

Supplemental Material*

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Supplement Table 1. Specification and emulation of a target trial evaluating the effectiveness of booster (i.e. third dose) mRNA COVID-19 vaccination conducted from December 1, 2021 to March 31, 2022

TARGET TRIAL SPECIFICATION	TARGET TRIAL EMULATION
ELIGIBILITY CRITERIA	
VA enrollees age ≥ 18 years	Same
Received two doses of mRNA COVID-19 vaccination at least 5 months before enrollment	Same
No prior known infection with SARS-CoV-2 documented in VA (or Medicare) records	
Known residential address	Same
User of VA healthcare system, defined as having any outpatient or inpatient encounter in the VA healthcare system in the preceding 24 months	Same
Having a documented primary care physician (PCP) visit in the preceding 24 months	Same
TREATMENT STRATEGIES	
Received 3 rd dose mRNA vaccination between December 1, 2021 and March 31, 2022 versus no 3 rd dose	Same.
TREATMENT ASSIGNMENT	
<p>Randomization: Eligible persons are randomly assigned to 3rd dose versus no 3rd dose mRNA COVID-19 vaccination</p>	<p>Sequential matching: A two-step matching process was used to emulate the balance in baseline characteristics achieved by randomization. Eligible persons were matched on the date of their booster dose to their comparator(s) who did not receive a booster dose as of that date by:</p> <ol style="list-style-type: none"> a. Exact-matching on the following characteristics <ul style="list-style-type: none"> • VA region or “VISN” (19 regions throughout USA) • Age (6-year buckets) • Charlson comorbidity index (3-point buckets) • Primary COVID-19 vaccination type ((BNT162b2 or mRNA-1273) • Time since completion of primary vaccination (6-week buckets) b. Propensity score matching <p>After exact-matching, we executed propensity score matching to identify the best match for each booster dose recipient. We used matching with replacement in a 1:k variable ratio, where k varied based on the number of propensity score ties. We included all ties to avoid imbalance due to random pruning.</p>

	<p>Characteristics included in the propensity score logistic regression model were:</p> <p>Age Sex Race Ethnicity Urban/rural residence Charlson Comorbidity Index (CCI) Body mass index Diabetes Congestive heart failure (CHF) Chronic obstructive pulmonary disease (COPD) Chronic kidney disease (CKD) Receipt of immunosuppressant medications in the 2 years prior Care Assessment Need (CAN) score</p>
OUTCOMES	
<p>Laboratory-confirmed SARS CoV-2 Infection, documented by a nucleic acid amplification test (NAAT) or antigen test SARS-CoV-2-related hospitalization: any hospitalization on or within 30 days following SARS-CoV-2 infection SARS-CoV-2-related death: death due to any cause on or within 30 days following SARS-CoV-2 infection</p>	Same as for target trial
FOLLOW-UP	
<p>Follow-up starts on the date of randomization to either 3rd dose vaccination or no 3rd dose vaccination (“time zero”). Analysis is limited to individuals still at risk 10 days after randomization since there is no expectation of protective effect within the first 10 days after vaccination</p>	<p>Follow-up starts on the date of 3rd dose vaccination or the equivalent index date for the comparator who did not receive 3rd dose vaccination (“time zero”). Analysis is limited to matched sets in which all individuals are still at risk 10 days after time zero since there is no expectation of protective effect within the first 10 days after vaccination</p>
CAUSAL CONTRASTS	
Intention-to-treat effect	Observational analogue of the per-protocol effect
Per-protocol effect, i.e. the effect if all individuals had received their assigned treatment	
STATISTICAL ANALYSIS	
<p>Hazard ratios, adjusted hazard ratios for each of the outcomes. Vaccine effectiveness was estimated as (1-adjusted hazard ratio)</p>	Same as for target trial

Supplement Table 2. Immunosuppressive and cancer medications.

We identified prescription of these medications within the 2-year period prior to the study period as evidence of being on potentially immune suppressive medications

Drug class	Drugs
Alkylating agents	bendamustine, busulfan, chlorambucil, cisplatin, cyclophosphamide, ifosfamide, lurbinectedin, melphalan, nitrogen mustard procarbazine, temozolomide
Anti-CD19/CD3	blinatumomab
Anti-HER2	trastuzumab
Antimetabolites	azathioprine, capecitabine, cladribine, cytarabine, fludarabine, floxuridine, fluorouracil, gemcitabine, mercaptopurine, methotrexate, pemetrexed, pentostatin, pralatrexate, thioguanine
Antitumor antibiotics	bleomycin, dacarbazine, dactinomycin, daunorubicin, doxorubicin, epirubidin, idarubicin, mitomycin, mitoxantrone
B-cell depletion and inhibition	belimumab, ibriumomab, tiuxetan, obinutuzumab, ocrelizumab, ^b ofatumumab, ^b rituximab ^b
BCL2 inhibitors	venetoxlax
Interferon	interferon alpha-2a, interferon alpha-2b, interferon beta-1a, interferon beta-1b, interferon gamma, interferon gamma-1b
BCR-ABL tyrosine kinase inhibitors	bosutinib, dasatinib, imatinib, nilotinib, ponatinib
Bruton tyrosine kinase (BTK) inhibitors	acalabrutinib, ibrutinib, zanubrutinib
Calcineurin inhibitors	cyclosporine, pimecrolimus, tacrolimus, voclosporin
Complement inhibitor	eculizumab
EGFR inhibitors	afatinib, cetuximab, dacomitinib, erlotinib, gefitinib, lapatinib, mobocertinib, necitumumab, osimertinib, panitumumab
Glucocorticoids (systemic)	cortisone acetate, betamethasone, budesonide, dexamethasone, hydrocortisone, methylprednisolone, prednisolone, prednisone
Histone deacetylase inhibitors	belinostat, vorinostat

IL-1 inhibitors	anakinra, canakinumab, rilonacept
IL-12/23 inhibitors	guselkumab, ustekinumab
IL-17 inhibitors	brodalumab, ixekizumab, secukinumab
IL-4/13 inhibitors	dupilumab
IL-5 inhibitors	benralizumab, mepolizumab, reslizumab
IL-6 inhibitors	sarilumab, siltuximab, tocilizumab
Immune checkpoint inhibitors (anti-CTLA-4)	ipilimumab
Immune checkpoint inhibitors (anti-PD-1)	cemiplimab, dostarlimab, nivolumab, pembrolizumab
Immune checkpoint inhibitors (anti-PD-L1)	atezolizumab, avelumab, durvalumab
Immune globulin	anti-thymocyte globulin ^b
Immunosuppressant agent	mycophenolate mofetil (MMF), mycophenolate sodium
Janus kinase (JAK) inhibitors	baricitinib, ruxolitinib, tofacitinib, upadacitinib
Miscellaneous antineoplastics	arsenic trioxide, blinhydroxyurea, idelalisib, olaparib, omacetaxine, palbociclib, pegaspargase, thalidomide, trabectedin
Miscellaneous biological	glatiramer acetate
Miscellaneous other	leflunomide, sulfasalazine
mTOR kinase inhibitors	everolimus, sirolimus, temsirolimus
Nitrosoureas	carmustine, lomustine, streptozocin
Platinum derivatives	carboplatin, oxaliplatin
Proteasome inhibitors	bortezomib, carfilzomib
Selective adhesion-molecule inhibitors	natalizumab, vedolizumab
T-cell costimulation inhibitors	abatacept, belatacept, alemtuzumab, ² basiliximab
Thalidomide analogs	lenalidomide, pomalidomide
TNF inhibitors	adalimumab, certolizumab, etanercept, golimumab, infliximab
Topoisomerase inhibitors	irinotecan, mitoxantrone, topotecan
Tubulin-acting agents	eribulin, etoposide, ixabepilone
Tubulin-acting agents (taxanes)	cabazitaxel, docetaxel, nabpaclitaxel, paclitaxel
Tubulin-acting agents (vinca alkaloids)	vinblastine, vincristine, vinorelbine

VEGF tyrosine kinase inhibitors	afibercept, axitinib, bevacizumab, lenvatinib, pazopanib, ramucirumab, regorafenib, sorafenib, sunitinib, vandetanib
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Supplement Table 3: ICD10 Codes used to define diabetes, congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD) and chronic kidney disease (CKD).

The presence of these conditions was defined by documentation of one or more of these ICD10 codes recorded in VA electronic health records (both outpatient or inpatient records) during the 2-year period prior to the date of vaccination. We used lists of ICD10 codes developed by the VA’s Centralized Interactive Phenomics Resource or CIPHER to define each condition. CIPHER develops and validates EHR-based phenotype algorithms and definitions.

CIPHER is available through VA intranet at:

[https://vhacdwdwhweb100.vha.med.va.gov/phenotype/index.php/VA_Phenomics_Library_-_Centralized_Interactive_Phenomics_Resource_\(CIPHER\)](https://vhacdwdwhweb100.vha.med.va.gov/phenotype/index.php/VA_Phenomics_Library_-_Centralized_Interactive_Phenomics_Resource_(CIPHER))

Phenotype	Code	CodeDescription
CONGESTIVE HEART FAILURE (CHF)		
CHF	I50.20	Unspecified systolic (congestive) heart failure
CHF	I50.21	Acute systolic (congestive) heart failure
CHF	I50.22	Chronic systolic (congestive) heart failure
CHF	I50.23	Acute on chronic systolic (congestive) heart failure
CHF	I50.30	Unspecified diastolic (congestive) heart failure
CHF	I50.31	Acute diastolic (congestive) heart failure
CHF	I50.32	Chronic diastolic (congestive) heart failure
CHF	I50.33	Acute on chronic diastolic (congestive) heart failure
CHF	I50.40	Unspecified combined systolic (congestive) and diastolic (congestive) heart failure
CHF	I50.41	Acute combined systolic (congestive) and diastolic (congestive) heart failure
CHRONIC KIDNEY DISEASE (CKD) AND KIDNEY FAILURE (CKF)		
CKD	585.9	CHRONIC KIDNEY DISEASE, UNSPECIFIED
CKD	D63.1	Anemia in chronic kidney disease
CKD	E08.22	Diabetes mellitus due to underlying condition with diabetic chronic kidney disease
CKD	E09.22	Drug or chemical induced diabetes mellitus with diabetic chronic kidney disease
CKD	E10.22	Type 1 diabetes mellitus with diabetic chronic kidney disease
CKD	E11.22	Type 2 diabetes mellitus with diabetic chronic kidney disease
CKD	E13.22	Other specified diabetes mellitus with diabetic chronic kidney disease
CKD	I12.0	Hypertensive chronic kidney disease with stage 5 chronic kidney disease or end stage renal disease
CKD	I12.9	Hypertensive chronic kidney disease with stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease
CKD	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
CKD	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
CKD	I13.11	Hypertensive heart and chronic kidney disease without heart failure, with stage 5 chronic kidney disease, or end stage renal disease
CKD	I13.2	Hypertensive heart and chronic kidney disease with heart failure and with stage 5 chronic kidney disease, or end stage renal disease
CKD	N18.1	Chronic kidney disease, stage 1
CKD	N18.2	Chronic kidney disease, stage 2 (mild)
CKD	N18.3	Chronic kidney disease, stage 3 (moderate)
CKD	N18.30	Chronic kidney disease, stage 3 unspecified

