

Supplementary Methods

A1 TriNetX network

This section provides an expanded version of our previous description of the network.^{1,2}

Legal and ethical status

TriNetX's Analytics network is compliant with the Health Insurance Portability and Accountability Act (HIPAA), the US federal law which protects the privacy and security of healthcare data. TriNetX is certified to the ISO 27001:2013 standard and maintains an Information Security Management System (ISMS) to ensure the protection of the healthcare data it has access to and to meet the requirements of the HIPAA Security Rule. Any data displayed on the TriNetX Platform in aggregate form, or any patient level data provided in a data set generated by the TriNetX Platform, only contains de-identified data as per the de-identification standard defined in Section §164.514(a) of the HIPAA Privacy Rule. The process by which the data is de-identified is attested to through a formal determination by a qualified expert as defined in Section §164.514(b)(1) of the HIPAA Privacy Rule. This formal determination by a qualified expert, refreshed in December 2020, supersedes the need for TriNetX's previous waiver from the Western Institutional Review Board (IRB). The network contains data that are provided by participating Health Care Organizations (HCOs), each of which represents and warrants that it has all necessary rights, consents, approvals and authority to provide the data to TriNetX under a Business Associate Agreement (BAA), so long as their name remains anonymous as a data source and their data are utilized for research purposes. The data shared through the TriNetX Platform are attenuated to ensure that they do not include sufficient information to facilitate the determination of which HCO contributed which specific information about a patient.

Acquisition of data, quality control, and other procedures

The data are stored onboard a TriNetX appliance – a physical server residing at the institution's data centre or a virtual hosted appliance. The TriNetX platform is a fleet of these appliances connected into a federated network able to broadcast queries to each appliance. Results are subsequently collected and aggregated.

Once the data are sent to the network, they are mapped to a standard and controlled set of clinical terminologies and undergo a data quality assessment including 'data cleaning' that rejects records which do not meet the TriNetX quality standards. HIPAA compliance of the clinical patient data is achieved using de-identification. Different data modalities are available in the network. They include demographics (coded to HL7 version 3 administrative standards), diagnoses (represented by ICD-10-CM codes), procedures (coded in ICD-10-PCS or CPT), and measurements (coded to LOINC). While extensive information is provided about patients' diagnoses and procedures, other variables (such as socioeconomic and lifetime factors are not comprehensively represented).

The data from a typical HCO generally go back around 7 years, with some going back 13 years. The data are continuously updated. HCOs update their data at various times, with most refreshing every 1, 2, or 4 weeks.

The data come primarily (>93%) from HCOs in the USA, with the remainder coming from India, Australia, Malaysia, Taiwan, Spain, UK, and Bulgaria. As noted above, to comply with legal frameworks and ethical guidelines guarding against data re-identification, the identity of participating HCOs and their individual contribution to each dataset are not disclosed to researchers.

Data quality assessment followed a standardised strategy wherein the data are reviewed for conformance (adherence to specified standards and formats), completeness (quantifying data presence or absence) and plausibility (believability of the data from a clinical perspective). There are pre-defined metrics for each of the above assessment categories. Results for these metrics are visualised and reviewed for each new site that joins the network as well as on an ongoing basis. Any identified issue is communicated to the data provider and resolved before continuing data collection.

The basic formatting of contributed data is also checked (e.g. to ensure that dates are properly represented). Records are checked against a list of required fields (e.g., patient identifier) and rejects those records for which the required information is missing. Referential integrity checking is done to ensure that data spanning multiple database tables can be successfully joined together. As the data are refreshed, changes in volume of data over

time is monitored to ensure data validity. At least one non-demographic fact for each patient is required for them to be counted in the dataset. Patient records with only demographics information are discarded.

The software also undergoes quality control. The engineers testing the software are independent from the engineers developing it. Each test code is checked by two independent testing engineers. Each piece of software is tested extensively against a range of synthetic data (i.e. generated for the purpose of testing) for which the expected output is established independently. If the software fails to return this output, then the software is deemed to have failed the test and is examined and modified accordingly. For statistical software (including that used for propensity score matching, for Kaplan-Meier analysis, etc), an additional quality control step is implemented. Two independent codes are written in two different programming languages (typically R and python) and the statistical results are compared. If discrepancies are identified, then the codes are deemed to have failed the test and are examined and modified accordingly. All the code is reviewed independently by another engineer.

The test strategy follows three levels of granularity:

1. Unit tests: These test specific blocks, or units, of code that perform specific actions (e.g. querying the database).
2. Integration tests: These ensure that different components are working together correctly.
3. End-to-end tests: These tests run the entire system and check the final output.

Some comments on advantages and disadvantages of EHR data

One advantage of EHR data, like those in TriNetX, over insurance claim data is that both insured and uninsured patients are included. An advantage of EHR data over survey data is that they represent the diagnostic rates in the population presenting to healthcare facilities. This provides an accurate account of the burden of specific diagnoses on healthcare systems. However, there are also limitations inherent to research using electronic health records,³⁻⁵ including TriNetX:

1. Undiagnosed patients who might have features of long-COVID but did not seek medical attention (or in whom the diagnosis was missed) are not included leading to underestimation of actual incidences.
2. Despite the matching and use of various comparison cohorts, there may well be residual confounding, particularly related to social and economic factors which are not well captured in EHR networks and which might influence outcomes post COVID-19.
3. We do not know which diagnoses were made in primary or secondary care or specialist facilities, nor by whom.
4. A patient may be seen in different HCOs for different parts of their care, and if one HCO is not part of the federated network then part of their medical records may not be available. Using a network of HCOs (rather than a single HCO) limits this possibility but does not fully remove it.
5. How long a symptom/diagnosis persists is difficult to assess using EHR data as this is not typically coded. As a result, we can comment on incidence of new cases but cannot assess the duration of clinical features.
6. Since the data are presented as they are recorded, we cannot be sure that there has not been mis-recording of information, adding a degree of noise to the data.
7. Historical data before the start of EHRs (or the addition of an HCO to the network) may well be incomplete.

A2 Definition of cohorts

Definitions

- 1) A confirmed diagnosis of COVID-19 was defined as the presence of ICD-10 code U07.1 in the patient's EHR.
- 2) A positive PCR test for SARS-CoV-2 was defined as any of the following:
 - a. Positive SARS-CoV-2 RNA in Respiratory specimen
 - b. Positive SARS-CoV-2 RNA in Unspecified specimen
 - c. Positive SARS-CoV-2 N gene in Respiratory specimen
 - d. Positive SARS-CoV-2 N gene in Unspecified specimen
 - e. Positive SARS-CoV-2 RdRp gene in Respiratory specimen
 - f. Positive SARS-CoV-2 E gene in Respiratory specimen

- g. Positive SARS-CoV-2 E gene in Unspecified specimen
 - h. Positive SARS-CoV-2 RNA panel in Respiratory specimen
 - i. Positive SARS-CoV-2 RNA panel in Unspecified specimen
 - j. Positive SARS-CoV-2 RNA in Nasopharynx
 - k. Positive SARS coronavirus 2 and related RNA
 - l. Positive SARS-related coronavirus RNA in Respiratory specimen
 - m. Positive SARS coronavirus 2 ORF1ab in Respiratory specimen
- 3) An mRNA vaccine against COVID-19 was defined as any of the following:
- a. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (Coronavirus disease [COVID-19]) vaccine, mRNA-LNP, spike protein, preservative free, 30 mcg/0.3mL dosage, diluent reconstituted, for intramuscular use
 - b. Immunization administration by intramuscular injection of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (Coronavirus disease [COVID-19]) vaccine, mRNA-LNP, spike protein, preservative free, 30 mcg/0.3mL dosage, diluent reconstituted; first dose
 - c. Immunization administration by intramuscular injection of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (Coronavirus disease [COVID-19]) vaccine, mRNA-LNP, spike protein, preservative free, 30 mcg/0.3mL dosage, diluent reconstituted; second dose
 - d. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (Coronavirus disease [COVID-19]) vaccine, mRNA-LNP, spike protein, preservative free, 100 mcg/0.5mL dosage, for intramuscular use
 - e. Immunization administration by intramuscular injection of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (Coronavirus disease [COVID-19]) vaccine, mRNA-LNP, spike protein, preservative free, 100 mcg/0.5mL dosage; first dose
 - f. Immunization administration by intramuscular injection of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (Coronavirus disease [COVID-19]) vaccine, mRNA-LNP, spike protein, preservative free, 100 mcg/0.5mL dosage; second dose
 - g. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (coronavirus disease [COVID-19]) vaccine, DNA, spike protein, adenovirus type 26 (Ad26) vector, preservative free, 5×10^{10} viral particles/0.5mL dosage, for intramuscular use
 - h. Immunization administration by intramuscular injection of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (coronavirus disease [COVID-19]) vaccine, DNA, spike protein, adenovirus type 26 (Ad26) vector, preservative free, 5×10^{10} viral particles/0.5mL dosage, single dose
 - i. SARS-CoV-2 (COVID-19) vaccine, mRNA spike protein
 - j. SARS-CoV-2 (COVID-19) vaccine

Inclusion and exclusion criteria for cohorts

The primary cohort was defined as all individuals who met the following criteria:

- A. The individual had a confirmed diagnosis of COVID-19 or a positive PCR test for SARS-CoV-2 between January 1, and August 31, 2021.
- B. The individual had received an mRNA vaccine against COVID-19 at least two weeks before the first occurrence of Event A

The control cohort was defined as all individuals who met the following criteria:

- A. The individual had a confirmed diagnosis of COVID-19 or a positive PCR test for SARS-CoV-2 between January 1, and August 31, 2021.
- B. The individual had not received an mRNA vaccine against COVID-19 before any Event A
- C. The individual had a recorded vaccine against influenza at some point in their EHR

Note that individuals who received a vaccine after infection with SARS-CoV-2 were included in the control cohort. This serves two purposes. First, it further decreases the risk of bias due to differences in health behaviour related to vaccine hesitancy. Second, a cohort defined by excluding those who have ever received a

vaccine against COVID-19 would be enriched for people who have died shortly after infection with SARS-CoV-2 infection, thus introducing bias.

A3 Definition of covariates

To reduce the effect of confounding on associations between a diagnosis of COVID-19 and a subsequent clinical feature of long-COVID, cohorts were matched for established or suspected risk factors for COVID-19⁶⁻⁹ and for established risk factors for COVID-19 death¹⁰ (taken to be risk factors of a more severe COVID-19 illness). The following confounding factors were therefore included (with ICD-10/CDC codes in brackets):

- 1) **Age** at the time of diagnosis.
- 2) **Sex** coded as female, male, or other.
- 3) **Race** encoded as 6 separate dichotomous variables: White (2106-3), Black or African American (2054-5), American Indian or Alaska Native (1002-5), Asian (2028-9), Native Hawaiian or Other Pacific Islander (2076-8), or Unknown Race (2131-1).
- 4) **Ethnicity** encoded as Hispanic or Latino (2135-2), Not Hispanic or Latino (2186-5), or Unknown Ethnicity.
- 5) **Socioeconomic deprivation** encoded as the ICD-10 code for Problems related to housing and economic circumstances (Z59).
- 6) **Obesity** encoded as one dichotomous variable: Overweight and obesity (E66).
- 7) **Hypertension** encoded as 2 dichotomous variables: Hypertensive diseases (I10-I16) and the now deprecated version that was used until 2018 Hypertension diseases (I10-I15).
- 8) **Diabetes mellitus** encoded as 2 dichotomous variables: Type 1 diabetes mellitus (E10) and Type 2 diabetes mellitus (E11).
- 9) **Chronic lower respiratory diseases** encoded by each sub-category of the corresponding ICD-10 group: Bronchitis, not specified as acute or chronic (J40), Simple and mucopurulent chronic bronchitis (J41), Unspecified chronic bronchitis (J42), Emphysema (J43), Other chronic obstructive pulmonary disease (J44), Asthma (J45), Bronchiectasis (J47).
- 10) **Nicotine dependence** encoded as the corresponding ICD-10 diagnosis (F17.2).
- 11) **Substance use disorders** encoded as the ICD-10 code for mental and behavioural disorders due to psychoactive substance use (F10-F19).
- 12) **Psychotic disorders** encoded as the ICD-10 code for schizophrenia, schizotypal, delusional, and other non-mood psychotic disorders (F20-F29).
- 13) **Mood disorders** encoded as the ICD-10 code for mood disorders (F30-F39).
- 14) **Anxiety disorders** encoded as the ICD-10 code for anxiety, dissociative, stress-related, somatoform and other nonpsychotic mental disorders (F40-F48).
- 15) **Heart diseases** encoded as 2 categorical variables: Ischaemic heart disease (I20-I25) and Other forms of heart disease (I30-I52).
- 16) **Chronic kidney disease** encoded as 2 dichotomous variables: Chronic kidney disease (N18) and Hypertensive chronic kidney disease (I12).
- 17) **Chronic liver disease** encoded as 8 categorical variables: Alcoholic liver disease (K70), Hepatic failure, not elsewhere classified (K72), Chronic hepatitis, not elsewhere classified (K73), Fibrosis and cirrhosis of liver (K74), Fatty (change of) liver, not elsewhere classified (K76.0), Chronic passive congestion of liver (K76.1), Portal hypertension (K76.6), Other specified diseases of liver (K76.8).
- 18) **Stroke** encoded as the dichotomous variable Cerebral infarction (I63).
- 19) **Dementia** encoded as 6 dichotomous variables: Vascular dementia (F01), Dementia in other diseases classified elsewhere (F02), Unspecified dementia (F03), Alzheimer's disease (G30), Frontotemporal dementia (G31.0), and Dementia with Lewy bodies (G31.83).
- 20) **Cancer and haematological cancer in particular** encoded as 2 dichotomous variables: Neoplasms (C00-D49) and Malignant neoplasms of lymphoid, hematopoietic and related tissue (C81-C96).
- 21) **Organ transplant** encoded as 2 dichotomous variables: Renal Transplantation Procedures and Liver Transplantation Procedures.
- 22) **Rheumatoid arthritis** encoded as 2 dichotomous variables: Rheumatoid arthritis with rheumatoid factor (M05) and Other rheumatoid arthritis (M06).
- 23) **Lupus** encoded as a dichotomous variable corresponding ICD-10 code (M32).
- 24) **Psoriasis** encoded as a dichotomous variable corresponding ICD-10 code (L40).
- 25) **Disorders involving an immune mechanism** encoded as a dichotomous variable "Certain disorders involving the immune mechanism" (D80-D89).

