4.2.3.4. HIV-Specific

abacavir
amprenavir
atazanavir
cabotegravir
cobicistat (in combination with others)
darunavir
delavirdine
didanosine
dolutegravir
doravirine
efavirenz
elvitegravir
emtricitabine
enfuvirtide
etravirine
fosamprenavir
fostemsavir
indinavir
lamivudine
lopinavir
maraviroc
nelfinavir
nevirapine
raltegravir
rilpivirine
ritonavir
saquinavir
stavudine
tenofovir
tipranavir
zalcitabine
zidovudine



17.4.2.3.5. ICD-10-PCS, CPT, and HCPCS Codes

In addition to NDC codes for the above, the following ICD-10-PCS, CPT, and HCPCS codes will be used:

17.4.2.3.5.1. ICD-10-PCS

XW0DX38	Introduction of Maribavir Anti-infective into Mouth and Pharynx, External Approach, New Technology Group 8
XW0G738	Introduction of Maribavir Anti-infective into Upper GI, Via Natural or Artificial Opening, New Technology Group 8
XW0H738	Introduction of Maribavir Anti-infective into Lower GI, Via Natural or Artificial Opening, New Technology Group 8

17.4.2.3.5.2. CPT

4150F	Patient receiving antiviral treatment for Hepatitis C (HEP-C)
4153F	Combination peginterferon and ribavirin therapy prescribed (HEP-C)

17.4.2.3.5.3. HCPCS

J0133	Injection, acyclovir, 5 mg
J0739	Injection, cabotegravir, 1 mg
J0740	Injection, cidofovir, 375 mg
J0741	Injection, cabotegravir and rilpivirine, 2 mg/3 mg
J1324	Injection, enfuvirtide, 1 mg
J1452	Injection, fomivirsen sodium, intraocular, 1.65 mg
J1455	Injection, foscarnet sodium, per 1,000 mg
J1570	Injection, ganciclovir sodium, 500 mg
J1574	Injection, ganciclovir sodium (Exela) not therapeutically equivalent to J1570, 500 mg
J2547	Injection, peramivir, 1 mg
J3485	Injection, zidovudine, 10 mg

PFIZER CONFIDENTIAL



J7310	Ganciclovir, 4.5 mg, long-acting implant
S0104	Zidovudine, oral, 100 mg
S0137	Didanosine (ddI), 25 mg
S0140	Saquinavir, 200 mg

17.4.2.4. Antibiotics

The below list includes generic drug names, organized by therapeutic class codes and hierarchical ingredient codes developed by First Databank. Therapeutic class codes (THERSPEC) and HICL codes are proprietary to First Databank. All associated NDC codes will be utilized. Additional therapies may be added as they are approved.

17.4.2.4.1. Vaginal

clindamycin
metronidazole

17.4.2.4.2. Topical

bacitracin
chloramphenicol
clindamycin
doxycycline
erythromycin
gentamicin
meclocycline
minocycline
mupirocin
neomycin
ozenoxacin
tetracycline

17.4.2.4.3. Eye and Ear

azithromycin
bacitracin
besifloxacin
cefuroxime



chloramphenicol
ciprofloxacin
erythromycin
gatifloxacin
gentamicin
levofloxacin
moxifloxacin
natamycin
neomycin
norfloxacin
ofloxacin
oxytetracycline
polymyxin
tetracycline
tobramycin
vancomycin

17.4.2.4.4. Nose

mupirocin

17.4.2.4.5. Antitubercular

bedaquiline
capreomycin
cycloserine
ethambutol
isoniazid
pretomanid
pyrazinamide
rifampin
rifapentine



17.4.2.4.6. Broad Spectrum

17.4.2.4.6.1. Penicillin Antibiotics

amoxicillin
ampicillin
bacampicillin
carbenicillin
cloxacillin
dicloxacillin
mezlocillin
nafcillin
oxacillin
penicillin
piperacillin
ticarcillin

17.4.2.4.6.2. Tetracycline Antibiotics

demeclocycline
doxycycline
eravacycline
minocycline
omadacycline
oxytetracycline
sarecycline
tetracycline