CKD	N18.31	Chronic kidney disease, stage 3a
CKD	N18.32	Chronic kidney disease, stage 3b
CKD	N18.4	Chronic kidney disease, stage 4 (severe)
CKD	N18.5	Chronic kidney disease, stage 5
CKD	N18.6	End stage renal disease
CKD	N18.9	Chronic kidney disease, unspecified
CKD	R88.0	Cloudy (hemodialysis) (peritoneal) dialysis effluent
CKD	Z49.01	Encounter for fitting and adjustment of extracorporeal dialysis catheter
CKD	Z49.02	Encounter for fitting and adjustment of peritoneal dialysis catheter
CKD	Z49.31	Encounter for adequacy testing for hemodialysis
CKD	Z49.32	Encounter for adequacy testing for peritoneal dialysis
CKF	I12.0	Hypertensive chronic kidney disease with stage 5 chronic kidney disease or end stage renal disease
CKF	I13.11	Hypertensive heart and chronic kidney disease without heart failure, with stage 5 chronic kidney disease, or end stage renal disease
CKF	I13.2	Hypertensive heart and chronic kidney disease with heart failure and with stage 5 chronic kidney disease, or end stage renal disease
CKF	N18.6	End stage renal disease
CKF	N99.0	Postprocedural (acute) (chronic) kidney failure
CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)		
COPD	J40.	Bronchitis, not specified as acute or chronic
COPD	J41.0	Simple chronic bronchitis
COPD	J41.1	Mucopurulent chronic bronchitis
COPD	J41.8	Mixed simple and mucopurulent chronic bronchitis
COPD	J42.	Unspecified chronic bronchitis
COPD	J43.0	Unilateral pulmonary emphysema [MacLeod's syndrome]
COPD	J43.1	Panlobular emphysema
COPD	J43.2	Centrilobular emphysema
COPD	J43.8	Other emphysema
COPD	J43.9	Emphysema, unspecified
COPD	J44.0	Chronic obstructive pulmonary disease with (acute) lower respiratory infection
COPD	J44.1	Chronic obstructive pulmonary disease with (acute) exacerbation
COPD	J44.9	Chronic obstructive pulmonary disease, unspecified
COPD	J47.0	Bronchiectasis with acute lower respiratory infection
COPD	J47.1	Bronchiectasis with (acute) exacerbation
COPD	J47.9	Bronchiectasis, uncomplicated
DIABETES		
DiabetesAny	250.00	DIABETES MELLITUS WITHOUT MENTION OF COMPLICATION, TYPE II OR UNSPECIFIED TYPE, NOT STATED AS UNCONTROLLED
DiabetesAny	250.60	DIABETES WITH NEUROLOGICAL MANIFESTATIONS, TYPE II OR UNSPECIFIED TYPE, NOT STATED AS UNCONTROLLED
DiabetesAny	E08.00	Diabetes mellitus due to underlying condition with hyperosmolarity without nonketotic hyperglycemic-hyperosmolar coma (NKHHC)
DiabetesAny	E08.01	Diabetes mellitus due to underlying condition with hyperosmolarity with coma
DiabetesAny	E08.10	Diabetes mellitus due to underlying condition with ketoacidosis without coma
DiabetesAny	E08.11	Diabetes mellitus due to underlying condition with ketoacidosis with coma
DiabetesAny	E08.21	Diabetes mellitus due to underlying condition with diabetic nephropathy

DiabetesAny	E08.22	Diabetes mellitus due to underlying condition with diabetic chronic kidney disease
DiabetesAny	E08.29	Diabetes mellitus due to underlying condition with other diabetic kidney complication
DiabetesAny	E08.311	Diabetes mellitus due to underlying condition with unspecified diabetic retinopathy with macular edema
DiabetesAny	E08.319	Diabetes mellitus due to underlying condition with unspecified diabetic retinopathy without macular edema
DiabetesAny	E08.3211	Diabetes mellitus due to underlying condition with mild nonproliferative diabetic retinopathy with macular edema, right eye
DiabetesAny	E08.3212	Diabetes mellitus due to underlying condition with mild nonproliferative diabetic retinopathy with macular edema, left eye
DiabetesAny	E08.3213	Diabetes mellitus due to underlying condition with mild nonproliferative diabetic retinopathy with macular edema, bilateral
DiabetesAny	E08.3219	Diabetes mellitus due to underlying condition with mild nonproliferative diabetic retinopathy with macular edema, unspecified eye
DiabetesAny	E08.3291	Diabetes mellitus due to underlying condition with mild nonproliferative diabetic retinopathy without macular edema, right eye
DiabetesAny	E08.3292	Diabetes mellitus due to underlying condition with mild nonproliferative diabetic retinopathy without macular edema, left eye
DiabetesAny	E08.3293	Diabetes mellitus due to underlying condition with mild nonproliferative diabetic retinopathy without macular edema, bilateral
DiabetesAny	E08.3299	Diabetes mellitus due to underlying condition with mild nonproliferative diabetic retinopathy without macular edema, unspecified eye
DiabetesAny	E08.3311	Diabetes mellitus due to underlying condition with moderate nonproliferative diabetic retinopathy with macular edema, right eye
DiabetesAny	E08.3312	Diabetes mellitus due to underlying condition with moderate nonproliferative diabetic retinopathy with macular edema, left eye
DiabetesAny	E08.3313	Diabetes mellitus due to underlying condition with moderate nonproliferative diabetic retinopathy with macular edema, bilateral
DiabetesAny	E08.3319	Diabetes mellitus due to underlying condition with moderate nonproliferative diabetic retinopathy with macular edema, unspecified eye
DiabetesAny	E08.3391	Diabetes mellitus due to underlying condition with moderate nonproliferative diabetic retinopathy without macular edema, right eye
DiabetesAny	E08.3392	Diabetes mellitus due to underlying condition with moderate nonproliferative diabetic retinopathy without macular edema, left eye
DiabetesAny	E08.3393	Diabetes mellitus due to underlying condition with moderate nonproliferative diabetic retinopathy without macular edema, bilateral
DiabetesAny	E08.3399	Diabetes mellitus due to underlying condition with moderate nonproliferative diabetic retinopathy without macular edema, unspecified eye
DiabetesAny	E08.3411	Diabetes mellitus due to underlying condition with severe nonproliferative diabetic retinopathy with macular edema, right eye
DiabetesAny	E08.3412	Diabetes mellitus due to underlying condition with severe nonproliferative diabetic retinopathy with macular edema, left eye
DiabetesAny	E08.3413	Diabetes mellitus due to underlying condition with severe nonproliferative diabetic retinopathy with macular edema, bilateral
DiabetesAny	E08.3419	Diabetes mellitus due to underlying condition with severe nonproliferative diabetic retinopathy with macular edema, unspecified eye
DiabetesAny	E08.3491	Diabetes mellitus due to underlying condition with severe nonproliferative diabetic retinopathy without macular edema, right eye
DiabetesAny	E08.3492	Diabetes mellitus due to underlying condition with severe nonproliferative diabetic retinopathy without macular edema, left eye
DiabetesAny	E08.3493	Diabetes mellitus due to underlying condition with severe nonproliferative diabetic retinopathy without macular edema, bilateral
DiabetesAny	E08.3499	Diabetes mellitus due to underlying condition with severe nonproliferative diabetic retinopathy without macular edema, unspecified eye

DiabetesAny	E08.3511	Diabetes mellitus due to underlying condition with proliferative diabetic retinopathy with macular edema, right eye
DiabetesAny	E08.3512	Diabetes mellitus due to underlying condition with proliferative diabetic retinopathy with macular edema, left eye
DiabetesAny	E08.3513	Diabetes mellitus due to underlying condition with proliferative diabetic retinopathy with macular edema, bilateral
DiabetesAny	E08.3519	Diabetes mellitus due to underlying condition with proliferative diabetic retinopathy with macular edema, unspecified eye
DiabetesAny	E08.3521	Diabetes mellitus due to underlying condition with proliferative diabetic retinopathy with traction retinal detachment involving the macula, right eye
DiabetesAny	E08.3522	Diabetes mellitus due to underlying condition with proliferative diabetic retinopathy with traction retinal detachment involving the macula, left eye
DiabetesAny	E08.3523	Diabetes mellitus due to underlying condition with proliferative diabetic retinopathy with traction retinal detachment involving the macula, bilateral
DiabetesAny	E08.3529	Diabetes mellitus due to underlying condition with proliferative diabetic retinopathy with traction retinal detachment involving the macula, unspecified eye
DiabetesAny	E08.3531	Diabetes mellitus due to underlying condition with proliferative diabetic retinopathy with traction retinal detachment not involving the macula, right eye
DiabetesAny	E08.3532	Diabetes mellitus due to underlying condition with proliferative diabetic retinopathy with traction retinal detachment not involving the macula, left eye
DiabetesAny	E08.3533	Diabetes mellitus due to underlying condition with proliferative diabetic retinopathy with traction retinal detachment not involving the macula, bilateral
DiabetesAny	E08.3539	Diabetes mellitus due to underlying condition with proliferative diabetic retinopathy with traction retinal detachment not involving the macula, unspecified eye
DiabetesAny	E08.3541	Diabetes mellitus due to underlying condition with proliferative diabetic retinopathy with combined traction retinal detachment and rhegmatogenous retinal detachment, right eye
DiabetesAny	E08.3542	Diabetes mellitus due to underlying condition with proliferative diabetic retinopathy with combined traction retinal detachment and rhegmatogenous retinal detachment, left eye
DiabetesAny	E08.3543	Diabetes mellitus due to underlying condition with proliferative diabetic retinopathy with combined traction retinal detachment and rhegmatogenous retinal detachment, bilateral
DiabetesAny	E08.3549	Diabetes mellitus due to underlying condition with proliferative diabetic retinopathy with combined traction retinal detachment and rhegmatogenous retinal detachment, unspecified
DiabetesAny	E08.3551	Diabetes mellitus due to underlying condition with stable proliferative diabetic retinopathy, right eye
DiabetesAny	E08.3552	Diabetes mellitus due to underlying condition with stable proliferative diabetic retinopathy, left eye
DiabetesAny	E08.3553	Diabetes mellitus due to underlying condition with stable proliferative diabetic retinopathy, bilateral
DiabetesAny	E08.3559	Diabetes mellitus due to underlying condition with stable proliferative diabetic retinopathy, unspecified eye
DiabetesAny	E08.3591	Diabetes mellitus due to underlying condition with proliferative diabetic retinopathy without macular edema, right eye
DiabetesAny	E08.3592	Diabetes mellitus due to underlying condition with proliferative diabetic retinopathy without macular edema, left eye
DiabetesAny	E08.3593	Diabetes mellitus due to underlying condition with proliferative diabetic retinopathy without macular edema, bilateral
DiabetesAny	E08.3599	Diabetes mellitus due to underlying condition with proliferative diabetic retinopathy without macular edema, unspecified eye
DiabetesAny	E08.36	Diabetes mellitus due to underlying condition with diabetic cataract
DiabetesAny	E08.37X1	Diabetes mellitus due to underlying condition with diabetic macular edema, resolved following treatment, right eye
DiabetesAny	E08.37X2	Diabetes mellitus due to underlying condition with diabetic macular edema, resolved following treatment, left eye
DiabetesAny	E08.37X3	Diabetes mellitus due to underlying condition with diabetic macular edema, resolved following treatment, bilateral