Each individual code was considered a confounding factor in and of itself so that matching was achieved for each of them individually. For instance, matching was achieved for each subcategory (and not just for the whole category) of chronic lower respiratory diseases. For variables representing diagnoses and socioeconomic deprivation, an individual was considered positive if the diagnostic was recorded at least once in their health record before the index event. For categorical variables representing measurements (i.e. BMI and blood pressures), all available measurements for all individuals were used and propensity score matching sought to define cohorts with similar numbers of measurements falling into each category.

A4 Definition of outcomes

We included all outcomes whose rates were found to be significantly higher after COVID-19 in at least one of 4 large-scale EHR-based study.^{2,11-13} If an outcome was defined differently in two different studies, then it was defined by combining the codes used in both definitions to encompass all events that would have qualify as an outcome with either definitions.

All outcomes were defined as an event recorded in the patient's electronic health. Specifically, the following ICD-10 codes (with the ICD-10 labels in brackets), Current Procedural Terminology (CPT) for procedures, and VA Formulary for medications codes were used to define outcomes.

1. **Anosmia:** R43.0
2. **Anxiety disorder:** F40-F48
3. **Arrhythmia:** I47 ('Paroxysmal tachycardia'), I48 ('Atrial fibrillation and flutter'), I49 ('Other cardiac arrhythmias'), or R00.0 ('Tachycardia, unspecified')
4. **Cardiac failure:** I50 ('Heart failure'), I11.0 ('Hypertensive heart disease with heart failure'), or 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')
5. **Cardiomyopathy:** I42 ('Cardiomyopathy'), I43 ('Cardiomyopathy in diseases classified elsewhere'), I25.5 ('Ischaemic cardiomyopathy'), B33.24 ('Viral cardiomyopathy'), or A36.81 ('Diphtheritic cardiomyopathy')
6. **Cerebral haemorrhage:** I60-I62
7. **Coronary disease:** I21 ('Acute myocardial infarction'), I22 ('Subsequent ST elevation and non-ST elevation myocardial infarction'), I20.0 ('Unstable angina'), I24 ('Other acute ischaemic heart disease'), or R57.0 ('Cardiogenic shock')
8. **Death**
9. **Gastro-oesophageal reflux disease (GORD):** K21
10. **Hair loss:** L63 ('Alopecia areata'), L64 ('Androgenic alopecia'), L65 ('Other non-scarring hair loss'), or L66 ('Cicatricial alopecia')
11. **Hospitalisation:** 1013659 ('Hospital inpatient services') or 1013729 ('Critical care services')
12. **Hypercoagulopathy/Deep vein thrombosis (DVT) /Pulmonary embolism (PE):** D68 ('Other coagulation defects'), I82 ('Other venous embolism and thrombosis'), or I26 ('Pulmonary embolism')
13. **Hyperlipidaemia:** E78.0-E78.5
14. **Hypertension:** I10-I16 ('Hypertensive diseases') or I27 ('Other pulmonary heart diseases')
15. **Hypoxaemia:** R09.02 ('Hypoxaemia') or J96.01 ('Acute respiratory failure with hypoxia')
16. **ICU admission:** 1013729 ('Critical care services')
17. **Interstitial lung disease:** J84 ('Other interstitial lung disease')
18. **Intubation/Ventilation:** 31500 ('Intubation, endotracheal, emergency procedure'), 5A1945Z ('Respiratory Ventilation, 24-96 Consecutive Hours'), 5A1955Z ('Respiratory Ventilation, Greater than 96 Consecutive Hours'), 5A1935Z ('Respiratory Ventilation, Less than 24 Consecutive Hours'), 0BH13EZ ('Insertion of Endotracheal Airway into Trachea, Percutaneous Approach'), 0BH17EZ ('Insertion of Endotracheal Airway into Trachea, Via Natural or Artificial Opening'), 0BH18EZ ('Insertion of Endotracheal Airway into Trachea, Via Natural or Artificial Opening Endoscopic'), 1022227 ('Extracorporeal membrane oxygenation (ECMO)/extracorporeal life support (ECLS) provided by physician'), 39.65 ('Extracorporeal membrane oxygenation [ECMO]'), or 1015098 ('Ventilator Management')
19. **Ischaemic stroke:** I63 ('Cerebral infarction') or H34.1 ('Central retinal artery occlusion')
20. **Joint pain:** M25.5 ('Pain in joint')
21. **Kidney disease:** N18 ('Chronic kidney disease'), I12 ('Hypertensive chronic kidney disease'), I13 ('Hypertensive heart and chronic kidney disease'), N17 ('Acute kidney failure'), I12 ('Hypertensive

- chronic kidney disease'), I13 ('Hypertensive heart and chronic kidney disease'), or R88.0 ('Cloudy (hemodialysis) (peritoneal) dialysis effluent')
22. **Liver disease:** K70-K76 ('Diseases of liver'), I85 ('Esophageal varices'), B18 ('Chronic viral hepatitis'), or I86.4 ('Gastric varices')
 23. **Long COVID feature (any):** Any of the following as defined in an EHR-based study of long-COVID features¹¹
 - a. **Abdominal symptoms:** R10 ('Abdominal and pelvic pain'), R19.4 ('Change in bowel habit'), or R19.7 ('Diarrhoea, unspecified').
 - b. **Abnormal breathing:** R06 ('Abnormalities of breathing').
 - c. **Anxiety/Depression:** F30-F39 ('Mood disorders') or F40-F48 ('Anxiety, dissociative, stress-related, somatoform and other nonpsychotic mental disorders'). F30-39 also encompasses diagnoses other than depression (e.g. mania), but these comprise only a small fraction of cases and so we use Anxiety/Depression for convenience.
 - d. **Chest/Throat pain:** R07 ('Pain in throat and chest').
 - e. **Cognitive symptoms:** R40 ('Somnolence, stupor and coma'), R41 ('Other symptoms and signs involving cognitive functions and awareness'), R48 ('Dyslexia and other symbolic dysfunction'), G93.40 ('Encephalopathy, unspecified'), G31.84 ('Mild cognitive impairment'), G30 ('Alzheimer's disease'), G31.0 ('Frontotemporal dementia'), G31.83 ('Dementia with Lewy bodies'), F01 ('Vascular dementia'), F02 ('Dementia in other disease classified elsewhere'), F03 ('Unspecified dementia'), F05 ('Delirium due to known physiological condition'), or F06.8 ('Other specified mental disorders due to known physiological condition'). These terms were used to capture the range of diagnostic codes that patients presenting with 'brain fog' might receive.
 - f. **Fatigue:** G93.3 ('Postviral fatigue syndrome') or R53 ('Malaise and fatigue').
 - g. **Headache:** R51 ('Headache'), G43 ('Migraine'), or G44 ('Other headache syndrome').
 - h. **Myalgia:** M79.1 ('Myalgia') or M60 ('Myositis'). Inclusion of the latter category was intended to capture those patients who received a specific diagnosis when presenting with myalgia.
 - i. **Other pain:** G89 ('Pain not elsewhere specified') or R52 ('Pain, unspecified').
 24. **Mood disorder:** F30-F39
 25. **Myocarditis:** I40 ('Acute myocarditis'), B33.22 ('Viral myocarditis'), or I51.4 ('Myocarditis, unspecified')
 26. **Myoneural junction/muscle disease:** G70-G73
 27. **Nerve/nerve root/plexus disorder:** G50-G59
 28. **Obesity:** E66 ('Overweight and obesity') or BMI recorded ≥ 30 kg/m²
 29. **Oxygen requirement:** RE600-7806 ('Oxygen'), Oxygen saturation measures $\leq 92\%$, 5A09 ('Physiological Systems / Assistance / Respiratory'), Z99.81 ('Dependence on supplemental oxygen'), 5A05121 ('Extracorporeal Hyperbaric Oxygenation, Intermittent'), 5A0512C ('Extracorporeal Supersaturated Oxygenation, Intermittent'), 5A05221 (Extracorporeal Hyperbaric Oxygenation, Continuous'), 5A0522C ('Extracorporeal Supersaturated Oxygenation, Continuous')
 30. **Peripheral neuropathy:** G62.9 ('Polyneuropathy, unspecified'), or G63 ('Polyneuropathy in diseases classified elsewhere')
 31. **Psychotic disorder:** F20-F29
 32. **Respiratory failure:** J96 ('Respiratory failure, not elsewhere classified')
 33. **Seizures:** G40 ('Epilepsy and recurrent seizures')
 34. **Sleep disorders:** G47
 35. **Type 2 diabetes mellitus:** E11
 36. **Urticaria:** L50

A5 Analysis of time since the vaccine

Investigating the association between the time since the vaccine was given and the outcomes of breakthrough infections is an important question. However, it cannot be easily answered using TriNetX given limitations in how cohorts can be built via the user interface of the platform.

In this study, we used time since the first dose of the vaccine to start to explore this question. However, a longer time since the first dose is also likely associated with a higher probability of a second dose. Therefore, outcomes in those who had COVID-19 a longer time after the first vaccine dose should be interpreted cautiously as they might have received a second dose in the interim (and indeed they were more likely to have received two doses

at the time of their COVID-19 diagnosis than those who had COVID-19 within the first 4 months after the first vaccine dose).

A6 Details on statistical analyses

Implementation details of propensity score matching

In propensity score matching, the propensity score was calculated using a logistic regression (implemented by the function `LogisticRegression` of the `scikit-learn` package in Python 3.7) including each of the covariates mentioned above. To eliminate the influence of ordering of records, the order of the records in the covariate matrix were randomised before matching.

Testing proportional hazards

The assumption that the hazards were proportional when accounting for the two phases was tested using the generalized Schoenfeld approach¹⁴ implemented in the `cox.zph` function of the `survival` package (version 3.2.3) in R. If the proportional hazard assumption was found to be violated (i.e. statistical evidence from a score test indicating a non-zero slope in the scaled Schoenfeld residuals over time), then the time-varying HR was assessed using natural cubic splines (in log-time) to the log-cumulative hazard¹⁵. This was achieved using the generalized survival models of the `rstpm2` package (version 1.5.1) in R¹⁶. As recommended by Royston and Parmar¹⁵, splines with 1, 2, and 3 degrees of freedom were estimated for both the baseline log-cumulative hazard and its cohort dependency and the number of degrees of freedom leading to the lowest Akaike Information Criterion (AIC) was selected. This was achieved on a per-comparison basis so that more complex time dependency (i.e. higher number of degrees of freedom) could be selected for a specific comparison if there was enough evidence in the data to support such complexity.

Accounting for competing risks

Because none of the outcomes can occur once a patient has died, death is a competing risk for all of the outcomes that we considered. Various approaches exist to account for competing risks in time-to-event analysis. A simple and often used approach is to include the competing risk in a composite endpoint.¹⁷ This was the approach used here. Other, more elaborate, approaches seek to estimate the cause-specific hazard.¹⁸ However, these were not achievable within TriNetX nor on the data returned by queries to TriNetX.