17.4.2.4.6.3. Macrolide Antibiotics

azithromycin
clarithromycin
dirithromycin
erythromycin
fidaxomicin
troleandomycin



17.4.2.4.6.4. Chloramphenicol Antibiotics and Derivatives

chloramphenicol

17.4.2.4.6.5. Aminoglycoside Antibiotics

amikacin

gentamicin

kanamycin

neomycin

netilmicin

plazomicin

streptomycin

tobramycin

17.4.2.4.6.6. Aminocyclitol Antibiotics

spectinomycin

17.4.2.4.6.7. Vancomycin Antibiotics and Derivatives

vancomycin

17.4.2.4.6.8. Lincosamide Antibiotics

clindamycin

lincomycin

17.4.2.4.6.9. Antibiotics, Miscellaneous, Other

bacitracin

novobiocin

17.4.2.4.6.10. Streptogramin Antibiotics

dalfopristin

quinupristin



17.4.2.4.6.11. Polymyxin Antibiotics and Derivatives

colistin
polymyxin

17.4.2.4.6.12. Oxazolidinone Antibiotics

linezolid
tedizolid

17.4.2.4.6.13. Quinolone Antibiotics

alatrofloxacin
cinoxacin
ciprofloxacin
delafloxacin
enoxacin
gatifloxacin
gemifloxacin
grepafloxacin
levofloxacin
lomefloxacin
moxifloxacin
nalidixic acid
norfloxacin
ofloxacin
sparfloxacin
trovafloxacin

17.4.2.4.6.14. Carbapenem Antibiotics (Thenamycins)

doripenem
ertapenem
imipenem
meropenem



17.4.2.4.6.15. Cephalosporin Antibiotics

cefaclor
cefadroxil
cefamandole
cefazolin
cefdinir
cefditoren
cefepime
cefiderocol
cefixime
cefonicid
cefoperazone
cefotaxime
cefotetan
cefoxitin
cefpodoxime
cefprozil
ceftazidime
ceftibuten
ceftizoxime
ceftolozane
ceftriaxone
cefuroxime
cephalexin
cephalothin
cephapirin
cephradine
loracarbef

17.4.2.4.6.16. Antifungal Antibiotics

amphotericin b
anidulafungin
caspofungin
griseofulvin
ibrexafungerp
micafungin
nystatin



rezafungin

17.4.2.4.6.17. Ketolide Antibiotics

telithromycin

17.4.2.4.6.18. Rifamycins and Related Derivative Antibiotics

rifamycin

rifaximin

17.4.2.4.6.19. Lipoglycopeptide Antibiotics

dalbavancin

oritavancin

telavancin

17.4.2.4.7. ICD-10-CM, CPT, and HCPCS Codes

In addition to NDC codes for the above, the following ICD-10-CM, ICD-10-PCS, CPT, and HCPCS codes will be used:

17.4.2.4.7.1. ICD-10-CM

T36.** Poisioning by, adverse effect of and underdosing of systemic antibiotics

17.4.2.4.7.2. ICD-10-PCS

XW033R9 Introduction of Rezafungin into Peripheral Vein, Percutaneous Approach, New Technology Group 9

XW043R9 Introduction of Rezafungin into Central Vein, Percutaneous Approach, New Technology Group 9

17.4.2.4.7.3. CPT

4045F Appropriate empiric antibiotic prescribed (CAP), (EM)

4046F Documentation that prophylactic antibiotics were given within 4 hours prior to surgical incision or given intraoperatively (PERI 2)



4047F	Documentation of order for prophylactic parenteral antibiotics to be given within 1 hour (if fluoroquinolone or vancomycin, 2 hours) prior to surgical incision (or start of procedure when no incision is required) (PERI 2)
4048F	Documentation that administration of prophylactic parenteral antibiotic was initiated within 1 hour (if fluoroquinolone or vancomycin, 2 hours) prior to surgical incision (or start of procedure when no incision is required) as ordered (PERI 2)
4120F	Antibiotic prescribed or dispensed (URI, PHAR), (A-BRONCH)
80150	Amikacin
80170	Gentamicin
80200	Tobramycin
80202	Vancomycin