DiabetesAny	E08.37X9	Diabetes mellitus due to underlying condition with diabetic macular edema, resolved following treatment, unspecified eye
DiabetesAny	E08.39	Diabetes mellitus due to underlying condition with other diabetic ophthalmic complication
DiabetesAny	E08.40	Diabetes mellitus due to underlying condition with diabetic neuropathy, unspecified
DiabetesAny	E08.41	Diabetes mellitus due to underlying condition with diabetic mononeuropathy
DiabetesAny	E08.42	Diabetes mellitus due to underlying condition with diabetic polyneuropathy
DiabetesAny	E08.43	Diabetes mellitus due to underlying condition with diabetic autonomic (poly)neuropathy
DiabetesAny	E08.44	Diabetes mellitus due to underlying condition with diabetic amyotrophy
DiabetesAny	E08.49	Diabetes mellitus due to underlying condition with other diabetic neurological complication
DiabetesAny	E08.51	Diabetes mellitus due to underlying condition with diabetic peripheral angiopathy without gangrene
DiabetesAny	E08.52	Diabetes mellitus due to underlying condition with diabetic peripheral angiopathy with gangrene
DiabetesAny	E08.59	Diabetes mellitus due to underlying condition with other circulatory complications
DiabetesAny	E08.610	Diabetes mellitus due to underlying condition with diabetic neuropathic arthropathy
DiabetesAny	E08.618	Diabetes mellitus due to underlying condition with other diabetic arthropathy
DiabetesAny	E08.620	Diabetes mellitus due to underlying condition with diabetic dermatitis
DiabetesAny	E08.621	Diabetes mellitus due to underlying condition with foot ulcer
DiabetesAny	E08.622	Diabetes mellitus due to underlying condition with other skin ulcer
DiabetesAny	E08.628	Diabetes mellitus due to underlying condition with other skin complications
DiabetesAny	E08.630	Diabetes mellitus due to underlying condition with periodontal disease
DiabetesAny	E08.638	Diabetes mellitus due to underlying condition with other oral complications
DiabetesAny	E08.641	Diabetes mellitus due to underlying condition with hypoglycemia with coma
DiabetesAny	E08.649	Diabetes mellitus due to underlying condition with hypoglycemia without coma
DiabetesAny	E08.65	Diabetes mellitus due to underlying condition with hyperglycemia
DiabetesAny	E08.69	Diabetes mellitus due to underlying condition with other specified complication
DiabetesAny	E08.8	Diabetes mellitus due to underlying condition with unspecified complications
DiabetesAny	E08.9	Diabetes mellitus due to underlying condition without complications
DiabetesAny	E09.00	Drug or chemical induced diabetes mellitus with hyperosmolarity without nonketotic hyperglycemic-hyperosmolar coma (NKHHC)
DiabetesAny	E09.01	Drug or chemical induced diabetes mellitus with hyperosmolarity with coma
DiabetesAny	E09.10	Drug or chemical induced diabetes mellitus with ketoacidosis without coma
DiabetesAny	E09.11	Drug or chemical induced diabetes mellitus with ketoacidosis with coma
DiabetesAny	E09.21	Drug or chemical induced diabetes mellitus with diabetic nephropathy
DiabetesAny	E09.22	Drug or chemical induced diabetes mellitus with diabetic chronic kidney disease
DiabetesAny	E09.29	Drug or chemical induced diabetes mellitus with other diabetic kidney complication
DiabetesAny	E09.311	Drug or chemical induced diabetes mellitus with unspecified diabetic retinopathy with macular edema
DiabetesAny	E09.319	Drug or chemical induced diabetes mellitus with unspecified diabetic retinopathy without macular edema
DiabetesAny	E09.3211	Drug or chemical induced diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema, right eye
DiabetesAny	E09.3212	Drug or chemical induced diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema, left eye
DiabetesAny	E09.3213	Drug or chemical induced diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema, bilateral
DiabetesAny	E09.3219	Drug or chemical induced diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema, unspecified eye

DiabetesAny	E09.3291	Drug or chemical induced diabetes mellitus with mild nonproliferative diabetic retinopathy without macular edema, right eye
DiabetesAny	E09.3292	Drug or chemical induced diabetes mellitus with mild nonproliferative diabetic retinopathy without macular edema, left eye
DiabetesAny	E09.3293	Drug or chemical induced diabetes mellitus with mild nonproliferative diabetic retinopathy without macular edema, bilateral
DiabetesAny	E09.3299	Drug or chemical induced diabetes mellitus with mild nonproliferative diabetic retinopathy without macular edema, unspecified eye
DiabetesAny	E09.3311	Drug or chemical induced diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema, right eye
DiabetesAny	E09.3312	Drug or chemical induced diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema, left eye
DiabetesAny	E09.3313	Drug or chemical induced diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema, bilateral
DiabetesAny	E09.3319	Drug or chemical induced diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema, unspecified eye
DiabetesAny	E09.3391	Drug or chemical induced diabetes mellitus with moderate nonproliferative diabetic retinopathy without macular edema, right eye
DiabetesAny	E09.3392	Drug or chemical induced diabetes mellitus with moderate nonproliferative diabetic retinopathy without macular edema, left eye
DiabetesAny	E09.3393	Drug or chemical induced diabetes mellitus with moderate nonproliferative diabetic retinopathy without macular edema, bilateral
DiabetesAny	E09.3399	Drug or chemical induced diabetes mellitus with moderate nonproliferative diabetic retinopathy without macular edema, unspecified eye
DiabetesAny	E09.3411	Drug or chemical induced diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema, right eye
DiabetesAny	E09.3412	Drug or chemical induced diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema, left eye
DiabetesAny	E09.3413	Drug or chemical induced diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema, bilateral
DiabetesAny	E09.3419	Drug or chemical induced diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema, unspecified eye
DiabetesAny	E09.3493	Drug or chemical induced diabetes mellitus with severe nonproliferative diabetic retinopathy without macular edema, bilateral
DiabetesAny	E09.3499	Drug or chemical induced diabetes mellitus with severe nonproliferative diabetic retinopathy without macular edema, unspecified eye
DiabetesAny	E09.3511	Drug or chemical induced diabetes mellitus with proliferative diabetic retinopathy with macular edema, right eye
DiabetesAny	E09.3512	Drug or chemical induced diabetes mellitus with proliferative diabetic retinopathy with macular edema, left eye
DiabetesAny	E09.3513	Drug or chemical induced diabetes mellitus with proliferative diabetic retinopathy with macular edema, bilateral
DiabetesAny	E09.3519	Drug or chemical induced diabetes mellitus with proliferative diabetic retinopathy with macular edema, unspecified eye
DiabetesAny	E09.3522	Drug or chemical induced diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment involving the macula, left eye
DiabetesAny	E09.3533	Drug or chemical induced diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment not involving the macula, bilateral
DiabetesAny	E09.3541	Drug or chemical induced diabetes mellitus with proliferative diabetic retinopathy with combined traction retinal detachment and rhegmatogenous retinal detachment, right eye
DiabetesAny	E09.3542	Drug or chemical induced diabetes mellitus with proliferative diabetic retinopathy with combined traction retinal detachment and rhegmatogenous retinal detachment, left eye
DiabetesAny	E09.3551	Drug or chemical induced diabetes mellitus with stable proliferative diabetic retinopathy, right eye

DiabetesAny	E09.3552	Drug or chemical induced diabetes mellitus with stable proliferative diabetic retinopathy, left eye
DiabetesAny	E09.3553	Drug or chemical induced diabetes mellitus with stable proliferative diabetic retinopathy, bilateral
DiabetesAny	E09.3559	Drug or chemical induced diabetes mellitus with stable proliferative diabetic retinopathy, unspecified eye
DiabetesAny	E09.3591	Drug or chemical induced diabetes mellitus with proliferative diabetic retinopathy without macular edema, right eye
DiabetesAny	E09.3592	Drug or chemical induced diabetes mellitus with proliferative diabetic retinopathy without macular edema, left eye
DiabetesAny	E09.3593	Drug or chemical induced diabetes mellitus with proliferative diabetic retinopathy without macular edema, bilateral
DiabetesAny	E09.3599	Drug or chemical induced diabetes mellitus with proliferative diabetic retinopathy without macular edema, unspecified eye
DiabetesAny	E09.36	Drug or chemical induced diabetes mellitus with diabetic cataract
DiabetesAny	E09.37X1	Drug or chemical induced diabetes mellitus with diabetic macular edema, resolved following treatment, right eye
DiabetesAny	E09.37X2	Drug or chemical induced diabetes mellitus with diabetic macular edema, resolved following treatment, left eye
DiabetesAny	E09.37X3	Drug or chemical induced diabetes mellitus with diabetic macular edema, resolved following treatment, bilateral
DiabetesAny	E09.39	Drug or chemical induced diabetes mellitus with other diabetic ophthalmic complication
DiabetesAny	E09.40	Drug or chemical induced diabetes mellitus with neurological complications with diabetic neuropathy, unspecified
DiabetesAny	E09.41	Drug or chemical induced diabetes mellitus with neurological complications with diabetic mononeuropathy
DiabetesAny	E09.42	Drug or chemical induced diabetes mellitus with neurological complications with diabetic polyneuropathy
DiabetesAny	E09.43	Drug or chemical induced diabetes mellitus with neurological complications with diabetic autonomic (poly)neuropathy
DiabetesAny	E09.44	Drug or chemical induced diabetes mellitus with neurological complications with diabetic amyotrophy
DiabetesAny	E09.49	Drug or chemical induced diabetes mellitus with neurological complications with other diabetic neurological complication
DiabetesAny	E09.51	Drug or chemical induced diabetes mellitus with diabetic peripheral angiopathy without gangrene
DiabetesAny	E09.52	Drug or chemical induced diabetes mellitus with diabetic peripheral angiopathy with gangrene
DiabetesAny	E09.59	Drug or chemical induced diabetes mellitus with other circulatory complications
DiabetesAny	E09.610	Drug or chemical induced diabetes mellitus with diabetic neuropathic arthropathy
DiabetesAny	E09.618	Drug or chemical induced diabetes mellitus with other diabetic arthropathy
DiabetesAny	E09.620	Drug or chemical induced diabetes mellitus with diabetic dermatitis
DiabetesAny	E09.621	Drug or chemical induced diabetes mellitus with foot ulcer
DiabetesAny	E09.622	Drug or chemical induced diabetes mellitus with other skin ulcer
DiabetesAny	E09.628	Drug or chemical induced diabetes mellitus with other skin complications
DiabetesAny	E09.630	Drug or chemical induced diabetes mellitus with periodontal disease
DiabetesAny	E09.638	Drug or chemical induced diabetes mellitus with other oral complications
DiabetesAny	E09.641	Drug or chemical induced diabetes mellitus with hypoglycemia with coma
DiabetesAny	E09.649	Drug or chemical induced diabetes mellitus with hypoglycemia without coma
DiabetesAny	E09.65	Drug or chemical induced diabetes mellitus with hyperglycemia
DiabetesAny	E09.69	Drug or chemical induced diabetes mellitus with other specified complication