Assessing moderation by age and number of vaccine doses

The Cox model used in the primary analysis reads:

$$\lambda(t|\text{Vaccinated}) = \lambda_0(t) \exp(\beta_0 + \beta_V \text{Vaccinated}),$$

where $\text{Vaccinated} = 1$ if the individual has been vaccinated, and 0 otherwise. The HR is then obtained as:

$$HR = \frac{\lambda(t|\text{Vaccinated}=1)}{\lambda(t|\text{Vaccinated}=0)} = \exp(\beta_V).$$

This is the standard approach to calculating HRs. To assess whether associations between vaccination status and COVID-19 outcomes are moderated by a variable X , we add an interaction term as follows:

$$\lambda(t|\text{Vaccinated}, X) = \lambda_0(t) \exp(\beta_0 + \beta_V \text{Vaccinated} + \beta_X X + \beta_{XV} X \times \text{Vaccinated}).$$

If X is a dummy variable (i.e. it only takes value 1 or 0), then the HR related to vaccination status for $X=0$ is:

$$HR_{X=0} = \frac{\lambda(t|\text{Vaccinated}=1, X=0)}{\lambda(t|\text{Vaccinated}=0, X=0)} = \exp(\beta_V),$$

and the HR related to vaccination status for $X=1$ is:

$$HR_{X=1} = \frac{\lambda(t|\text{Vaccinated}=1, X=1)}{\lambda(t|\text{Vaccinated}=0, X=1)} = \exp(\beta_V + \beta_{XV}) = \exp(\beta_V) \exp(\beta_{XV}).$$

Therefore, the ratio between the two (which are presented for each outcome in Table S10 and S13) is:

$$\frac{HR_{X=1}}{HR_{X=0}} = \exp(\beta_{XV}).$$

Testing whether the ratio of HR is equal to 1 thus amounts to testing whether β_{XV} is equal to zero, and this is tested as part of the estimation of the Cox model with `coxph` function from the Survival package (version 3.2.3).

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Supplementary figures

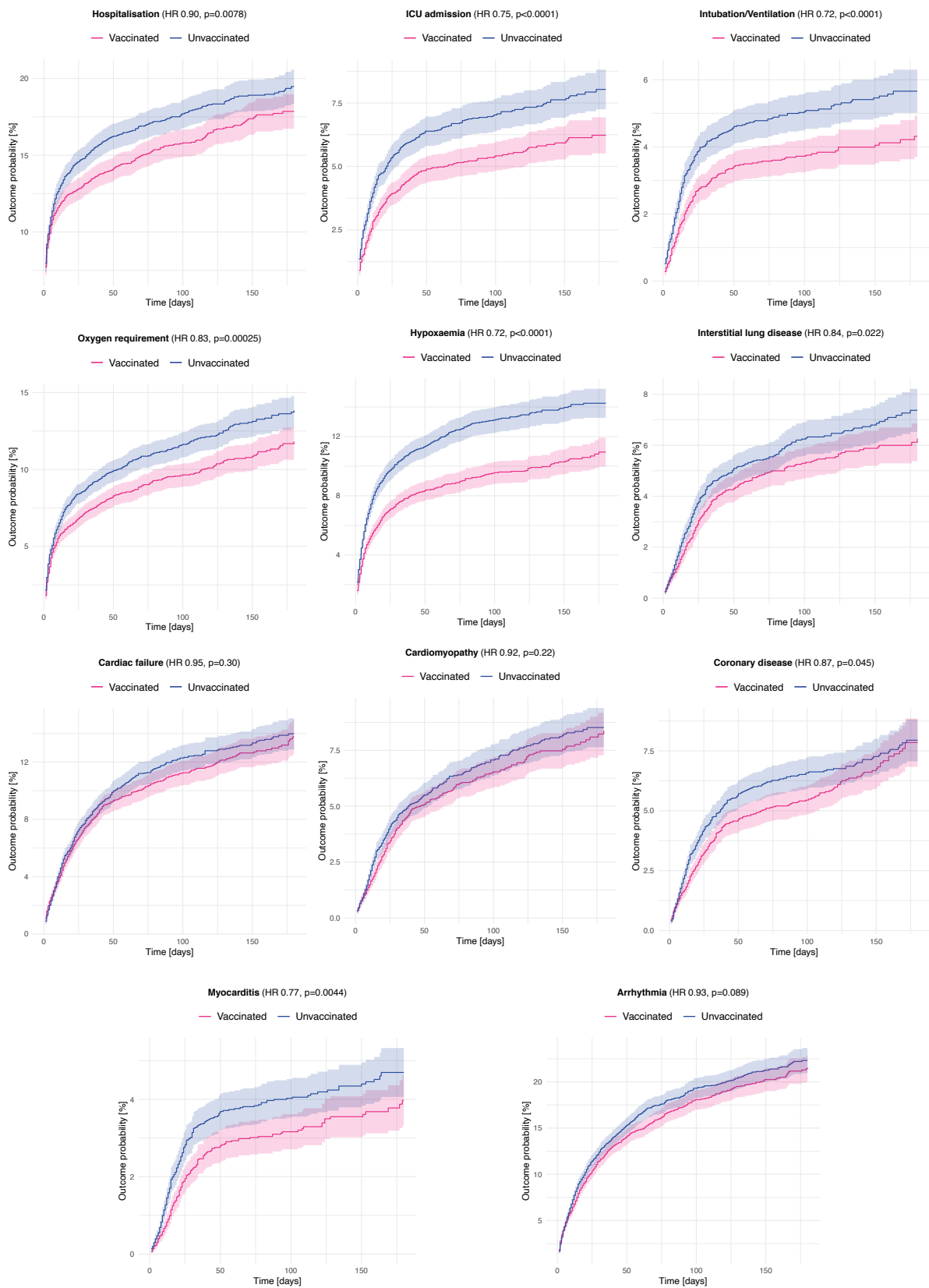


Fig. A1 – Same figure as Fig. 2 in the main manuscript but representing Kaplan-Meier curves for additional outcomes (broadly service use, respiratory and cardiac outcomes).

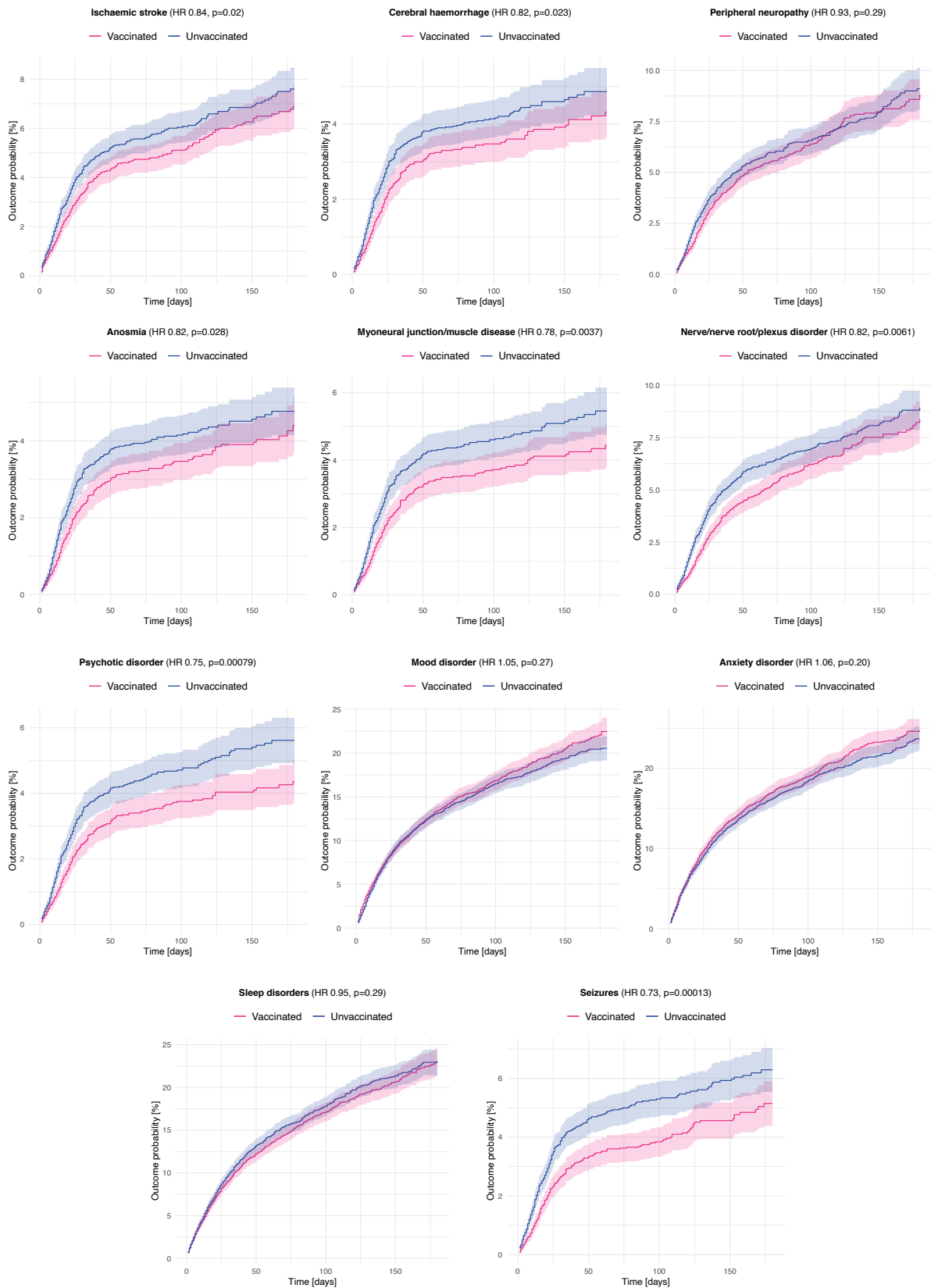


Fig. A2 – Same figure as Fig. 2 in the main manuscript but representing Kaplan-Meier curves for additional outcomes (broadly the neuro-psychiatric outcomes).

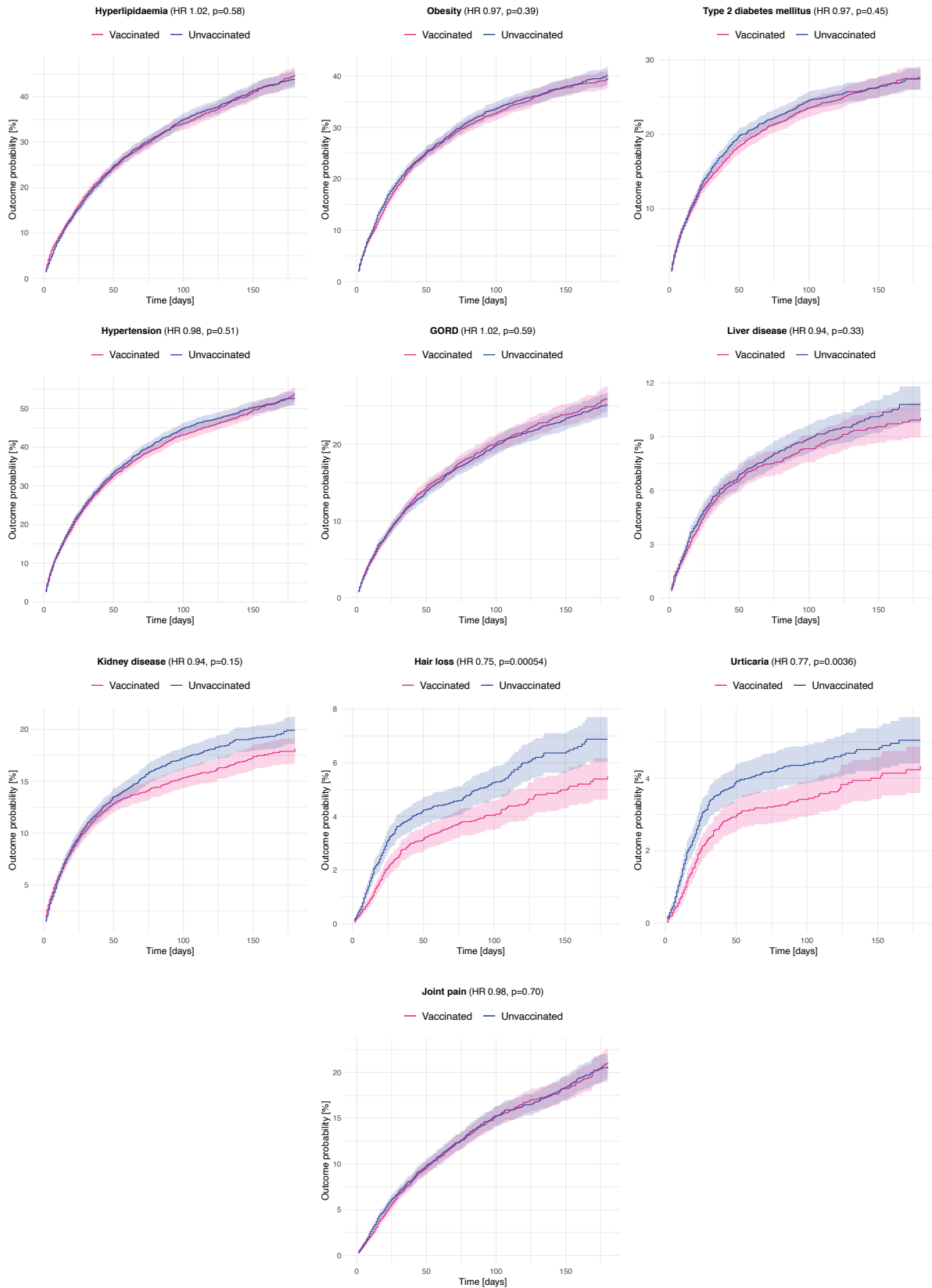


Fig. A3 – Same figure as Fig. 2 in the main manuscript but representing Kaplan-Meier curves for additional outcomes (broadly the outcomes affecting other body systems not represented in Fig. S2-S3).