17.4.2.4.7.4. HCPCS

C9462	Injection, delafloxacin, 1 mg
G8710	Patient prescribed antibiotic
G8711	Prescribed antibiotic on or within 3 days after the episode date
G9498	Antibiotic regimen prescribed
G9505	Antibiotic regimen prescribed within 10 days after onset of symptoms for documented medical reason
G8916	Patient with preoperative order for IV antibiotic surgical site infection (SSI) prophylaxis, antibiotic initiated on time
G9286	Antibiotic regimen prescribed within 10 days after onset of symptoms
G9315	Amoxicillin, with or without clavulanate, prescribed as a first line antibiotic at the time of diagnosis
G9712	Documentation of medical reason(s) for prescribing or dispensing antibiotic (eg, intestinal infection, pertussis,



	bacterial infection, lyme disease, otitis media, acute sinusitis, acute pharyngitis, acute tonsillitis, chronic sinusitis
J0120	Injection, tetracycline, up to 250 mg
J0121	Injection, omadacycline, 1 mg
J0122	Injection, eravacycline, 1 mg
J0200	Injection, alatrofloxacin mesylate, 100 mg
J0278	Injection, amikacin sulfate, 100 mg
J0285	Injection, amphotericin B, 50 mg
J0287	Injection, amphotericin B lipid complex, 10 mg
J0288	Injection, amphotericin B cholesteryl sulfate complex, 10 mg
J0289	Injection, amphotericin B liposome, 10 mg
J0290	Injection, ampicillin sodium, 500 mg
J0291	Injection, plazomicin, 5 mg
J0295	Injection, ampicillin sodium/sulbactam sodium, per 1.5 g
J0348	Injection, anidulafungin, 1 mg
J0349	Injection, rezafungin, 1 mg
J0456	Injection, azithromycin, 500 mg
J0558	Injection, penicillin G benzathine and penicillin G procaine, 100,000 units
J0561	Injection, penicillin G benzathine, 100,000 units
J0637	Injection, caspofungin acetate, 5 mg
J0689	Injection, cefazolin sodium (Baxter), not therapeutically equivalent to J0690, 500 mg
J0690	Injection, cefazolin sodium, 500 mg

090177e1a617ace1\Approved\Approved On: 18-May-2026 22:07 (GMT)



J0692	Injection, cefepime HCl, 500 mg
J0694	Injection, cefoxitin sodium, 1 g
J0695	Injection, ceftolozane 50 mg and tazobactam 25 mg
J0696	Injection, ceftriaxone sodium, per 250 mg
J0697	Injection, sterile cefuroxime sodium, per 750 mg
J0698	Injection, cefotaxime sodium, per g
J0699	Injection, cefiderocol, 10 mg
J0701	Injection, cefepime HCl (Baxter), not therapeutically equivalent to Maxipime, 500 mg
J0703	Injection, cefepime HCl (B. Braun), not therapeutically equivalent to Maxipime, 500 mg
J0710	Injection, cephalirin sodium, up to 1 g
J0713	Injection, ceftazidime, per 500 mg
J0714	Injection, ceftazidime and avibactam, 0.5 g/0.125 g
J0715	Injection, ceftizoxime sodium, per 500 mg
J0720	Injection, chloramphenicol sodium succinate, up to 1 g
J0736	Injection, clindamycin phosphate, 300 mg
J0737	Injection, clindamycin phosphate (Baxter), not therapeutically equivalent to J0736, 300 mg
J0742	Injection, imipenem 4 mg, cilastatin 4 mg and relebactam 2 mg
J0743	Injection, cilastatin sodium; imipenem, per 250 mg
J0744	Injection, ciprofloxacin for intravenous infusion, 200 mg
J0875	Injection, dalbavancin, 5 mg
J0878	Injection, daptomycin, 1 mg