DiabetesAny	E09.8	Drug or chemical induced diabetes mellitus with unspecified complications
DiabetesAny	E09.9	Drug or chemical induced diabetes mellitus without complications
DiabetesAny	E10.10	Type 1 diabetes mellitus with ketoacidosis without coma
DiabetesAny	E10.11	Type 1 diabetes mellitus with ketoacidosis with coma
DiabetesAny	E10.21	Type 1 diabetes mellitus with diabetic nephropathy
DiabetesAny	E10.22	Type 1 diabetes mellitus with diabetic chronic kidney disease
DiabetesAny	E10.29	Type 1 diabetes mellitus with other diabetic kidney complication
DiabetesAny	E10.311	Type 1 diabetes mellitus with unspecified diabetic retinopathy with macular edema
DiabetesAny	E10.319	Type 1 diabetes mellitus with unspecified diabetic retinopathy without macular edema
DiabetesAny	E10.3211	Type 1 diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema, right eye
DiabetesAny	E10.3212	Type 1 diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema, left eye
DiabetesAny	E10.3213	Type 1 diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema, bilateral
DiabetesAny	E10.3219	Type 1 diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema, unspecified eye
DiabetesAny	E10.3291	Type 1 diabetes mellitus with mild nonproliferative diabetic retinopathy without macular edema, right eye
DiabetesAny	E10.3292	Type 1 diabetes mellitus with mild nonproliferative diabetic retinopathy without macular edema, left eye
DiabetesAny	E10.3293	Type 1 diabetes mellitus with mild nonproliferative diabetic retinopathy without macular edema, bilateral
DiabetesAny	E10.3299	Type 1 diabetes mellitus with mild nonproliferative diabetic retinopathy without macular edema, unspecified eye
DiabetesAny	E10.3311	Type 1 diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema, right eye
DiabetesAny	E10.3312	Type 1 diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema, left eye
DiabetesAny	E10.3313	Type 1 diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema, bilateral
DiabetesAny	E10.3319	Type 1 diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema, unspecified eye
DiabetesAny	E10.3391	Type 1 diabetes mellitus with moderate nonproliferative diabetic retinopathy without macular edema, right eye
DiabetesAny	E10.3392	Type 1 diabetes mellitus with moderate nonproliferative diabetic retinopathy without macular edema, left eye
DiabetesAny	E10.3393	Type 1 diabetes mellitus with moderate nonproliferative diabetic retinopathy without macular edema, bilateral
DiabetesAny	E10.3399	Type 1 diabetes mellitus with moderate nonproliferative diabetic retinopathy without macular edema, unspecified eye
DiabetesAny	E10.3411	Type 1 diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema, right eye
DiabetesAny	E10.3412	Type 1 diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema, left eye
DiabetesAny	E10.3413	Type 1 diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema, bilateral
DiabetesAny	E10.3419	Type 1 diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema, unspecified eye
DiabetesAny	E10.3491	Type 1 diabetes mellitus with severe nonproliferative diabetic retinopathy without macular edema, right eye
DiabetesAny	E10.3492	Type 1 diabetes mellitus with severe nonproliferative diabetic retinopathy without macular edema, left eye

DiabetesAny	E10.3493	Type 1 diabetes mellitus with severe nonproliferative diabetic retinopathy without macular edema, bilateral
DiabetesAny	E10.3499	Type 1 diabetes mellitus with severe nonproliferative diabetic retinopathy without macular edema, unspecified eye
DiabetesAny	E10.3511	Type 1 diabetes mellitus with proliferative diabetic retinopathy with macular edema, right eye
DiabetesAny	E10.3512	Type 1 diabetes mellitus with proliferative diabetic retinopathy with macular edema, left eye
DiabetesAny	E10.3513	Type 1 diabetes mellitus with proliferative diabetic retinopathy with macular edema, bilateral
DiabetesAny	E10.3519	Type 1 diabetes mellitus with proliferative diabetic retinopathy with macular edema, unspecified eye
DiabetesAny	E10.3521	Type 1 diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment involving the macula, right eye
DiabetesAny	E10.3522	Type 1 diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment involving the macula, left eye
DiabetesAny	E10.3523	Type 1 diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment involving the macula, bilateral
DiabetesAny	E10.3529	Type 1 diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment involving the macula, unspecified eye
DiabetesAny	E10.3531	Type 1 diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment not involving the macula, right eye
DiabetesAny	E10.3532	Type 1 diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment not involving the macula, left eye
DiabetesAny	E10.3533	Type 1 diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment not involving the macula, bilateral
DiabetesAny	E10.3539	Type 1 diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment not involving the macula, unspecified eye
DiabetesAny	E10.3541	Type 1 diabetes mellitus with proliferative diabetic retinopathy with combined traction retinal detachment and rhegmatogenous retinal detachment, right eye
DiabetesAny	E10.3542	Type 1 diabetes mellitus with proliferative diabetic retinopathy with combined traction retinal detachment and rhegmatogenous retinal detachment, left eye
DiabetesAny	E10.3543	Type 1 diabetes mellitus with proliferative diabetic retinopathy with combined traction retinal detachment and rhegmatogenous retinal detachment, bilateral
DiabetesAny	E10.3549	Type 1 diabetes mellitus with proliferative diabetic retinopathy with combined traction retinal detachment and rhegmatogenous retinal detachment, unspecified eye
DiabetesAny	E10.3551	Type 1 diabetes mellitus with stable proliferative diabetic retinopathy, right eye
DiabetesAny	E10.3552	Type 1 diabetes mellitus with stable proliferative diabetic retinopathy, left eye
DiabetesAny	E10.3553	Type 1 diabetes mellitus with stable proliferative diabetic retinopathy, bilateral
DiabetesAny	E10.3559	Type 1 diabetes mellitus with stable proliferative diabetic retinopathy, unspecified eye
DiabetesAny	E10.3591	Type 1 diabetes mellitus with proliferative diabetic retinopathy without macular edema, right eye
DiabetesAny	E10.3592	Type 1 diabetes mellitus with proliferative diabetic retinopathy without macular edema, left eye
DiabetesAny	E10.3593	Type 1 diabetes mellitus with proliferative diabetic retinopathy without macular edema, bilateral
DiabetesAny	E10.3599	Type 1 diabetes mellitus with proliferative diabetic retinopathy without macular edema, unspecified eye
DiabetesAny	E10.36	Type 1 diabetes mellitus with diabetic cataract
DiabetesAny	E10.37X1	Type 1 diabetes mellitus with diabetic macular edema, resolved following treatment, right eye
DiabetesAny	E10.37X2	Type 1 diabetes mellitus with diabetic macular edema, resolved following treatment, left eye
DiabetesAny	E10.37X3	Type 1 diabetes mellitus with diabetic macular edema, resolved following treatment, bilateral
DiabetesAny	E10.37X9	Type 1 diabetes mellitus with diabetic macular edema, resolved following treatment, unspecified eye

DiabetesAny	E10.39	Type 1 diabetes mellitus with other diabetic ophthalmic complication
DiabetesAny	E10.40	Type 1 diabetes mellitus with diabetic neuropathy, unspecified
DiabetesAny	E10.41	Type 1 diabetes mellitus with diabetic mononeuropathy
DiabetesAny	E10.42	Type 1 diabetes mellitus with diabetic polyneuropathy
DiabetesAny	E10.43	Type 1 diabetes mellitus with diabetic autonomic (poly)neuropathy
DiabetesAny	E10.44	Type 1 diabetes mellitus with diabetic amyotrophy
DiabetesAny	E10.49	Type 1 diabetes mellitus with other diabetic neurological complication
DiabetesAny	E10.51	Type 1 diabetes mellitus with diabetic peripheral angiopathy without gangrene
DiabetesAny	E10.52	Type 1 diabetes mellitus with diabetic peripheral angiopathy with gangrene
DiabetesAny	E10.59	Type 1 diabetes mellitus with other circulatory complications
DiabetesAny	E10.610	Type 1 diabetes mellitus with diabetic neuropathic arthropathy
DiabetesAny	E10.618	Type 1 diabetes mellitus with other diabetic arthropathy
DiabetesAny	E10.620	Type 1 diabetes mellitus with diabetic dermatitis
DiabetesAny	E10.621	Type 1 diabetes mellitus with foot ulcer
DiabetesAny	E10.622	Type 1 diabetes mellitus with other skin ulcer
DiabetesAny	E10.628	Type 1 diabetes mellitus with other skin complications
DiabetesAny	E10.630	Type 1 diabetes mellitus with periodontal disease
DiabetesAny	E10.638	Type 1 diabetes mellitus with other oral complications
DiabetesAny	E10.641	Type 1 diabetes mellitus with hypoglycemia with coma
DiabetesAny	E10.649	Type 1 diabetes mellitus with hypoglycemia without coma
DiabetesAny	E10.65	Type 1 diabetes mellitus with hyperglycemia
DiabetesAny	E10.69	Type 1 diabetes mellitus with other specified complication
DiabetesAny	E10.8	Type 1 diabetes mellitus with unspecified complications
DiabetesAny	E10.9	Type 1 diabetes mellitus without complications
DiabetesAny	E11.00	Type 2 diabetes mellitus with hyperosmolarity without nonketotic hyperglycemic-hyperosmolar coma (NKHHC)
DiabetesAny	E11.01	Type 2 diabetes mellitus with hyperosmolarity with coma
DiabetesAny	E11.10	Type 2 diabetes mellitus with ketoacidosis without coma
DiabetesAny	E11.11	Type 2 diabetes mellitus with ketoacidosis with coma
DiabetesAny	E11.21	Type 2 diabetes mellitus with diabetic nephropathy
DiabetesAny	E11.22	Type 2 diabetes mellitus with diabetic chronic kidney disease
DiabetesAny	E11.29	Type 2 diabetes mellitus with other diabetic kidney complication
DiabetesAny	E11.311	Type 2 diabetes mellitus with unspecified diabetic retinopathy with macular edema
DiabetesAny	E11.319	Type 2 diabetes mellitus with unspecified diabetic retinopathy without macular edema
DiabetesAny	E11.321	Type 2 Diabetes Mellitus with Mild Nonproliferative Diabetic Retinopathy with Macular Edema
DiabetesAny	E11.3211	Type 2 diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema, right eye
DiabetesAny	E11.3212	Type 2 diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema, left eye
DiabetesAny	E11.3213	Type 2 diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema, bilateral
DiabetesAny	E11.3219	Type 2 diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema, unspecified eye
DiabetesAny	E11.329	Type 2 Diabetes Mellitus with Mild Nonproliferative Diabetic Retinopathy without Macular Edema