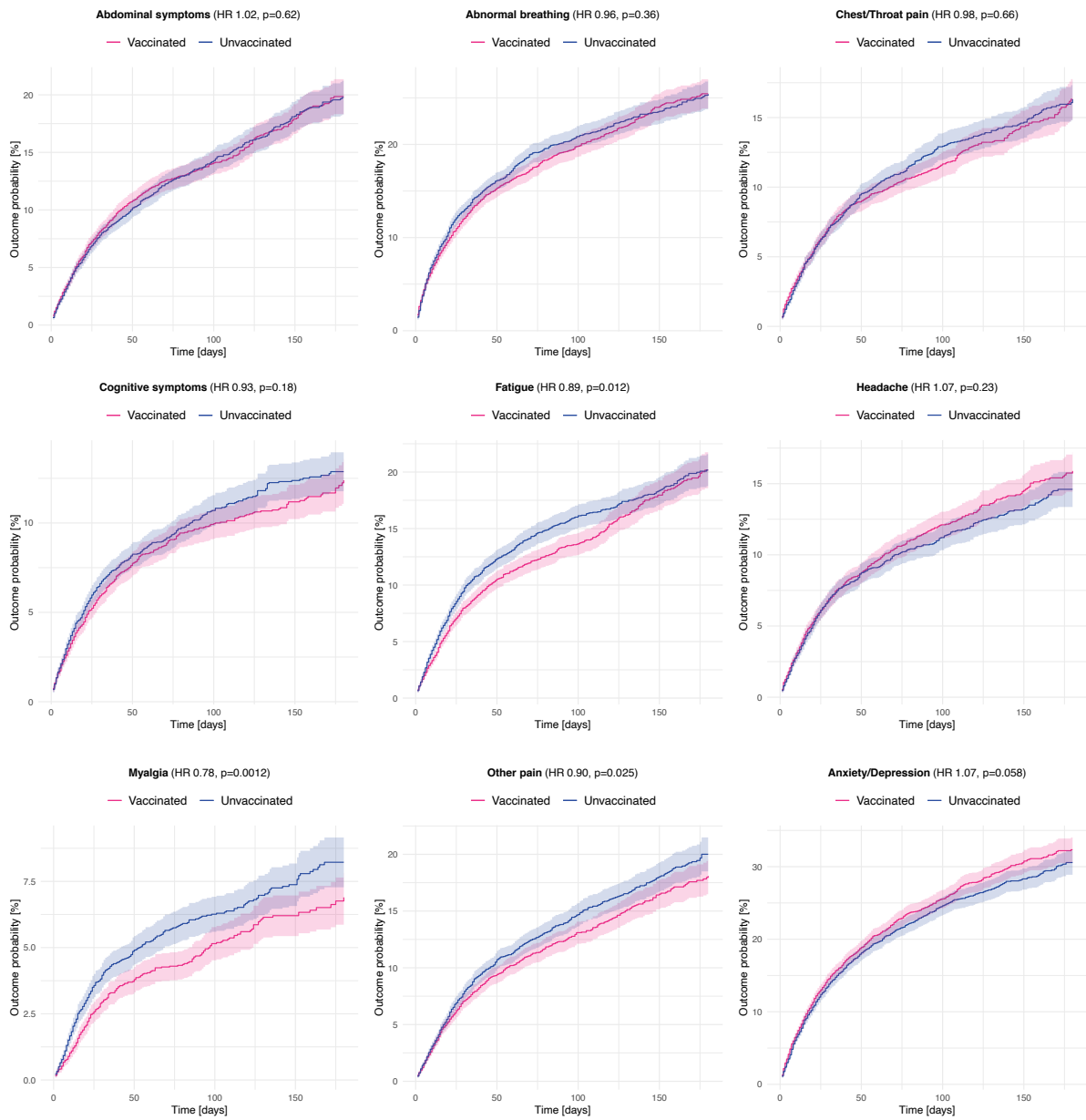


Fig. A4 – Same figure as Fig. 2 in the main manuscript but representing Kaplan-Meier curves for additional the outcomes termed “long-COVID features”.

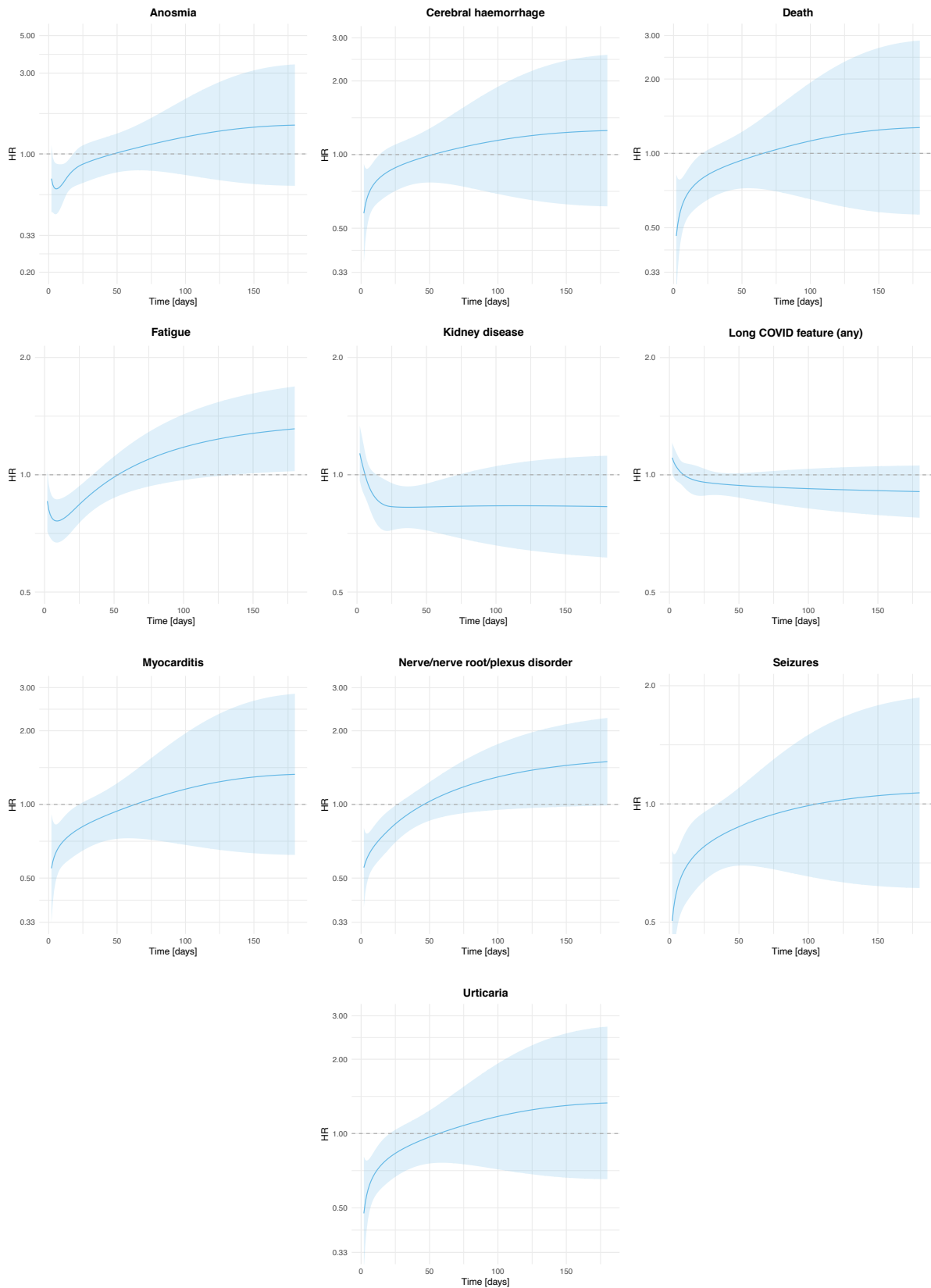


Fig. A5 – Time-varying hazard ratios for the outcomes for which there was evidence of non-proportionality of hazards (as per Table S6).

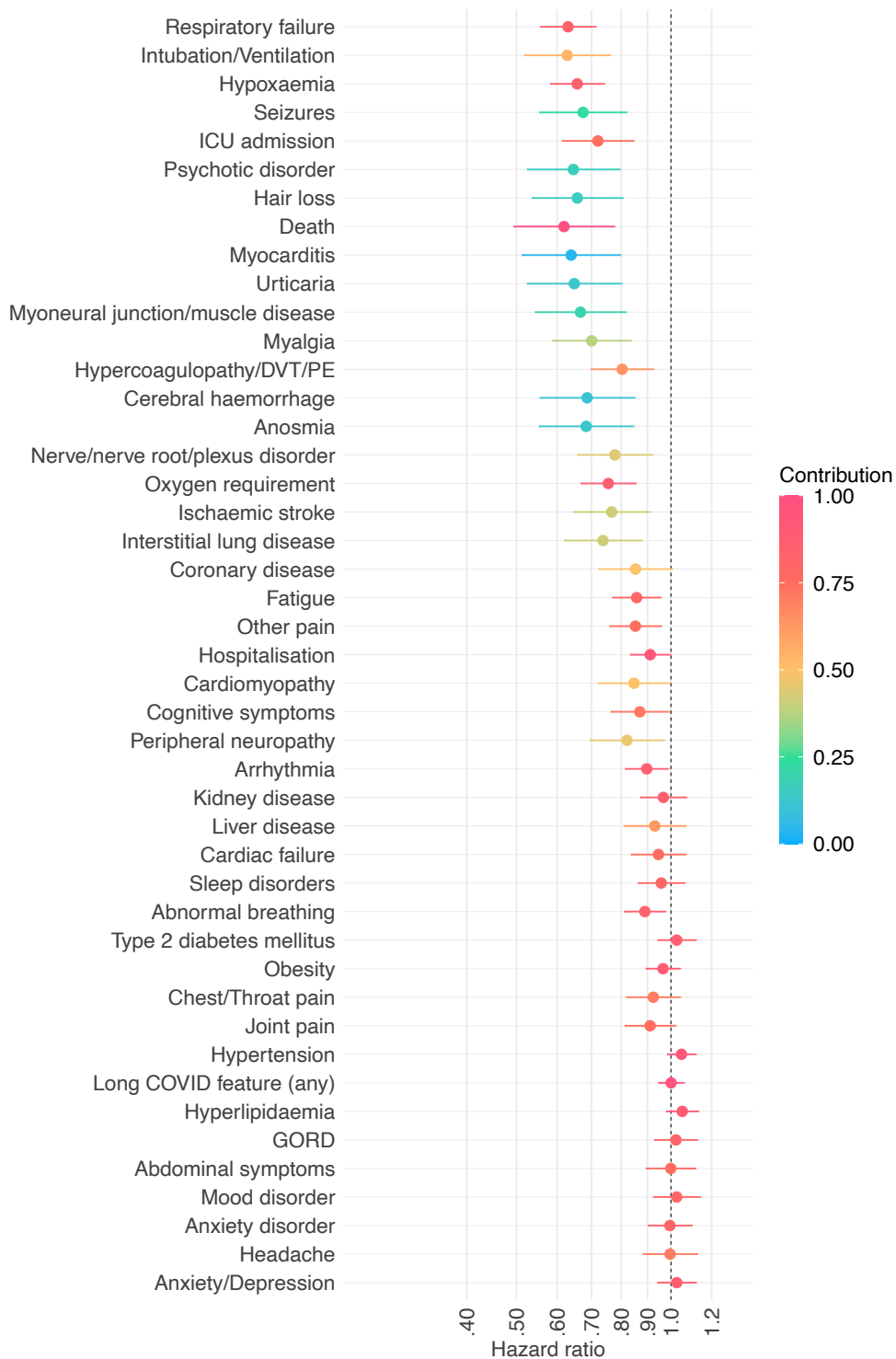


Fig. A6 – Same figure as Fig. 3 in the main manuscript for the comparison of individuals having received two doses of the vaccine vs. unvaccinated individuals but representing hazard ratios for *all* outcomes. HR lower than 1 indicate outcomes less common among vaccinated individuals. Horizontal bars represent 95% confidence intervals. Each outcome is a composite outcome with death as a component to address competing risks. The contribution of the outcome of interest to the overall incidence of the composite endpoint is encoded by the colour.