J1267	Injection, doripenem, 10 mg
J1335	Injection, ertapenem sodium, 500 mg
J1364	Injection, erythromycin lactobionate, per 500 mg
J1580	Injection, garamycin, gentamicin, up to 80 mg
J1836	Injection, metronidazole, 10 mg
J1840	Injection, kanamycin sulfate, up to 500 mg
J1850	Injection, kanamycin sulfate, up to 75 mg
J1890	Injection, cephalothin sodium, up to 1 g
J1956	Injection, levofloxacin, 250 mg
J2010	Injection, lincomycin HCl, up to 300 mg
J2020	Injection, linezolid, 200 mg
J2021	Injection, linezolid (Hospira) not therapeutically equivalent to J2020, 200 mg
J2184	Injection, meropenem (B. Braun) not therapeutically equivalent to J2185, 100 mg
J2185	Injection, meropenem, 100 mg
J2186	Injection, meropenem, vaborbactam, 10 mg/10 mg, (20 mg)
J2247	Injection, micafungin sodium (Par Pharm) not therapeutically equivalent to J2248, 1 mg
J2248	Injection, micafungin sodium, 1 mg
J2265	Injection, minocycline HCl, 1 mg
J2280	Injection, moxifloxacin, 100 mg
J2281	Injection, moxifloxacin (Fresenius Kabi) not therapeutically equivalent to J2280, 100 mg
J2406	Injection, oritavancin (Kimyrza), 10 mg



J2407	Injection, oritavancin (Orbactiv), 10 mg
J2460	Injection, oxytetracycline HCl, up to 50 mg
J2510	Injection, penicillin G procaine, aqueous, up to 600,000 units
J2540	Injection, penicillin G potassium, up to 600,000 units
J2543	Injection, piperacillin sodium/tazobactam sodium, 1 g/0.125 g (1.125 g)
J2700	Injection, oxacillin sodium, up to 250 mg
J2770	Injection, quinupristin/dalfopristin, 500 mg (150/350)
J3000	Injection, streptomycin, up to 1 g
J3090	Injection, tedizolid phosphate, 1 mg
J3095	Injection, telavancin, 10 mg
J3260	Injection, tobramycin sulfate, up to 80 mg
J3320	Injection, spectinomycin dihydrochloride, up to 2 g
J3370	Injection, vancomycin HCl, 500 mg
J3371	Injection, vancomycin HCl (Mylan) not therapeutically equivalent to J3370, 500 mg
J3372	Injection, vancomycin HCl (Xellia) not therapeutically equivalent to J3370, 500 mg
J7342	Instillation, ciprofloxacin otic suspension, 6 mg
J7682	Tobramycin, inhalation solution, FDA-approved final product, noncompounded, unit dose form, administered through DME, per 300 mg
J7685	Tobramycin, inhalation solution, compounded product, administered through DME, unit dose form, per 300 mg
Q0144	Azithromycin dihydrate, oral, capsules/powder, 1 g
S0021	Injection, cefoperazone sodium, 1 g



S0032	Injection, nafcillin sodium, 2 g
S0034	Injection, ofloxacin, 400 mg
S0040	Injection, ticarcillin disodium and clavulanate potassium, 3.1 g
S0074	Injection, cefotetan disodium, 500 mg
S0081	Injection, piperacillin sodium, 500 mg

18. ANNEX 3. ADDITIONAL INFORMATION

Not applicable.

Document Approval Record

Document Name: C4591070_PROTOCOL AND SAP V2 AMENDMENT 1_22APR2026
Document Title: C4591070_PROTOCOL AND SAP V2 AMENDMENT 1_22APR2026

Signed By:	Date(GMT)	Signing Capacity
Asomaning, Kofi	07-May-2026 20:18:34	Manager Approval
Schachterle, Stephen	08-May-2026 19:21:16	Scientific Review
De Bernardi, Barbara	10-May-2026 21:09:20	EUQPPV Approval
Cai, Bing	18-May-2026 22:07:04	Business Line Approver