DiabetesAny	E11.3291	Type 2 diabetes mellitus with mild nonproliferative diabetic retinopathy without macular edema, right eye
DiabetesAny	E11.3292	Type 2 diabetes mellitus with mild nonproliferative diabetic retinopathy without macular edema, left eye
DiabetesAny	E11.3293	Type 2 diabetes mellitus with mild nonproliferative diabetic retinopathy without macular edema, bilateral
DiabetesAny	E11.3299	Type 2 diabetes mellitus with mild nonproliferative diabetic retinopathy without macular edema, unspecified eye
DiabetesAny	E11.3311	Type 2 diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema, right eye
DiabetesAny	E11.3312	Type 2 diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema, left eye
DiabetesAny	E11.3313	Type 2 diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema, bilateral
DiabetesAny	E11.3319	Type 2 diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema, unspecified eye
DiabetesAny	E11.339	Type 2 Diabetes Mellitus with Moderate Nonproliferative Diabetic Retinopathy without Macular Edema
DiabetesAny	E11.3391	Type 2 diabetes mellitus with moderate nonproliferative diabetic retinopathy without macular edema, right eye
DiabetesAny	E11.3392	Type 2 diabetes mellitus with moderate nonproliferative diabetic retinopathy without macular edema, left eye
DiabetesAny	E11.3393	Type 2 diabetes mellitus with moderate nonproliferative diabetic retinopathy without macular edema, bilateral
DiabetesAny	E11.3399	Type 2 diabetes mellitus with moderate nonproliferative diabetic retinopathy without macular edema, unspecified eye
DiabetesAny	E11.341	Type 2 Diabetes Mellitus with Severe Nonproliferative Diabetic Retinopathy with Macular Edema
DiabetesAny	E11.3411	Type 2 diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema, right eye
DiabetesAny	E11.3412	Type 2 diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema, left eye
DiabetesAny	E11.3413	Type 2 diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema, bilateral
DiabetesAny	E11.3419	Type 2 diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema, unspecified eye
DiabetesAny	E11.3491	Type 2 diabetes mellitus with severe nonproliferative diabetic retinopathy without macular edema, right eye
DiabetesAny	E11.3492	Type 2 diabetes mellitus with severe nonproliferative diabetic retinopathy without macular edema, left eye
DiabetesAny	E11.3493	Type 2 diabetes mellitus with severe nonproliferative diabetic retinopathy without macular edema, bilateral
DiabetesAny	E11.3499	Type 2 diabetes mellitus with severe nonproliferative diabetic retinopathy without macular edema, unspecified eye
DiabetesAny	E11.351	Type 2 Diabetes Mellitus with Proliferative Diabetic Retinopathy with Macular Edema
DiabetesAny	E11.3511	Type 2 diabetes mellitus with proliferative diabetic retinopathy with macular edema, right eye
DiabetesAny	E11.3512	Type 2 diabetes mellitus with proliferative diabetic retinopathy with macular edema, left eye
DiabetesAny	E11.3513	Type 2 diabetes mellitus with proliferative diabetic retinopathy with macular edema, bilateral
DiabetesAny	E11.3519	Type 2 diabetes mellitus with proliferative diabetic retinopathy with macular edema, unspecified eye
DiabetesAny	E11.3521	Type 2 diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment involving the macula, right eye

DiabetesAny	E11.3522	Type 2 diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment involving the macula, left eye
DiabetesAny	E11.3523	Type 2 diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment involving the macula, bilateral
DiabetesAny	E11.3529	Type 2 diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment involving the macula, unspecified eye
DiabetesAny	E11.3531	Type 2 diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment not involving the macula, right eye
DiabetesAny	E11.3532	Type 2 diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment not involving the macula, left eye
DiabetesAny	E11.3533	Type 2 diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment not involving the macula, bilateral
DiabetesAny	E11.3539	Type 2 diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment not involving the macula, unspecified eye
DiabetesAny	E11.3541	Type 2 diabetes mellitus with proliferative diabetic retinopathy with combined traction retinal detachment and rhegmatogenous retinal detachment, right eye
DiabetesAny	E11.3542	Type 2 diabetes mellitus with proliferative diabetic retinopathy with combined traction retinal detachment and rhegmatogenous retinal detachment, left eye
DiabetesAny	E11.3543	Type 2 diabetes mellitus with proliferative diabetic retinopathy with combined traction retinal detachment and rhegmatogenous retinal detachment, bilateral
DiabetesAny	E11.3549	Type 2 diabetes mellitus with proliferative diabetic retinopathy with combined traction retinal detachment and rhegmatogenous retinal detachment, unspecified eye
DiabetesAny	E11.3551	Type 2 diabetes mellitus with stable proliferative diabetic retinopathy, right eye
DiabetesAny	E11.3552	Type 2 diabetes mellitus with stable proliferative diabetic retinopathy, left eye
DiabetesAny	E11.3553	Type 2 diabetes mellitus with stable proliferative diabetic retinopathy, bilateral
DiabetesAny	E11.3559	Type 2 diabetes mellitus with stable proliferative diabetic retinopathy, unspecified eye
DiabetesAny	E11.359	Type 2 Diabetes Mellitus with Proliferative Diabetic Retinopathy without Macular Edema
DiabetesAny	E11.3591	Type 2 diabetes mellitus with proliferative diabetic retinopathy without macular edema, right eye
DiabetesAny	E11.3592	Type 2 diabetes mellitus with proliferative diabetic retinopathy without macular edema, left eye
DiabetesAny	E11.3593	Type 2 diabetes mellitus with proliferative diabetic retinopathy without macular edema, bilateral
DiabetesAny	E11.3599	Type 2 diabetes mellitus with proliferative diabetic retinopathy without macular edema, unspecified eye
DiabetesAny	E11.36	Type 2 diabetes mellitus with diabetic cataract
DiabetesAny	E11.37X1	Type 2 diabetes mellitus with diabetic macular edema, resolved following treatment, right eye
DiabetesAny	E11.37X2	Type 2 diabetes mellitus with diabetic macular edema, resolved following treatment, left eye
DiabetesAny	E11.37X3	Type 2 diabetes mellitus with diabetic macular edema, resolved following treatment, bilateral
DiabetesAny	E11.37X9	Type 2 diabetes mellitus with diabetic macular edema, resolved following treatment, unspecified eye
DiabetesAny	E11.39	Type 2 diabetes mellitus with other diabetic ophthalmic complication
DiabetesAny	E11.40	Type 2 diabetes mellitus with diabetic neuropathy, unspecified
DiabetesAny	E11.41	Type 2 diabetes mellitus with diabetic mononeuropathy
DiabetesAny	E11.42	Type 2 diabetes mellitus with diabetic polyneuropathy
DiabetesAny	E11.43	Type 2 diabetes mellitus with diabetic autonomic (poly)neuropathy
DiabetesAny	E11.44	Type 2 diabetes mellitus with diabetic amyotrophy
DiabetesAny	E11.49	Type 2 diabetes mellitus with other diabetic neurological complication
DiabetesAny	E11.51	Type 2 diabetes mellitus with diabetic peripheral angiopathy without gangrene
DiabetesAny	E11.52	Type 2 diabetes mellitus with diabetic peripheral angiopathy with gangrene

DiabetesAny	E11.59	Type 2 diabetes mellitus with other circulatory complications
DiabetesAny	E11.610	Type 2 diabetes mellitus with diabetic neuropathic arthropathy
DiabetesAny	E11.618	Type 2 diabetes mellitus with other diabetic arthropathy
DiabetesAny	E11.620	Type 2 diabetes mellitus with diabetic dermatitis
DiabetesAny	E11.621	Type 2 diabetes mellitus with foot ulcer
DiabetesAny	E11.622	Type 2 diabetes mellitus with other skin ulcer
DiabetesAny	E11.628	Type 2 diabetes mellitus with other skin complications
DiabetesAny	E11.630	Type 2 diabetes mellitus with periodontal disease
DiabetesAny	E11.638	Type 2 diabetes mellitus with other oral complications
DiabetesAny	E11.641	Type 2 diabetes mellitus with hypoglycemia with coma
DiabetesAny	E11.649	Type 2 diabetes mellitus with hypoglycemia without coma
DiabetesAny	E11.65	Type 2 diabetes mellitus with hyperglycemia
DiabetesAny	E11.69	Type 2 diabetes mellitus with other specified complication
DiabetesAny	E11.8	Type 2 diabetes mellitus with unspecified complications
DiabetesAny	E11.9	Type 2 diabetes mellitus without complications
DiabetesAny	E13.00	Other specified diabetes mellitus with hyperosmolarity without nonketotic hyperglycemic-hyperosmolar coma (NKHHC)
DiabetesAny	E13.01	Other specified diabetes mellitus with hyperosmolarity with coma
DiabetesAny	E13.10	Other specified diabetes mellitus with ketoacidosis without coma
DiabetesAny	E13.11	Other specified diabetes mellitus with ketoacidosis with coma
DiabetesAny	E13.21	Other specified diabetes mellitus with diabetic nephropathy
DiabetesAny	E13.22	Other specified diabetes mellitus with diabetic chronic kidney disease
DiabetesAny	E13.29	Other specified diabetes mellitus with other diabetic kidney complication
DiabetesAny	E13.311	Other specified diabetes mellitus with unspecified diabetic retinopathy with macular edema
DiabetesAny	E13.319	Other specified diabetes mellitus with unspecified diabetic retinopathy without macular edema
DiabetesAny	E13.3211	Other specified diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema, right eye
DiabetesAny	E13.3212	Other specified diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema, left eye
DiabetesAny	E13.3213	Other specified diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema, bilateral
DiabetesAny	E13.3219	Other specified diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema, unspecified eye
DiabetesAny	E13.3291	Other specified diabetes mellitus with mild nonproliferative diabetic retinopathy without macular edema, right eye
DiabetesAny	E13.3292	Other specified diabetes mellitus with mild nonproliferative diabetic retinopathy without macular edema, left eye
DiabetesAny	E13.3293	Other specified diabetes mellitus with mild nonproliferative diabetic retinopathy without macular edema, bilateral
DiabetesAny	E13.3299	Other specified diabetes mellitus with mild nonproliferative diabetic retinopathy without macular edema, unspecified eye
DiabetesAny	E13.3311	Other specified diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema, right eye
DiabetesAny	E13.3312	Other specified diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema, left eye
DiabetesAny	E13.3313	Other specified diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema, bilateral
DiabetesAny	E13.3319	Other specified diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema, unspecified eye