Fig. A7 – Same figure as Fig. 3 in the main manuscript for the comparison of individuals having received only one dose of the vaccine at the time of SARS-CoV-2 infection vs. unvaccinated individuals but representing hazard ratios for *all* outcomes. HR lower than 1 indicate outcomes less common among vaccinated individuals. Horizontal bars represent 95% confidence intervals. Each outcome is a composite outcome with death as a component to address competing risks. The contribution of the outcome of interest to the overall incidence of the composite endpoint is encoded by the colour.

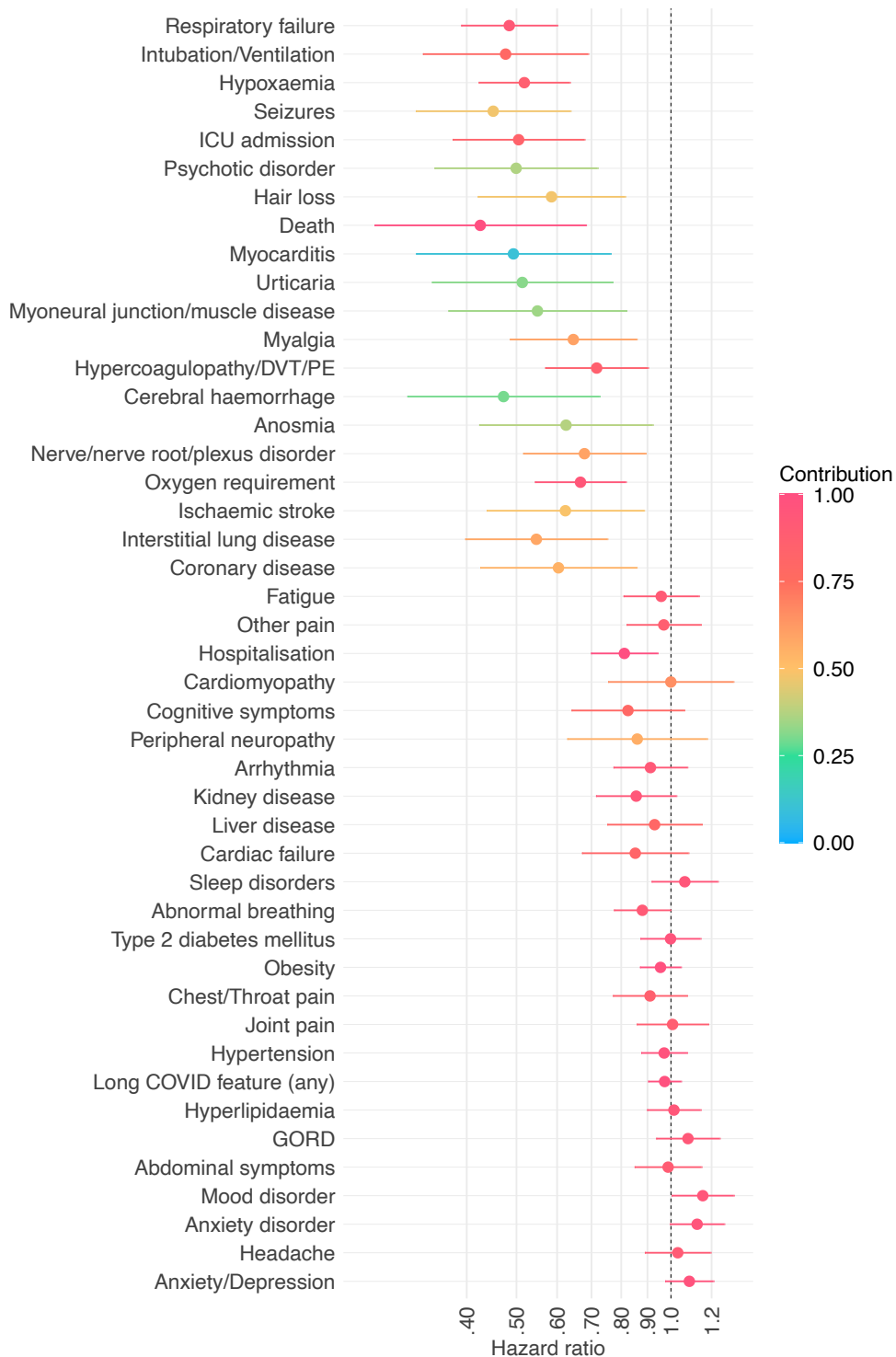


Fig. A8 – Same figure as Fig. 3 in the main manuscript for the comparison of vaccinated vs. unvaccinated individuals among people < 60 years-old, and representing hazard ratios for *all* outcomes. HR lower than 1 indicate outcomes less common among vaccinated individuals. Horizontal bars represent 95% confidence intervals. Each outcome is a composite outcome with death as a component to address competing risks. The contribution of the outcome of interest to the overall incidence of the composite endpoint is encoded by the colour.

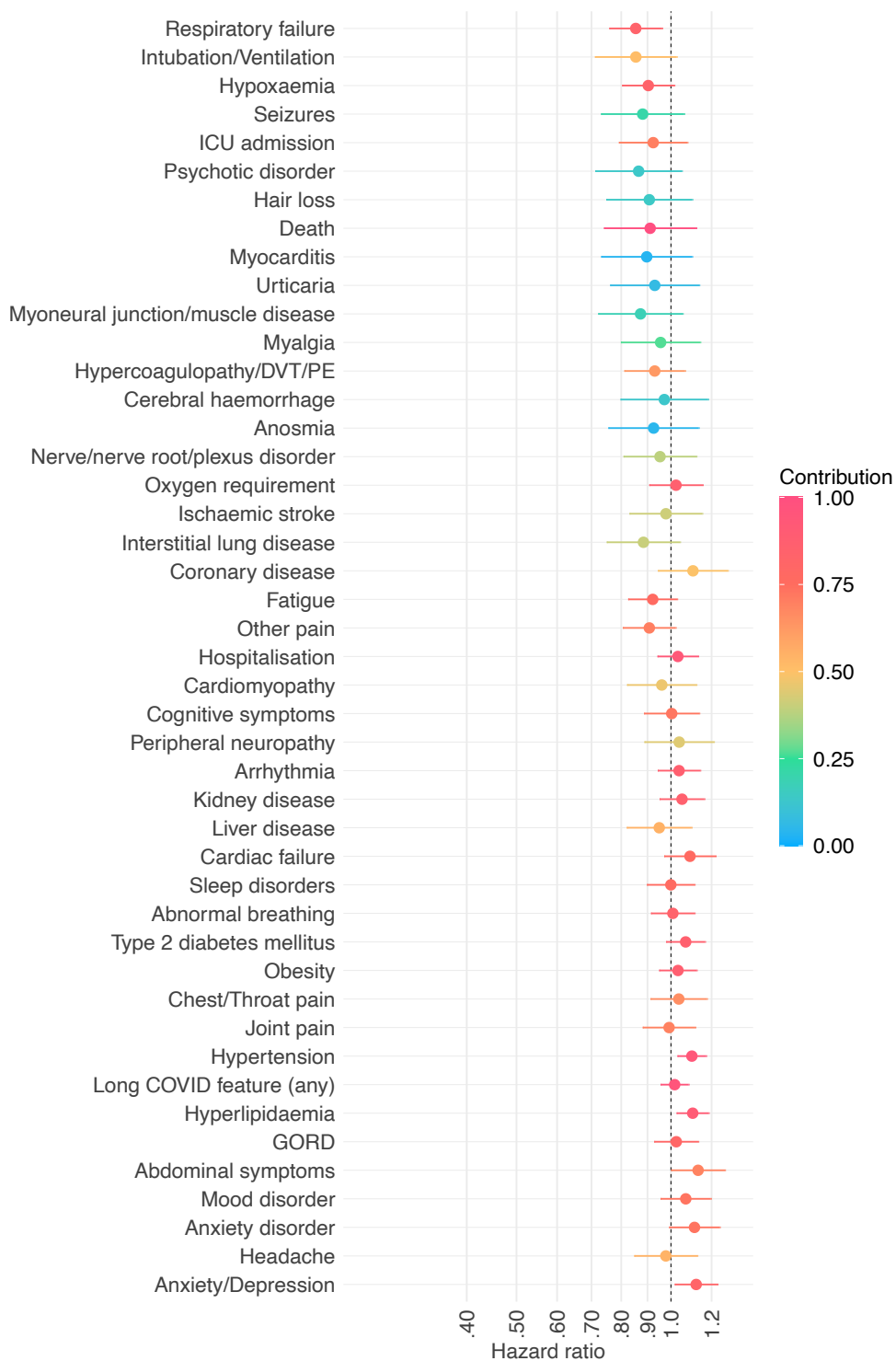


Fig. A9 – Same figure as Fig. 3 in the main manuscript for the comparison of vaccinated vs. unvaccinated individuals among people ≥ 60 years-old, and representing hazard ratios for *all* outcomes. HR lower than 1 indicate outcomes less common among vaccinated individuals. Horizontal bars represent 95% confidence intervals. Each outcome is a composite outcome with death as a component to address competing risks. The contribution of the outcome of interest to the overall incidence of the composite endpoint is encoded by the colour.

Supplementary tables

Table A1 – Characteristics of the vaccinated and unvaccinated cohorts, before and after propensity score matching. SMD = Standardised Mean Difference.

	Vaccinated (unmatched)	Unvaccinated (unmatched)	Vaccinated (matched)	Unvaccinated (matched)	SMD
Number	10024	83957	9479	9479	-
DEMOGRAPHICS					
Age; mean (SD)	57.0 (17.9)	51.9 (23.1)	56.5 (18.0)	57.6 (20.6)	0.06
Sex; n (%)					
Female	5950 (59.4)	48968 (58.3)	5676 (59.9)	5761 (60.8)	0.02
Male	4072 (40.6)	34981 (41.7)	3801 (40.1)	3716 (39.2)	0.02
Other	20 (0.2)	40 (0.0)	20 (0.2)	10 (0.1)	0.03
Race; n (%)					
White	7208 (71.9)	57310 (68.3)	6783 (71.6)	6873 (72.5)	0.02
Black or African American	1584 (15.8)	16296 (19.4)	1540 (16.2)	1514 (16.0)	0.007
Asian	368 (3.7)	1992 (2.4)	317 (3.3)	285 (3.0)	0.02
American Indian or Alaska Native	61 (0.6)	345 (0.4)	57 (0.6)	57 (0.6)	0
Native Hawaiian or Other Pacific Islander	42 (0.4)	171 (0.2)	40 (0.4)	30 (0.3)	0.02
Unknown	802 (8.0)	7843 (9.3)	783 (8.3)	756 (8.0)	0.01
Ethnicity; n (%)					
Hispanic or Latino	1097 (10.9)	7539 (9.0)	1015 (10.7)	974 (10.3)	0.01
Not Hispanic or Latino	7199 (71.8)	63015 (75.1)	6780 (71.5)	6793 (71.7)	0.003
Unknown	1728 (17.2)	13403 (16.0)	1684 (17.8)	1712 (18.1)	0.008
Problems related to housing and economic circumstances; n (%)	135 (1.3)	1735 (2.1)	133 (1.4)	146 (1.5)	0.01
COMORBIDITIES					
Overweight and obesity; n (%)	3175 (31.7)	30363 (36.2)	3086 (32.6)	3263 (34.4)	0.04
Hypertensive diseases; n (%)	5227 (52.1)	46211 (55.0)	5060 (53.4)	5197 (54.8)	0.03
Diabetes mellitus; n (%)					
Type 1 diabetes mellitus	436 (4.3)	4825 (5.7)	417 (4.4)	470 (5.0)	0.03
Type 2 diabetes mellitus	2508 (25.0)	24073 (28.7)	2426 (25.6)	2551 (26.9)	0.03
Chronic lower respiratory diseases; n (%)					
Asthma	1526 (15.2)	17665 (21.0)	1502 (15.8)	1491 (15.7)	0.003
Bronchiectasis	217 (2.2)	1711 (2.0)	211 (2.2)	233 (2.5)	0.02
Bronchitis, not specified as acute or chronic	887 (8.8)	10121 (12.1)	870 (9.2)	867 (9.1)	0.001
Emphysema	398 (4.0)	3981 (4.7)	387 (4.1)	413 (4.4)	0.01
Other chronic obstructive pulmonary disease	884 (8.8)	10493 (12.5)	871 (9.2)	958 (10.1)	0.03
Simple and mucopurulent chronic bronchitis	133 (1.3)	1210 (1.4)	129 (1.4)	147 (1.6)	0.02
Unspecified chronic bronchitis	126 (1.3)	1433 (1.7)	125 (1.3)	126 (1.3)	0.0009
Nicotine dependence; n (%)	929 (9.3)	11509 (13.7)	917 (9.7)	935 (9.9)	0.006
Psychiatric comorbidities; n (%)					
Anxiety disorders	3187 (31.8)	31966 (38.1)	3098 (32.7)	3159 (33.3)	0.01
Substance misuse	1351 (13.5)	16299 (19.4)	1334 (14.1)	1373 (14.5)	0.01
Mood disorders	2453 (24.5)	27245 (32.5)	2408 (25.4)	2458 (25.9)	0.01
Psychotic disorders	176 (1.8)	2827 (3.4)	175 (1.8)	176 (1.9)	0.0008
Heart disease; n (%)					

Ischemic heart diseases	2074 (20.7)	18880 (22.5)	2013 (21.2)	2114 (22.3)	0.03
Other forms of heart disease	3573 (35.6)	34359 (40.9)	3485 (36.8)	3607 (38.1)	0.03
Chronic kidney diseases; n (%)					
Chronic kidney disease (CKD)	1501 (15.0)	15137 (18.0)	1471 (15.5)	1561 (16.5)	0.03
Hypertensive chronic kidney disease	783 (7.8)	8795 (10.5)	761 (8.0)	812 (8.6)	0.02
Chronic liver diseases; n (%)					
Alcoholic liver disease	88 (0.9)	848 (1.0)	84 (0.9)	86 (0.9)	0.002
Chronic hepatitis, not elsewhere classified	57 (0.6)	340 (0.4)	53 (0.6)	53 (0.6)	0
Chronic passive congestion of liver	140 (1.4)	1419 (1.7)	136 (1.4)	157 (1.7)	0.02
Fatty (change of) liver, not elsewhere classified	727 (7.3)	6530 (7.8)	705 (7.4)	730 (7.7)	0.01
Fibrosis and cirrhosis of liver	251 (2.5)	2269 (2.7)	240 (2.5)	266 (2.8)	0.02
Hepatic failure, not elsewhere classified	141 (1.4)	1248 (1.5)	132 (1.4)	128 (1.4)	0.004
Portal hypertension	118 (1.2)	1047 (1.2)	111 (1.2)	133 (1.4)	0.02
Cerebral infarction; n (%)	497 (5.0)	5384 (6.4)	487 (5.1)	508 (5.4)	0.01
Dementia; n (%)					
Alzheimer's disease	70 (0.7)	1181 (1.4)	68 (0.7)	71 (0.7)	0.004
Dementia in other diseases classified elsewhere	97 (1.0)	1555 (1.9)	95 (1.0)	95 (1.0)	0
Dementia with Lewy bodies	40 (0.4)	149 (0.2)	40 (0.4)	40 (0.4)	0
Frontotemporal dementia	20 (0.2)	89 (0.1)	20 (0.2)	30 (0.3)	0.02
Unspecified dementia	179 (1.8)	3013 (3.6)	178 (1.9)	183 (1.9)	0.004
Vascular dementia	60 (0.6)	963 (1.1)	59 (0.6)	66 (0.7)	0.009
Neoplasms; n (%)					
Malignant neoplasms of lymphoid, hematopoietic and related tissue	392 (3.9)	2718 (3.2)	387 (4.1)	397 (4.2)	0.005
Neoplasms (any)	4184 (41.7)	34046 (40.6)	4038 (42.6)	4208 (44.4)	0.04
Organ transplant; n (%)					
Liver Transplantation Procedures	50 (0.5)	140 (0.2)	47 (0.5)	43 (0.5)	0.006
Renal Transplantation Procedures	124 (1.2)	704 (0.8)	114 (1.2)	113 (1.2)	0.001
Psoriasis; n (%)	246 (2.5)	2142 (2.6)	242 (2.6)	254 (2.7)	0.008
Rheumatoid arthritis; n (%)					
Other rheumatoid arthritis	348 (3.5)	3069 (3.7)	341 (3.6)	349 (3.7)	0.005
Rheumatoid arthritis with rheumatoid factor	123 (1.2)	1022 (1.2)	118 (1.2)	130 (1.4)	0.01
Systemic lupus erythematosus (SLE); n (%)	125 (1.2)	1129 (1.3)	122 (1.3)	120 (1.3)	0.002
Disorders involving the immune mechanism; n (%)	810 (8.1)	5844 (7.0)	778 (8.2)	771 (8.1)	0.003

Table A2 – Characteristics of the vaccinated (1 dose only) and unvaccinated cohorts after propensity score matching. SMD = Standardised Mean Difference.

	Vaccinated	Unvaccinated	SMD
Number	2996	2996	-
DEMOGRAPHICS			
Age; mean (SD)	58.2 (17.2)	58.6 (19.7)	0.02
Sex; n (%)			
Female	1808 (60.3)	1837 (61.3)	0.02
Male	1181 (39.4)	1150 (38.4)	0.02
Other	30 (1.0)	20 (0.7)	0.04
Race; n (%)			
White	2043 (68.2)	2047 (68.3)	0.003
Black or African American	534 (17.8)	522 (17.4)	0.01
Asian	123 (4.1)	129 (4.3)	0.01
American Indian or Alaska Native	70 (2.3)	60 (2.0)	0.02
Native Hawaiian or Other Pacific Islander	30 (1.0)	20 (0.7)	0.04
Unknown	281 (9.4)	288 (9.6)	0.008
Ethnicity; n (%)			
Hispanic or Latino	297 (9.9)	296 (9.9)	0.001
Not Hispanic or Latino	2246 (75.0)	2267 (75.7)	0.02
Unknown	453 (15.1)	435 (14.5)	0.02
Problems related to housing and economic circumstances; n (%)	83 (2.8)	88 (2.9)	0.01
COMORBIDITIES			
Overweight and obesity; n (%)	1000 (33.4)	956 (31.9)	0.03
Hypertensive diseases; n (%)	1604 (53.5)	1639 (54.7)	0.02
Diabetes mellitus; n (%)			
Type 1 diabetes mellitus	134 (4.5)	124 (4.1)	0.02
Type 2 diabetes mellitus	803 (26.8)	768 (25.6)	0.03
Chronic lower respiratory diseases; n (%)			
Asthma	506 (16.9)	539 (18.0)	0.03
Bronchiectasis	84 (2.8)	82 (2.7)	0.004
Bronchitis, not specified as acute or chronic	243 (8.1)	241 (8.0)	0.002
Emphysema	128 (4.3)	140 (4.7)	0.02
Other chronic obstructive pulmonary disease	278 (9.3)	289 (9.6)	0.01
Simple and mucopurulent chronic bronchitis	80 (2.7)	80 (2.7)	0
Unspecified chronic bronchitis	80 (2.7)	82 (2.7)	0.004
Nicotine dependence; n (%)	319 (10.6)	331 (11.0)	0.01
Psychiatric comorbidities; n (%)			
Anxiety disorders	1047 (34.9)	1039 (34.7)	0.006
Substance misuse	455 (15.2)	457 (15.3)	0.002
Mood disorders	811 (27.1)	815 (27.2)	0.003
Psychotic disorders	86 (2.9)	101 (3.4)	0.03
Heart disease; n (%)			
Ischemic heart diseases	606 (20.2)	627 (20.9)	0.02
Other forms of heart disease	1119 (37.3)	1132 (37.8)	0.009
Chronic kidney diseases; n (%)			

Chronic kidney disease (CKD)	477 (15.9)	486 (16.2)	0.008
Hypertensive chronic kidney disease	245 (8.2)	249 (8.3)	0.005
Chronic liver diseases; n (%)			
Alcoholic liver disease	80 (2.7)	70 (2.3)	0.02
Chronic hepatitis, not elsewhere classified	60 (2.0)	70 (2.3)	0.02
Chronic passive congestion of liver	81 (2.7)	80 (2.7)	0.002
Fatty (change of) liver, not elsewhere classified	230 (7.7)	208 (6.9)	0.03
Fibrosis and cirrhosis of liver	94 (3.1)	94 (3.1)	0
Hepatic failure, not elsewhere classified	85 (2.8)	84 (2.8)	0.002
Portal hypertension	81 (2.7)	81 (2.7)	0
Cerebral infarction; n (%)	147 (4.9)	145 (4.8)	0.003
Dementia; n (%)			
Alzheimer's disease	80 (2.7)	80 (2.7)	0
Dementia in other diseases classified elsewhere	70 (2.3)	63 (2.1)	0.02
Dementia with Lewy bodies	30 (1.0)	30 (1.0)	0
Frontotemporal dementia	10 (0.3)	20 (0.7)	0.05
Unspecified dementia	80 (2.7)	87 (2.9)	0.01
Vascular dementia	70 (2.3)	70 (2.3)	0
Neoplasms; n (%)			
Malignant neoplasms of lymphoid, hematopoietic and related tissue	110 (3.7)	126 (4.2)	0.03
Neoplasms (any)	1225 (40.9)	1229 (41.0)	0.003
Organ transplant; n (%)			
Liver Transplantation Procedures	70 (2.3)	70 (2.3)	0
Renal Transplantation Procedures	80 (2.7)	73 (2.4)	0.01
Psoriasis; n (%)	103 (3.4)	86 (2.9)	0.03
Rheumatoid arthritis; n (%)			
Other rheumatoid arthritis	123 (4.1)	115 (3.8)	0.01
Rheumatoid arthritis with rheumatoid factor	70 (2.3)	70 (2.3)	0
Systemic lupus erythematosus (SLE); n (%)	87 (2.9)	83 (2.8)	0.008
Disorders involving the immune mechanism; n (%)	277 (9.2)	292 (9.7)	0.02

Table A3 – Characteristics of the vaccinated (2 doses only) and unvaccinated cohorts after propensity score matching. SMD = Standardised Mean Difference.

	Vaccinated	Unvaccinated	SMD
Number	6957	6957	-
DEMOGRAPHICS			
Age; mean (SD)	57.2 (17.8)	58.3 (20.6)	0.06
Sex; n (%)			
Female	4071 (58.5)	4133 (59.4)	0.02
Male	2884 (41.5)	2822 (40.6)	0.02
Other	20 (0.3)	20 (0.3)	0
Race; n (%)			
White	5032 (72.3)	5088 (73.1)	0.02
Black or African American	1082 (15.6)	1055 (15.2)	0.01
Asian	248 (3.6)	250 (3.6)	0.002
American Indian or Alaska Native	53 (0.8)	43 (0.6)	0.02
Native Hawaiian or Other Pacific Islander	30 (0.4)	30 (0.4)	0
Unknown	552 (7.9)	522 (7.5)	0.02
Ethnicity; n (%)			
Hispanic or Latino	775 (11.1)	775 (11.1)	0
Not Hispanic or Latino	5030 (72.3)	4994 (71.8)	0.01
Unknown	1152 (16.6)	1188 (17.1)	0.01
Problems related to housing and economic circumstances; n (%)	97 (1.4)	102 (1.5)	0.006
COMORBIDITIES			
Overweight and obesity; n (%)	2255 (32.4)	2321 (33.4)	0.02
Hypertensive diseases; n (%)	3754 (54.0)	3852 (55.4)	0.03
Diabetes mellitus; n (%)			
Type 1 diabetes mellitus	306 (4.4)	303 (4.4)	0.002
Type 2 diabetes mellitus	1771 (25.5)	1787 (25.7)	0.005
Chronic lower respiratory diseases; n (%)			
Asthma	1061 (15.3)	1075 (15.5)	0.006
Bronchiectasis	161 (2.3)	181 (2.6)	0.02
Bronchitis, not specified as acute or chronic	629 (9.0)	651 (9.4)	0.01
Emphysema	285 (4.1)	291 (4.2)	0.004
Other chronic obstructive pulmonary disease	612 (8.8)	641 (9.2)	0.01
Simple and mucopurulent chronic bronchitis	106 (1.5)	105 (1.5)	0.001
Unspecified chronic bronchitis	98 (1.4)	113 (1.6)	0.02
Nicotine dependence; n (%)	642 (9.2)	682 (9.8)	0.02
Psychiatric comorbidities; n (%)			
Anxiety disorders	2243 (32.2)	2352 (33.8)	0.03
Substance misuse	950 (13.7)	1005 (14.4)	0.02
Mood disorders	1723 (24.8)	1820 (26.2)	0.03
Psychotic disorders	122 (1.8)	132 (1.9)	0.01
Heart disease; n (%)			
Ischemic heart diseases	1510 (21.7)	1560 (22.4)	0.02
Other forms of heart disease	2563 (36.8)	2630 (37.8)	0.02
Chronic kidney diseases; n (%)			