DiabetesAny	E13.3391	Other specified diabetes mellitus with moderate nonproliferative diabetic retinopathy without macular edema, right eye
DiabetesAny	E13.3392	Other specified diabetes mellitus with moderate nonproliferative diabetic retinopathy without macular edema, left eye
DiabetesAny	E13.3393	Other specified diabetes mellitus with moderate nonproliferative diabetic retinopathy without macular edema, bilateral
DiabetesAny	E13.3399	Other specified diabetes mellitus with moderate nonproliferative diabetic retinopathy without macular edema, unspecified eye
DiabetesAny	E13.3411	Other specified diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema, right eye
DiabetesAny	E13.3412	Other specified diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema, left eye
DiabetesAny	E13.3413	Other specified diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema, bilateral
DiabetesAny	E13.3419	Other specified diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema, unspecified eye
DiabetesAny	E13.3491	Other specified diabetes mellitus with severe nonproliferative diabetic retinopathy without macular edema, right eye
DiabetesAny	E13.3492	Other specified diabetes mellitus with severe nonproliferative diabetic retinopathy without macular edema, left eye
DiabetesAny	E13.3493	Other specified diabetes mellitus with severe nonproliferative diabetic retinopathy without macular edema, bilateral
DiabetesAny	E13.3499	Other specified diabetes mellitus with severe nonproliferative diabetic retinopathy without macular edema, unspecified eye
DiabetesAny	E13.3511	Other specified diabetes mellitus with proliferative diabetic retinopathy with macular edema, right eye
DiabetesAny	E13.3512	Other specified diabetes mellitus with proliferative diabetic retinopathy with macular edema, left eye
DiabetesAny	E13.3513	Other specified diabetes mellitus with proliferative diabetic retinopathy with macular edema, bilateral
DiabetesAny	E13.3519	Other specified diabetes mellitus with proliferative diabetic retinopathy with macular edema, unspecified eye
DiabetesAny	E13.3521	Other specified diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment involving the macula, right eye
DiabetesAny	E13.3522	Other specified diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment involving the macula, left eye
DiabetesAny	E13.3523	Other specified diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment involving the macula, bilateral
DiabetesAny	E13.3529	Other specified diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment involving the macula, unspecified eye
DiabetesAny	E13.3531	Other specified diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment not involving the macula, right eye
DiabetesAny	E13.3532	Other specified diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment not involving the macula, left eye
DiabetesAny	E13.3533	Other specified diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment not involving the macula, bilateral
DiabetesAny	E13.3539	Other specified diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment not involving the macula, unspecified eye
DiabetesAny	E13.3541	Other specified diabetes mellitus with proliferative diabetic retinopathy with combined traction retinal detachment and rhegmatogenous retinal detachment, right eye
DiabetesAny	E13.3542	Other specified diabetes mellitus with proliferative diabetic retinopathy with combined traction retinal detachment and rhegmatogenous retinal detachment, left eye
DiabetesAny	E13.3543	Other specified diabetes mellitus with proliferative diabetic retinopathy with combined traction retinal detachment and rhegmatogenous retinal detachment, bilateral

DiabetesAny	E13.3549	Other specified diabetes mellitus with proliferative diabetic retinopathy with combined traction retinal detachment and rhegmatogenous retinal detachment, unspecified eye
DiabetesAny	E13.3551	Other specified diabetes mellitus with stable proliferative diabetic retinopathy, right eye
DiabetesAny	E13.3552	Other specified diabetes mellitus with stable proliferative diabetic retinopathy, left eye
DiabetesAny	E13.3553	Other specified diabetes mellitus with stable proliferative diabetic retinopathy, bilateral
DiabetesAny	E13.3559	Other specified diabetes mellitus with stable proliferative diabetic retinopathy, unspecified eye
DiabetesAny	E13.3591	Other specified diabetes mellitus with proliferative diabetic retinopathy without macular edema, right eye
DiabetesAny	E13.3592	Other specified diabetes mellitus with proliferative diabetic retinopathy without macular edema, left eye
DiabetesAny	E13.3593	Other specified diabetes mellitus with proliferative diabetic retinopathy without macular edema, bilateral
DiabetesAny	E13.3599	Other specified diabetes mellitus with proliferative diabetic retinopathy without macular edema, unspecified eye
DiabetesAny	E13.36	Other specified diabetes mellitus with diabetic cataract
DiabetesAny	E13.37X1	Other specified diabetes mellitus with diabetic macular edema, resolved following treatment, right eye
DiabetesAny	E13.37X2	Other specified diabetes mellitus with diabetic macular edema, resolved following treatment, left eye
DiabetesAny	E13.37X3	Other specified diabetes mellitus with diabetic macular edema, resolved following treatment, bilateral
DiabetesAny	E13.37X9	Other specified diabetes mellitus with diabetic macular edema, resolved following treatment, unspecified eye
DiabetesAny	E13.39	Other specified diabetes mellitus with other diabetic ophthalmic complication
DiabetesAny	E13.40	Other specified diabetes mellitus with diabetic neuropathy, unspecified
DiabetesAny	E13.41	Other specified diabetes mellitus with diabetic mononeuropathy
DiabetesAny	E13.42	Other specified diabetes mellitus with diabetic polyneuropathy
DiabetesAny	E13.43	Other specified diabetes mellitus with diabetic autonomic (poly)neuropathy
DiabetesAny	E13.44	Other specified diabetes mellitus with diabetic amyotrophy
DiabetesAny	E13.49	Other specified diabetes mellitus with other diabetic neurological complication
DiabetesAny	E13.51	Other specified diabetes mellitus with diabetic peripheral angiopathy without gangrene
DiabetesAny	E13.52	Other specified diabetes mellitus with diabetic peripheral angiopathy with gangrene
DiabetesAny	E13.59	Other specified diabetes mellitus with other circulatory complications
DiabetesAny	E13.610	Other specified diabetes mellitus with diabetic neuropathic arthropathy
DiabetesAny	E13.618	Other specified diabetes mellitus with other diabetic arthropathy
DiabetesAny	E13.620	Other specified diabetes mellitus with diabetic dermatitis
DiabetesAny	E13.621	Other specified diabetes mellitus with foot ulcer
DiabetesAny	E13.622	Other specified diabetes mellitus with other skin ulcer
DiabetesAny	E13.628	Other specified diabetes mellitus with other skin complications
DiabetesAny	E13.630	Other specified diabetes mellitus with periodontal disease
DiabetesAny	E13.638	Other specified diabetes mellitus with other oral complications
DiabetesAny	E13.641	Other specified diabetes mellitus with hypoglycemia with coma
DiabetesAny	E13.649	Other specified diabetes mellitus with hypoglycemia without coma
DiabetesAny	E13.65	Other specified diabetes mellitus with hyperglycemia
DiabetesAny	E13.69	Other specified diabetes mellitus with other specified complication
DiabetesAny	E13.8	Other specified diabetes mellitus with unspecified complications
DiabetesAny	E13.9	Other specified diabetes mellitus without complications

DiabetesAny	E89.1	Postprocedural hypoinsulinemia
DiabetesAny	O24.011	Pre-existing type 1 diabetes mellitus, in pregnancy, first trimester
DiabetesAny	O24.012	Pre-existing type 1 diabetes mellitus, in pregnancy, second trimester
DiabetesAny	O24.013	Pre-existing type 1 diabetes mellitus, in pregnancy, third trimester
DiabetesAny	O24.019	Pre-existing type 1 diabetes mellitus, in pregnancy, unspecified trimester
DiabetesAny	O24.02	Pre-existing type 1 diabetes mellitus, in childbirth
DiabetesAny	O24.03	Pre-existing type 1 diabetes mellitus, in the puerperium
DiabetesAny	O24.111	Pre-existing type 2 diabetes mellitus, in pregnancy, first trimester
DiabetesAny	O24.112	Pre-existing type 2 diabetes mellitus, in pregnancy, second trimester
DiabetesAny	O24.113	Pre-existing type 2 diabetes mellitus, in pregnancy, third trimester
DiabetesAny	O24.119	Pre-existing type 2 diabetes mellitus, in pregnancy, unspecified trimester
DiabetesAny	O24.12	Pre-existing type 2 diabetes mellitus, in childbirth
DiabetesAny	O24.13	Pre-existing type 2 diabetes mellitus, in the puerperium
DiabetesAny	O24.311	Unspecified pre-existing diabetes mellitus in pregnancy, first trimester
DiabetesAny	O24.312	Unspecified pre-existing diabetes mellitus in pregnancy, second trimester
DiabetesAny	O24.313	Unspecified pre-existing diabetes mellitus in pregnancy, third trimester
DiabetesAny	O24.319	Unspecified pre-existing diabetes mellitus in pregnancy, unspecified trimester
DiabetesAny	O24.32	Unspecified pre-existing diabetes mellitus in childbirth
DiabetesAny	O24.33	Unspecified pre-existing diabetes mellitus in the puerperium
DiabetesAny	O24.410	Gestational diabetes mellitus in pregnancy, diet controlled
DiabetesAny	O24.414	Gestational diabetes mellitus in pregnancy, insulin controlled
DiabetesAny	O24.415	Gestational diabetes mellitus in pregnancy, controlled by oral hypoglycemic drugs
DiabetesAny	O24.419	Gestational diabetes mellitus in pregnancy, unspecified control
DiabetesAny	O24.420	Gestational diabetes mellitus in childbirth, diet controlled
DiabetesAny	O24.424	Gestational diabetes mellitus in childbirth, insulin controlled
DiabetesAny	O24.425	Gestational diabetes mellitus in childbirth, controlled by oral hypoglycemic drugs
DiabetesAny	O24.429	Gestational diabetes mellitus in childbirth, unspecified control
DiabetesAny	O24.430	Gestational diabetes mellitus in the puerperium, diet controlled
DiabetesAny	O24.434	Gestational diabetes mellitus in the puerperium, insulin controlled
DiabetesAny	O24.435	Gestational diabetes mellitus in puerperium, controlled by oral hypoglycemic drugs
DiabetesAny	O24.439	Gestational diabetes mellitus in the puerperium, unspecified control
DiabetesAny	O24.811	Other pre-existing diabetes mellitus in pregnancy, first trimester
DiabetesAny	O24.812	Other pre-existing diabetes mellitus in pregnancy, second trimester
DiabetesAny	O24.813	Other pre-existing diabetes mellitus in pregnancy, third trimester
DiabetesAny	O24.819	Other pre-existing diabetes mellitus in pregnancy, unspecified trimester
DiabetesAny	O24.82	Other pre-existing diabetes mellitus in childbirth
DiabetesAny	O24.83	Other pre-existing diabetes mellitus in the puerperium
DiabetesAny	O24.911	Unspecified diabetes mellitus in pregnancy, first trimester
DiabetesAny	O24.912	Unspecified diabetes mellitus in pregnancy, second trimester
DiabetesAny	O24.913	Unspecified diabetes mellitus in pregnancy, third trimester
DiabetesAny	O24.919	Unspecified diabetes mellitus in pregnancy, unspecified trimester
DiabetesAny	O24.92	Unspecified diabetes mellitus in childbirth
DiabetesAny	O24.93	Unspecified diabetes mellitus in the puerperium
DiabetesAny	O99.810	Abnormal glucose complicating pregnancy

DiabetesAny	O99.814	Abnormal glucose complicating childbirth
DiabetesAny	O99.815	Abnormal glucose complicating the puerperium

Supplement Table 4. Baseline sociodemographic and clinical characteristics of persons who received a booster dose of mRNA COVID-19 vaccination in the VA healthcare system and their unmatched counterparts who did not receive a booster dose from December 1, 2021 to March 31, 2022.