Chronic kidney disease (CKD)	1091 (15.7)	1104 (15.9)	0.005
Hypertensive chronic kidney disease	578 (8.3)	612 (8.8)	0.02
Chronic liver diseases; n (%)			
Alcoholic liver disease	66 (0.9)	67 (1.0)	0.001
Chronic hepatitis, not elsewhere classified	50 (0.7)	50 (0.7)	0
Chronic passive congestion of liver	107 (1.5)	115 (1.7)	0.009
Fatty (change of) liver, not elsewhere classified	520 (7.5)	527 (7.6)	0.004
Fibrosis and cirrhosis of liver	179 (2.6)	177 (2.5)	0.002
Hepatic failure, not elsewhere classified	92 (1.3)	98 (1.4)	0.007
Portal hypertension	84 (1.2)	91 (1.3)	0.009
Cerebral infarction; n (%)	346 (5.0)	369 (5.3)	0.01
Dementia; n (%)			
Alzheimer's disease	61 (0.9)	82 (1.2)	0.03
Dementia in other diseases classified elsewhere	79 (1.1)	98 (1.4)	0.02
Dementia with Lewy bodies	40 (0.6)	40 (0.6)	0
Frontotemporal dementia	20 (0.3)	20 (0.3)	0
Unspecified dementia	121 (1.7)	138 (2.0)	0.02
Vascular dementia	48 (0.7)	49 (0.7)	0.002
Neoplasms; n (%)			
Malignant neoplasms of lymphoid, hematopoietic and related tissue	314 (4.5)	297 (4.3)	0.01
Neoplasms (any)	3009 (43.3)	3099 (44.5)	0.03
Organ transplant; n (%)			
Liver Transplantation Procedures	45 (0.6)	49 (0.7)	0.007
Renal Transplantation Procedures	102 (1.5)	106 (1.5)	0.005
Psoriasis; n (%)	189 (2.7)	195 (2.8)	0.005
Rheumatoid arthritis; n (%)			
Other rheumatoid arthritis	227 (3.3)	255 (3.7)	0.02
Rheumatoid arthritis with rheumatoid factor	89 (1.3)	104 (1.5)	0.02
Systemic lupus erythematosus (SLE); n (%)	75 (1.1)	85 (1.2)	0.01
Disorders involving the immune mechanism; n (%)	604 (8.7)	590 (8.5)	0.007

Table A4 – Characteristics of the under-60 vaccinated and unvaccinated cohorts after propensity score matching. SMD = Standardised Mean Difference.

	Vaccinated	Unvaccinated	SMD
Number	4633	4633	-
DEMOGRAPHICS			
Age; mean (SD)	41.5 (11.7)	42.1 (13.7)	0.06
Sex; n (%)			
Female	2976 (64.2)	3030 (65.4)	0.02
Male	1650 (35.6)	1598 (34.5)	0.02
Other	30 (0.6)	30 (0.6)	0
Race; n (%)			
White	3069 (66.2)	3118 (67.3)	0.02
Black or African American	831 (17.9)	805 (17.4)	0.01
Asian	225 (4.9)	192 (4.1)	0.03
American Indian or Alaska Native	46 (1.0)	45 (1.0)	0.002
Native Hawaiian or Other Pacific Islander	40 (0.9)	40 (0.9)	0
Unknown	475 (10.3)	488 (10.5)	0.009
Ethnicity; n (%)			
Hispanic or Latino	628 (13.6)	637 (13.7)	0.006
Not Hispanic or Latino	3131 (67.6)	3115 (67.2)	0.007
Unknown	874 (18.9)	881 (19.0)	0.004
Problems related to housing and economic circumstances; n (%)	50 (1.1)	55 (1.2)	0.01
COMORBIDITIES			
Overweight and obesity; n (%)	1510 (32.6)	1552 (33.5)	0.02
Hypertensive diseases; n (%)	1589 (34.3)	1638 (35.4)	0.02
Diabetes mellitus; n (%)			
Type 1 diabetes mellitus	146 (3.2)	153 (3.3)	0.009
Type 2 diabetes mellitus	772 (16.7)	812 (17.5)	0.02
Chronic lower respiratory diseases; n (%)			
Asthma	760 (16.4)	743 (16.0)	0.01
Bronchiectasis	70 (1.5)	59 (1.3)	0.02
Bronchitis, not specified as acute or chronic	334 (7.2)	362 (7.8)	0.02
Emphysema	59 (1.3)	57 (1.2)	0.004
Other chronic obstructive pulmonary disease	162 (3.5)	154 (3.3)	0.01
Simple and mucopurulent chronic bronchitis	46 (1.0)	43 (0.9)	0.007
Unspecified chronic bronchitis	40 (0.9)	40 (0.9)	0
Nicotine dependence; n (%)	420 (9.1)	437 (9.4)	0.01
Psychiatric comorbidities; n (%)			
Anxiety disorders	1596 (34.4)	1630 (35.2)	0.02
Substance misuse	588 (12.7)	599 (12.9)	0.007
Mood disorders	1141 (24.6)	1176 (25.4)	0.02
Psychotic disorders	82 (1.8)	91 (2.0)	0.01
Heart disease; n (%)			
Ischemic heart diseases	373 (8.1)	383 (8.3)	0.008
Other forms of heart disease	1007 (21.7)	1010 (21.8)	0.002
Chronic kidney diseases; n (%)			

Chronic kidney disease (CKD)	357 (7.7)	354 (7.6)	0.002
Hypertensive chronic kidney disease	197 (4.3)	196 (4.2)	0.001
Chronic liver diseases; n (%)			
Alcoholic liver disease	47 (1.0)	52 (1.1)	0.01
Chronic hepatitis, not elsewhere classified	40 (0.9)	40 (0.9)	0
Chronic passive congestion of liver	60 (1.3)	64 (1.4)	0.008
Fatty (change of) liver, not elsewhere classified	299 (6.5)	310 (6.7)	0.01
Fibrosis and cirrhosis of liver	72 (1.6)	74 (1.6)	0.003
Hepatic failure, not elsewhere classified	61 (1.3)	58 (1.3)	0.006
Portal hypertension	49 (1.1)	53 (1.1)	0.008
Cerebral infarction; n (%)	97 (2.1)	101 (2.2)	0.006
Dementia; n (%)			
Alzheimer's disease	0 (0.0)	10 (0.2)	0.07
Dementia in other diseases classified elsewhere	30 (0.6)	30 (0.6)	0
Dementia with Lewy bodies	0 (0.0)	0 (0.0)	-
Frontotemporal dementia	0 (0.0)	0 (0.0)	-
Unspecified dementia	20 (0.4)	20 (0.4)	0
Vascular dementia	10 (0.2)	10 (0.2)	0
Neoplasms; n (%)			
Malignant neoplasms of lymphoid, hematopoietic and related tissue	129 (2.8)	116 (2.5)	0.02
Neoplasms (any)	1516 (32.7)	1540 (33.2)	0.01
Organ transplant; n (%)			
Liver Transplantation Procedures	40 (0.9)	40 (0.9)	0
Renal Transplantation Procedures	75 (1.6)	75 (1.6)	0
Psoriasis; n (%)	96 (2.1)	122 (2.6)	0.04
Rheumatoid arthritis; n (%)			
Other rheumatoid arthritis	97 (2.1)	98 (2.1)	0.002
Rheumatoid arthritis with rheumatoid factor	55 (1.2)	54 (1.2)	0.002
Systemic lupus erythematosus (SLE); n (%)	78 (1.7)	79 (1.7)	0.002
Disorders involving the immune mechanism; n (%)	352 (7.6)	365 (7.9)	0.01

Table A5 – Characteristics of the over-60 vaccinated and unvaccinated cohorts after propensity score matching.
SMD = Standardised Mean Difference.

	Vaccinated	Unvaccinated	SMD
Number	4657	4657	-
DEMOGRAPHICS			
Age; mean (SD)	71.8 (8.0)	71.6 (8.1)	0.03
Sex; n (%)			
Female	2585 (55.5)	2590 (55.6)	0.002
Male	2070 (44.4)	2065 (44.3)	0.002
Other	10 (0.2)	10 (0.2)	0
Race; n (%)			
White	3550 (76.2)	3576 (76.8)	0.01
Black or African American	691 (14.8)	684 (14.7)	0.004
Asian	100 (2.1)	91 (2.0)	0.01
American Indian or Alaska Native	40 (0.9)	40 (0.9)	0
Native Hawaiian or Other Pacific Islander	20 (0.4)	20 (0.4)	0
Unknown	296 (6.4)	280 (6.0)	0.01
Ethnicity; n (%)			
Hispanic or Latino	318 (6.8)	323 (6.9)	0.004
Not Hispanic or Latino	3565 (76.6)	3582 (76.9)	0.009
Unknown	774 (16.6)	752 (16.1)	0.01
Problems related to housing and economic circumstances; n (%)	82 (1.8)	84 (1.8)	0.003
COMORBIDITIES			
Overweight and obesity; n (%)	1548 (33.2)	1560 (33.5)	0.005
Hypertensive diseases; n (%)	3404 (73.1)	3342 (71.8)	0.03
Diabetes mellitus; n (%)			
Type 1 diabetes mellitus	275 (5.9)	260 (5.6)	0.01
Type 2 diabetes mellitus	1645 (35.3)	1629 (35.0)	0.007
Chronic lower respiratory diseases; n (%)			
Asthma	726 (15.6)	754 (16.2)	0.02
Bronchiectasis	148 (3.2)	131 (2.8)	0.02
Bronchitis, not specified as acute or chronic	528 (11.3)	521 (11.2)	0.005
Emphysema	337 (7.2)	349 (7.5)	0.01
Other chronic obstructive pulmonary disease	709 (15.2)	694 (14.9)	0.009
Simple and mucopurulent chronic bronchitis	104 (2.2)	104 (2.2)	0
Unspecified chronic bronchitis	104 (2.2)	109 (2.3)	0.007
Nicotine dependence; n (%)	495 (10.6)	525 (11.3)	0.02
Psychiatric comorbidities; n (%)			
Anxiety disorders	1487 (31.9)	1504 (32.3)	0.008
Substance misuse	736 (15.8)	771 (16.6)	0.02
Mood disorders	1251 (26.9)	1242 (26.7)	0.004
Psychotic disorders	95 (2.0)	106 (2.3)	0.02
Heart disease; n (%)			
Ischemic heart diseases	1620 (34.8)	1627 (34.9)	0.003
Other forms of heart disease	2446 (52.5)	2408 (51.7)	0.02
Chronic kidney diseases; n (%)			

Chronic kidney disease (CKD)	1106 (23.7)	1125 (24.2)	0.01
Hypertensive chronic kidney disease	566 (12.2)	591 (12.7)	0.02
Chronic liver diseases; n (%)			
Alcoholic liver disease	51 (1.1)	60 (1.3)	0.02
Chronic hepatitis, not elsewhere classified	48 (1.0)	47 (1.0)	0.002
Chronic passive congestion of liver	85 (1.8)	87 (1.9)	0.003
Fatty (change of) liver, not elsewhere classified	397 (8.5)	401 (8.6)	0.003
Fibrosis and cirrhosis of liver	174 (3.7)	193 (4.1)	0.02
Hepatic failure, not elsewhere classified	77 (1.7)	77 (1.7)	0
Portal hypertension	74 (1.6)	92 (2.0)	0.03
Cerebral infarction; n (%)	392 (8.4)	400 (8.6)	0.006
Dementia; n (%)			
Alzheimer's disease	69 (1.5)	79 (1.7)	0.02
Dementia in other diseases classified elsewhere	89 (1.9)	99 (2.1)	0.02
Dementia with Lewy bodies	40 (0.9)	40 (0.9)	0
Frontotemporal dementia	20 (0.4)	30 (0.6)	0.03
Unspecified dementia	172 (3.7)	194 (4.2)	0.02
Vascular dementia	58 (1.2)	76 (1.6)	0.03
Neoplasms; n (%)			
Malignant neoplasms of lymphoid, hematopoietic and related tissue	251 (5.4)	243 (5.2)	0.008
Neoplasms (any)	2487 (53.4)	2486 (53.4)	0.0004
Organ transplant; n (%)			
Liver Transplantation Procedures	40 (0.9)	30 (0.6)	0.02
Renal Transplantation Procedures	56 (1.2)	47 (1.0)	0.02
Psoriasis; n (%)	140 (3.0)	139 (3.0)	0.001
Rheumatoid arthritis; n (%)			
Other rheumatoid arthritis	244 (5.2)	230 (4.9)	0.01
Rheumatoid arthritis with rheumatoid factor	84 (1.8)	86 (1.8)	0.003
Systemic lupus erythematosus (SLE); n (%)	53 (1.1)	53 (1.1)	0
Disorders involving the immune mechanism; n (%)	413 (8.9)	424 (9.1)	0.008

Table A6 – Characteristics of the vaccinated (infected 2 weeks to 4 months after the first vaccine dose) and unvaccinated cohorts, before and after propensity score matching. Note, this analysis was run on Feb 8 and so cohorts might be slightly different from the primary cohorts since TriNetX is a live network. SMD = Standardised Mean Difference.