	Booster mRNA vaccination N=505,585	No booster vaccination N=1,181,836
Type of booster vaccine		
BNT162b2	37.9	N/A
mRNA-1273	62.1	N/A
Time since 2nd dose COVID-19 mRNA vaccine (days), mean ±SD	274.0± 36.7	N/A
Time since 2nd dose COVID-19 mRNA vaccine (%)		
5-9 months (154-270 days)	48.0	N/A
>9 months (> 270 days)	52.0	N/A
Type of primary COVID-19 mRNA vaccine**		
BNT162b2	38.5	43.5
mRNA-1273	61.5	56.5
Sex (%)		
Female	10.3	9.5
Male	87.3	87
Missing	2.3	3.5
Age (years), mean ±SD	63.0±14.0	62.5±16.3
Age Group (%)		
18 to 49	17	22.9
50 to 59	19	15.4
60 to 64	14.1	9.7
65 to 69	12.1	10
70 to 74	19	18.6
75 to 79	9.7	10.7
80 to 84	4.4	5.5
85 to 89	3.2	4.5
≥90	1.6	2.5
Race (%)		
White	65.7	70.8
Black	23.6	17.3
Asian	1.7	1.7
American Indian/Alaska Native	1	1
Pacific Islander/ Native Hawaiian	1.1	1
Declined/Unknown/Missing	6.9	8.1
Ethnicity (%)		
Non-Hispanic	86.8	86.8
Hispanic	8.7	7.5
Declined/Unknown/Missing	4.4	5.6

Urban/Rural (%)		
Rural/Highly rural	47.3	51.7
Urban	52.7	48.3
VA Integrated Service Network (VISN) (%)		
1	4.6	4
2	5.4	4
4	5	4.4
5	2.9	3.4
6	6.5	6.2
7	6.4	7.9
8	10.3	9.8
9	3.4	3.8
10	7.7	6.5
12	5.1	3.5
15	3.3	3.5
16	6.2	6.1
17	5.3	7.9
19	3.9	4.9
20	4.1	6
21	5.8	4.9
22	9.3	8.6
23	4.9	4.7
Body Mass Index (kg/m²), mean ±SD	30.4±6.1	30.1±5.9
Body Mass Index (kg/m²), group (%)		
<18.5	0.7	0.7
18.5 to <25	16.4	16.8
25 to <30 (Overweight)	34.1	34.9
30 to <35 (Obese I)	27	26.1
35 to <40 (Obese II)	12.5	11.5
≥40 (Obese III)	6.7	5.8
Missing	2.4	4.3
Charlson Comorbidity Index, mean ± SD	1.4±1.8	1.1±1.6
Charlson Comorbidity Index group (%)		
0	43.9	51.4
1	21.3	20.6
2	14.9	13.2
3	7.8	6.3
4	5.1	3.8
5-6	4.7	3.3
7-8	1.6	1.1
≥9	0.6	0.3
Diabetes (%)		
No	68.8	74.2
Yes	31.2	25.8

Chronic Kidney Disease (%)		
No	89.2	91.1
Yes	10.8	8.9
Congestive heart failure (%)		
No	95.1	96.6
Yes	4.9	3.4
Chronic Obstructive Pulmonary Disease (%)		
No	86.3	89.1
Yes	13.7	10.9
CAN Score† for mortality w/in 1 year, mean ± SD	46.8±27.8	46.8±28.6
CAN Score† for mortality w/in 1 year group (%)		
0-30	33	34.4
31-55	28.4	24.8
56-75	20	20
76-90	13.2	14.3
95-96	1.7	1.7
97-98	1.6	1.6
99	0.7	0.6
Missing	1.4	2.6
Immunosuppressant medications* (%)		
No	94.1	95.9
Yes	5.9	4.1

† **CAN score** is the Care Assessment Needs score a validated measure of 1-year mortality in VA enrollees, presented as a percentile of all VA enrollees

* Immunosuppressant medications prescribed in the previous year (see list of immunosuppressant medications in **Supplement Table 2**)

Supplement Table 5. Baseline sociodemographic and clinical characteristics of persons who received a booster dose of mRNA COVID-19 vaccination in the VA healthcare system and their matched counterparts who did not receive a booster dose from December 1, 2021 to March 31, 2022, and for whom all members of matched sets were still at risk 10 days after time zero.

	Booster mRNA vaccination N=468,616	No booster vaccination N=468,616	Standardized Mean Difference
Type of 3rd dose COVID-19 mRNA vaccine			
BNT162b2	37.7	N/A	0.0000
mRNA-1273	62.3	N/A	0.0000
Time since 2nd dose COVID-19 mRNA vaccine (days), mean \pmSD	273.3 \pm 35.8	273.4 \pm 36.8	-0.0028
Time since 2nd dose COVID-19 mRNA vaccine (%)			
5-9 months (154-270 days)	51.5	51.8	-0.0060
>9 months (> 270 days)	48.5	48.2	0.0060
Type of primary COVID-19 mRNA vaccine**			
BNT162b2	38.3	38.3	0.0000
mRNA-1273	61.7	61.7	0.0000
Sex (%)			
Female	10.2	9.9	0.0100
Male	87.4	87.7	-0.0091
Declined/Unknown/Missing	2.4	2.4	0.0000
Age (years), mean \pmSD	63.0 \pm 14.0	63.0 \pm 14.0	0.0000
Age Group (%)			
18 to 49	17	17	0.0000
50 to 59	18.9	18.9	0.0000
60 to 64	14	13.7	0.0087
65 to 69	12.2	12	0.0061
70 to 74	19.1	19.7	-0.0152
75 to 79	9.8	9.6	0.0068
80 to 84	4.4	4.4	0.0000
85 to 89	3.2	3.1	0.0057
\geq 90	1.5	1.5	0.0000
Race (%)			
White	66.4	67.1	-0.0149
Black	22.8	22.2	0.0144
Asian	1.7	1.7	0.0000
American Indian/Alaska Native	1	1	0.0000
Pacific Islander/ Native Hawaiian	1.1	1.1	0.0000
Declined/Unknown/Missing	6.9	6.8	0.0040

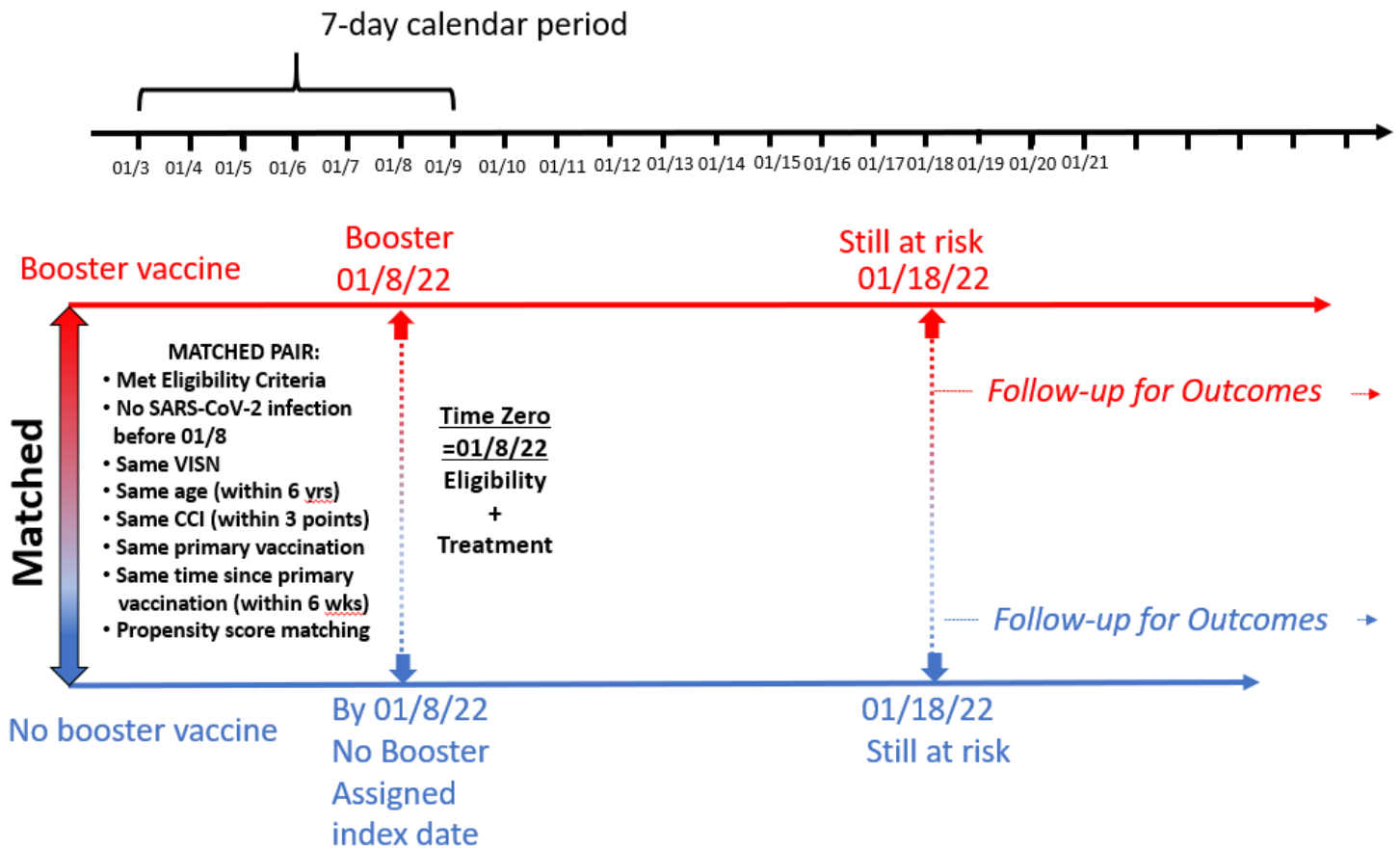
Ethnicity (%)			
Non-Hispanic	86.9	87.3	-0.0119
Hispanic	8.6	8.2	0.0144
Declined/Unknown/Missing	4.5	4.5	0.0000
Urban/Rural (%)			
Rural/Highly rural	47.9	48.2	-0.0060
Urban	52.1	51.8	0.0060
VA Integrated Service Network (VISN) (%)			
1	4.5	4.5	0.0000
2	5.3	5.3	0.0000
4	5	5	0.0000
5	2.8	2.8	0.0000
6	6.5	6.5	0.0000
7	6.5	6.5	0.0000
8	10.4	10.4	0.0000
9	3.4	3.4	0.0000
10	7.7	7.7	0.0000
12	5	5	0.0000
15	3.2	3.2	0.0000
16	6.2	6.2	0.0000
17	5.4	5.4	0.0000
19	3.9	3.9	0.0000
20	4.1	4.1	0.0000
21	5.8	5.8	0.0000
22	9.3	9.3	0.0000
23	5	5	
Body Mass Index (kg/m²), mean ±SD	30.4±6.1	30.4±6.1	0.0000
Body Mass Index (kg/m²), group (%)			
<18.5	0.7	0.7	0.0000
18.5 to <25	16.5	15.8	0.0190
25 to <30 (Overweight)	34.2	33.9	0.0063
30 to <35 (Obese I)	27	27	0.0000
35 to <40 (Obese II)	12.5	12.6	-0.0030
≥40 (Obese III)	6.6	6.7	-0.0040
Missing	2.5	3.3	-0.0477
Charlson Comorbidity Index, mean ± SD	1.3±1.7	1.3±1.7	0.0000
Charlson Comorbidity Index group (%)			
0	44.7	44.7	0.0000
1	21.5	22	-0.0121
2	15.1	14.8	0.0084
3	7.8	7.6	0.0075
4	4.9	4.9	0.0000
5-6	4.4	4.4	0.0000
7-8	1.3	1.3	0.0000

≥9	0.3	0.3	0.0000
Diabetes (%)	30.6	31.2	-0.0130
Chronic Kidney Disease (%)	10.2	10	0.0066
Congestive heart failure (%)	4.5	4.3	0.0098
Chronic Obstructive Pulmonary Disease (%)	13.2	13.5	-0.0088
CAN Score† for mortality w/in 1 year, mean ± SD	46.7±27.6	46.6±27.4	0.0036
CAN Score† for mortality w/in 1 year group (%)			
0-30	33	32.9	0.0021
31-55	28.6	28.4	0.0044
56-75	20.2	20.2	0.0000
76-90	13.1	12.9	0.0059
95-96	1.6	1.5	0.0081
97-98	1.5	1.4	0.0084
99	0.6	0.5	0.0135
Missing	1.4	2.1	-0.0534
Immunosuppressant medications* (%)	5.3	5.2	0.0045

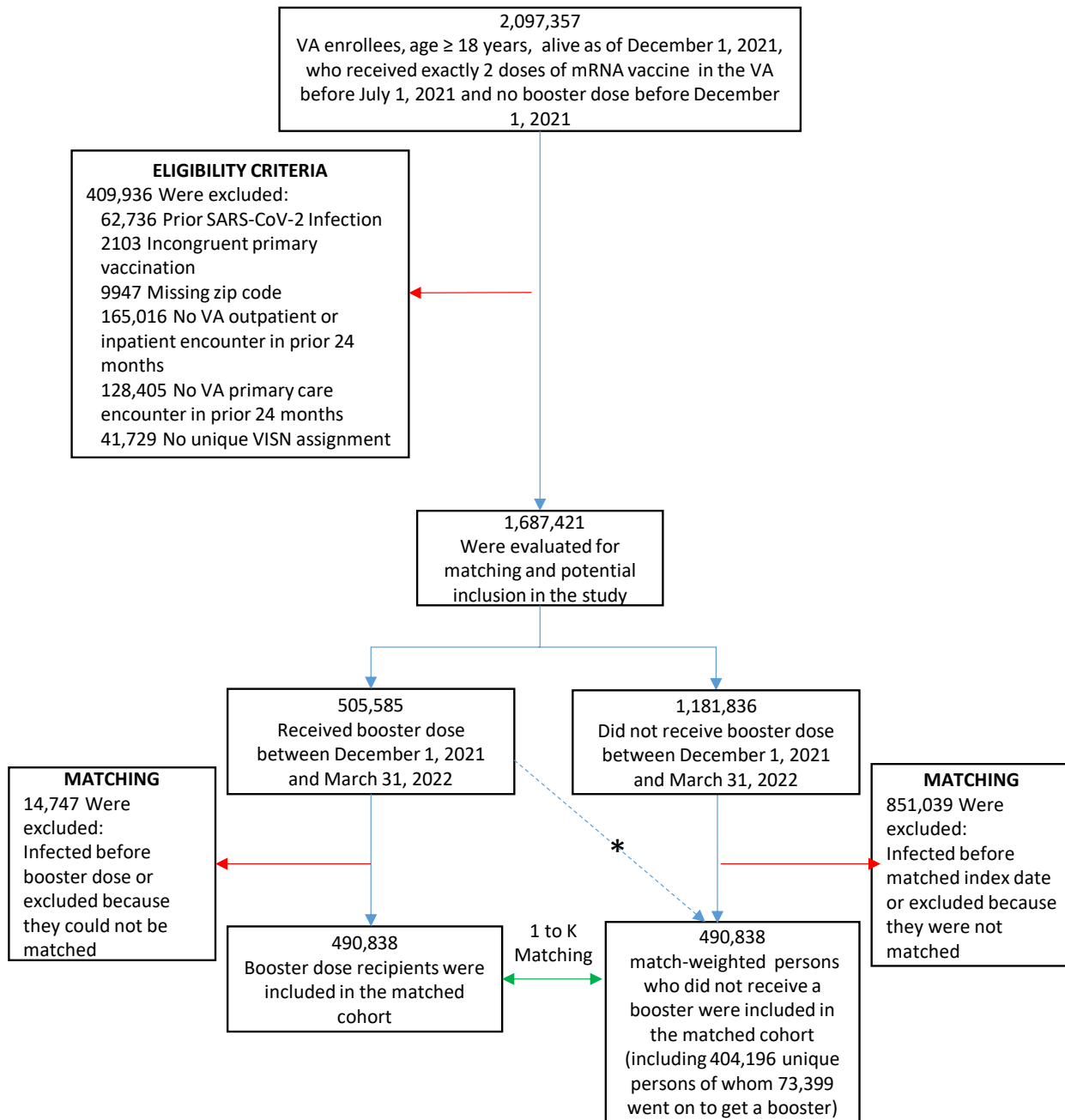
Supplement Figure 1. Schematic representation of the method used to match person(s) who did not receive a booster mRNA vaccine to each person who received a booster mRNA vaccine, within each 1-week period during the target trial period.

Supplement Figure 1 Caption.

The schematic shows a specific person during the 1-week period from 01/3/2022 to 01/9/2022 who received a booster mRNA vaccine dose on 01/8/2022 and met all of the target trial’s eligibility criteria and did not have SARS-CoV-2 infection as of 01/8/2022. This person is matched to a person who did not receive a booster vaccine dose as of 01/8/2022 (i.e. had only received two mRNA doses), who also fulfilled all the eligibility criteria and was alive as of 01/8/2022, and had the same VISN, type of primary vaccination, week of primary vaccination completion (within 6 weeks), age (within 6 years) and Charlson Comorbidity Index (CCI, within 3 points) as the booster dose recipient, and has a propensity score within 0.2 standard deviation of the mean (sdm) of that of the booster dose recipient. In practice, the propensity score difference between matched sets ranged from 0.0002-0.0033 sdm. Both persons in the matched pair have to remain at risk (i.e. alive, uninfected) as of the date 10 days later, after which outcomes are ascertained for the calculation of vaccine effectiveness



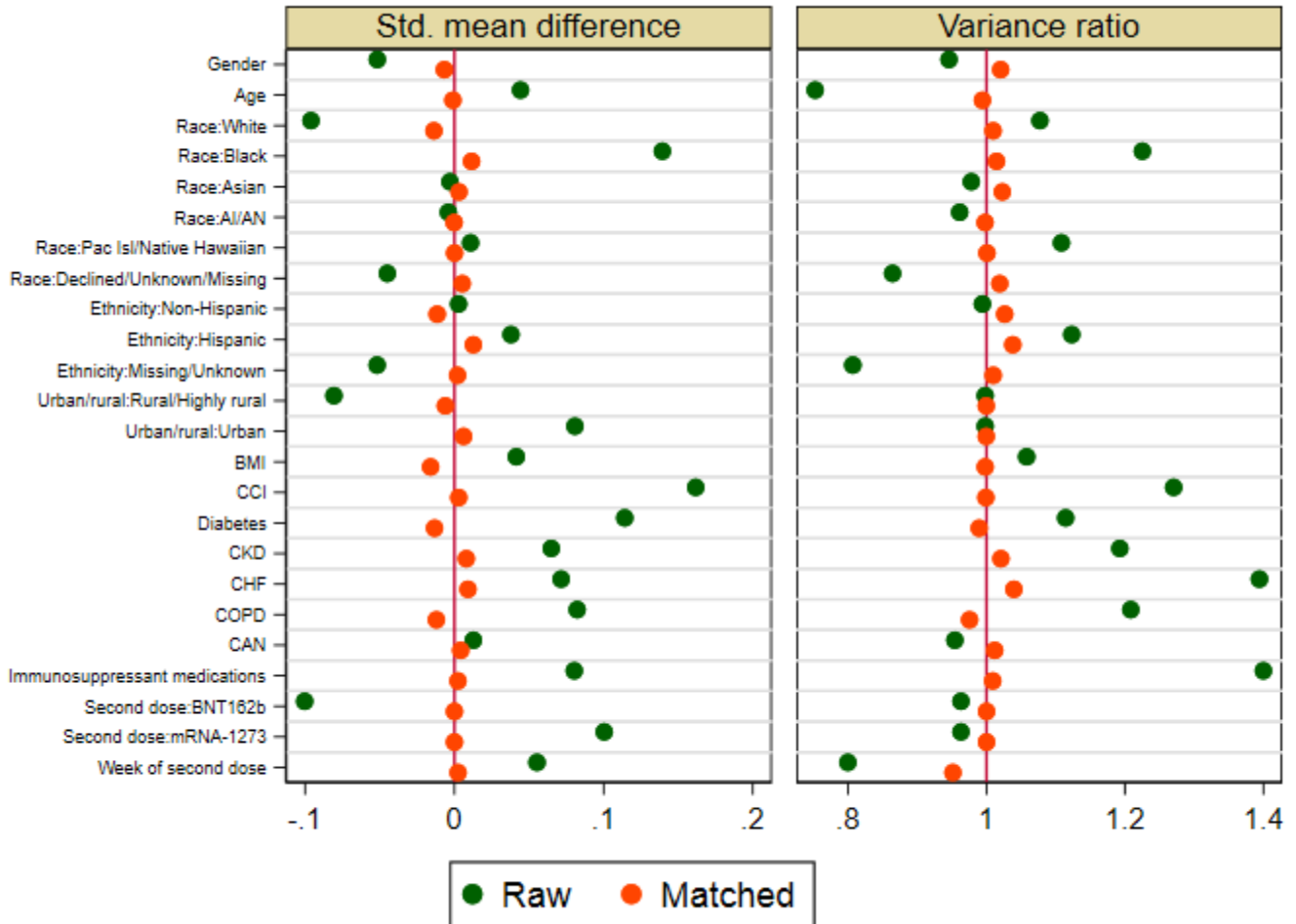
Supplement Figure 2. Eligibility criteria and matching process resulting in the selection of study populations for the emulation of a target trial comparing the effectiveness of booster mRNA COVID-19 vaccination versus no booster in the national Veterans Affairs (VA) healthcare system from December 1, 2021 to March 31, 2022



Supplement Figure 3. Comparison of baseline characteristics of persons who received a 3rd dose mRNA COVID-19 vaccine and their comparators who did not, before and after matching, demonstrate excellent balance after matching

- a. Absolute standardized mean difference and variance ratio of baseline characteristics between 3rd dose mRNA vaccination recipients versus no third dose received shown for the raw (green dots) and matched (orange dots) data demonstrate balance after matching.

Prior to matching, the absolute standardized difference in baseline characteristics between the 3rd dose and no 3rd dose groups ranged from 0.003-0.162 with a median of 0.060 (IQR: 0.040-0.089). After matching, the absolute standardized differences ranged from 0.000-0.016 with a median of 0.001 (IQR: 0.002-0.011).



- b. Cumulative distribution of propensity score between 3rd dose mRNA vaccination recipients versus no third dose received shown for the raw and matched data demonstrate balance after matching.