	Vaccinated (matched)	Unvaccinated (matched)	SMD
Number	5985	5985	-
DEMOGRAPHICS			
Age; mean (SD)	55.1 (18.8)	55.3 (20.5)	0.01
Sex; n (%)			
Female	3579 (59.8)	3704 (61.9)	0.04
Male	2405 (40.2)	2281 (38.1)	0.04
Other	10 (0.2)	0 (0.0)	0.06
Race; n (%)			
White	3636 (60.8)	3639 (60.8)	0.001
Black or African American	880 (14.7)	852 (14.2)	0.01
Asian	218 (3.6)	224 (3.7)	0.005
American Indian or Alaska Native	42 (0.7)	47 (0.8)	0.01
Native Hawaiian or Other Pacific Islander	40 (0.7)	40 (0.7)	0
Unknown	1216 (20.3)	1227 (20.5)	0.005
Ethnicity; n (%)			
Hispanic or Latino	552 (9.2)	526 (8.8)	0.02
Not Hispanic or Latino	4340 (72.5)	4404 (73.6)	0.02
Unknown	1093 (18.3)	1055 (17.6)	0.02
Problems related to housing and economic circumstances; n (%)	85 (1.4)	70 (1.2)	0.02
COMORBIDITIES			
Overweight and obesity; n (%)	1975 (33.0)	1929 (32.2)	0.02
Hypertensive diseases; n (%)	3036 (50.7)	2940 (49.1)	0.03
Diabetes mellitus; n (%)			
Type 1 diabetes mellitus	244 (4.1)	246 (4.1)	0.002
Type 2 diabetes mellitus	1479 (24.7)	1398 (23.4)	0.03
Chronic lower respiratory diseases; n (%)			
Asthma	983 (16.4)	915 (15.3)	0.03
Bronchiectasis	114 (1.9)	106 (1.8)	0.01
Bronchitis, not specified as acute or chronic	530 (8.9)	541 (9.0)	0.006
Emphysema	276 (4.6)	245 (4.1)	0.03
Other chronic obstructive pulmonary disease	591 (9.9)	526 (8.8)	0.04
Simple and mucopurulent chronic bronchitis	66 (1.1)	59 (1.0)	0.01
Unspecified chronic bronchitis	65 (1.1)	52 (0.9)	0.02
Nicotine dependence; n (%)	743 (12.4)	675 (11.3)	0.04
Psychiatric comorbidities; n (%)			
Anxiety disorders	2005 (33.5)	1994 (33.3)	0.004
Substance misuse	1186 (19.8)	1079 (18.0)	0.05
Mood disorders	1741 (29.1)	1733 (29.0)	0.003
Psychotic disorders	133 (2.2)	145 (2.4)	0.01
Ischemic heart diseases; n (%)	1283 (21.4)	1217 (20.3)	0.03

Chronic kidney diseases; n (%)			
Chronic kidney disease (CKD)	878 (14.7)	835 (14.0)	0.02
Hypertensive chronic kidney disease	491 (8.2)	464 (7.8)	0.02
Chronic liver diseases; n (%)			
Alcoholic liver disease	56 (0.9)	56 (0.9)	0
Chronic hepatitis, not elsewhere classified	40 (0.7)	30 (0.5)	0.02
Chronic passive congestion of liver	70 (1.2)	83 (1.4)	0.02
Fatty (change of) liver, not elsewhere classified	448 (7.5)	390 (6.5)	0.04
Fibrosis and cirrhosis of liver	154 (2.6)	137 (2.3)	0.02
Hepatic failure, not elsewhere classified	71 (1.2)	62 (1.0)	0.01
Portal hypertension	70 (1.2)	64 (1.1)	0.01
Cerebral infarction; n (%)	387 (6.5)	389 (6.5)	0.001
Dementia; n (%)			
Alzheimer's disease	42 (0.7)	46 (0.8)	0.008
Dementia in other diseases classified elsewhere	53 (0.9)	59 (1.0)	0.01
Dementia with Lewy bodies	40 (0.7)	30 (0.5)	0.02
Frontotemporal dementia	20 (0.3)	20 (0.3)	0
Unspecified dementia	123 (2.1)	129 (2.2)	0.007
Vascular dementia	56 (0.9)	58 (1.0)	0.003
Neoplasms; n (%)			
Malignant neoplasms of lymphoid, hematopoietic, and related tissue	262 (4.4)	250 (4.2)	0.01
Neoplasms (any)	2574 (43.0)	2484 (41.5)	0.03
Organ transplant; n (%)			
Liver Transplantation Procedures	40 (0.7)	40 (0.7)	0
Renal Transplantation Procedures	60 (1.0)	56 (0.9)	0.007
Psoriasis; n (%)	175 (2.9)	181 (3.0)	0.006
Rheumatoid arthritis; n (%)			
Other rheumatoid arthritis	240 (4.0)	234 (3.9)	0.005
Rheumatoid arthritis with rheumatoid factor	73 (1.2)	78 (1.3)	0.007
Systemic lupus erythematosus (SLE); n (%)	87 (1.5)	79 (1.3)	0.01
Disorders involving the immune mechanism; n (%)	508 (8.5)	471 (7.9)	0.02

Table A7 – Characteristics of the vaccinated (infected >4 months after the first vaccine dose) and unvaccinated cohorts, before and after propensity score matching. Note, this analysis was run on Feb 8 and so cohorts might be slightly different from the primary cohorts since TriNetX is a live network. SMD = Standardised Mean Difference.

	Vaccinated (matched)	Unvaccinated (matched)	SMD
Number	6431	6431	-
DEMOGRAPHICS			
Age; mean (SD)	58.8 (17.8)	58.9 (19.5)	0.01
Sex; n (%)			
Female	3817 (59.4)	3895 (60.6)	0.02
Male	2614 (40.6)	2536 (39.4)	0.02
Other	0 (0.0)	0 (0.0)	-
Race; n (%)			
White	4619 (71.8)	4615 (71.8)	0.001
Black or African American	689 (10.7)	664 (10.3)	0.01
Asian	178 (2.8)	169 (2.6)	0.009
American Indian or Alaska Native	41 (0.6)	32 (0.5)	0.02
Native Hawaiian or Other Pacific Islander	30 (0.5)	31 (0.5)	0.002
Unknown	932 (14.5)	967 (15.0)	0.02
Ethnicity; n (%)			
Hispanic or Latino	587 (9.1)	581 (9.0)	0.003
Not Hispanic or Latino	4944 (76.9)	4918 (76.5)	0.01
Unknown	907 (14.1)	935 (14.5)	0.01
Problems related to housing and economic circumstances; n (%)	71 (1.1)	55 (0.9)	0.03
COMORBIDITIES			
Overweight and obesity; n (%)	2133 (33.2)	2123 (33.0)	0.003
Hypertensive diseases; n (%)	3500 (54.4)	3434 (53.4)	0.02
Diabetes mellitus; n (%)			
Type 1 diabetes mellitus	265 (4.1)	282 (4.4)	0.01
Type 2 diabetes mellitus	1603 (24.9)	1668 (25.9)	0.02
Chronic lower respiratory diseases; n (%)			
Asthma	965 (15.0)	949 (14.8)	0.007
Bronchiectasis	144 (2.2)	140 (2.2)	0.004
Bronchitis, not specified as acute or chronic	648 (10.1)	661 (10.3)	0.007
Emphysema	256 (4.0)	265 (4.1)	0.007
Other chronic obstructive pulmonary disease	625 (9.7)	609 (9.5)	0.008
Simple and mucopurulent chronic bronchitis	86 (1.3)	90 (1.4)	0.005
Unspecified chronic bronchitis	107 (1.7)	108 (1.7)	0.001
Nicotine dependence; n (%)	627 (9.7)	596 (9.3)	0.02
Psychiatric comorbidities; n (%)			
Anxiety disorders	2157 (33.5)	2183 (33.9)	0.009
Substance misuse	986 (15.3)	984 (15.3)	0.0009
Mood disorders	1726 (26.8)	1774 (27.6)	0.02
Psychotic disorders	106 (1.6)	111 (1.7)	0.006
Ischemic heart diseases; n (%)	1357 (21.1)	1346 (20.9)	0.004
Chronic kidney diseases; n (%)			

Chronic kidney disease (CKD)	918 (14.3)	900 (14.0)	0.008
Hypertensive chronic kidney disease	539 (8.4)	537 (8.4)	0.001
Chronic liver diseases; n (%)			
Alcoholic liver disease	51 (0.8)	35 (0.5)	0.03
Chronic hepatitis, not elsewhere classified	28 (0.4)	31 (0.5)	0.007
Chronic passive congestion of liver	92 (1.4)	93 (1.4)	0.001
Fatty (change of) liver, not elsewhere classified	459 (7.1)	464 (7.2)	0.003
Fibrosis and cirrhosis of liver	144 (2.2)	159 (2.5)	0.02
Hepatic failure, not elsewhere classified	88 (1.4)	92 (1.4)	0.005
Portal hypertension	82 (1.3)	74 (1.2)	0.01
Cerebral infarction; n (%)	348 (5.4)	320 (5.0)	0.02
Dementia; n (%)			
Alzheimer's disease	66 (1.0)	85 (1.3)	0.03
Dementia in other diseases classified elsewhere	80 (1.2)	98 (1.5)	0.02
Dementia with Lewy bodies	10 (0.2)	10 (0.2)	0
Frontotemporal dementia	10 (0.2)	10 (0.2)	0
Unspecified dementia	142 (2.2)	142 (2.2)	0
Vascular dementia	45 (0.7)	38 (0.6)	0.01
Neoplasms; n (%)			
Malignant neoplasms of lymphoid, hematopoietic and related tissue	225 (3.5)	206 (3.2)	0.02
Neoplasms (any)	2793 (43.4)	2739 (42.6)	0.02
Organ transplant; n (%)			
Liver Transplantation Procedures	15 (0.2)	17 (0.3)	0.006
Renal Transplantation Procedures	65 (1.0)	63 (1.0)	0.003
Psoriasis; n (%)	183 (2.8)	184 (2.9)	0.0009
Rheumatoid arthritis; n (%)			
Other rheumatoid arthritis	258 (4.0)	267 (4.2)	0.007
Rheumatoid arthritis with rheumatoid factor	115 (1.8)	105 (1.6)	0.01
Systemic lupus erythematosus (SLE); n (%)	86 (1.3)	85 (1.3)	0.001
Disorders involving the immune mechanism; n (%)	421 (6.5)	411 (6.4)	0.006

Table A8 – Percent incidences and HRs (95% CI) for all outcomes (each as part of a composite endpoint with death as the other component) in the propensity score matched vaccinated and unvaccinated cohorts ($n=9479$ individuals in each cohort).

Outcome	Incidence % (95% CI) in vaccinated cohort	Incidence % (95% CI) in unvaccinated cohort	HR (95% CI)	p-value
Abdominal symptoms	19.86 (18.32-21.36)	19.76 (18.28-21.22)	1.02 (0.93-1.12)	0.62
Abnormal breathing	25.44 (23.85-27.00)	25.39 (23.87-26.88)	0.96 (0.89-1.04)	0.36
Anosmia	4.41 (3.68-5.13)	4.77 (4.15-5.39)	0.82 (0.69-0.98)	0.03
Anxiety disorder	24.74 (23.14-26.30)	23.68 (22.12-25.21)	1.06 (0.97-1.15)	0.2
Anxiety/Depression	32.33 (30.60-34.02)	30.57 (28.89-32.22)	1.07 (1.00-1.15)	0.06
Arrhythmia	21.53 (20.10-22.94)	22.31 (20.95-23.66)	0.93 (0.86-1.01)	0.09
Cardiac failure	13.77 (12.55-14.97)	13.98 (12.89-15.05)	0.95 (0.86-1.05)	0.3
Cardiomyopathy	8.37 (7.38-9.36)	8.52 (7.64-9.39)	0.92 (0.80-1.05)	0.22
Cerebral haemorrhage	4.32 (3.66-4.97)	4.87 (4.23-5.49)	0.82 (0.68-0.97)	0.02
Chest/Throat pain	16.31 (14.84-17.76)	16.31 (14.99-17.60)	0.98 (0.88-1.08)	0.66
Cognitive symptoms	12.39 (11.18-13.58)	12.87 (11.78-13.96)	0.93 (0.83-1.04)	0.18
Coronary disease	7.85 (6.83-8.85)	7.94 (7.06-8.81)	0.87 (0.75-1.00)	0.05
Death	3.74 (3.12-4.35)	4.50 (3.89-5.10)	0.75 (0.62-0.91)	0.003
Fatigue	20.17 (18.56-21.75)	20.18 (18.75-21.58)	0.89 (0.81-0.97)	0.01
GORD	25.92 (24.26-27.55)	25.13 (23.56-26.67)	1.02 (0.94-1.11)	0.59
Hair loss	5.50 (4.70-6.29)	6.88 (6.05-7.70)	0.75 (0.64-0.88)	0.0005
Headache	15.89 (14.54-17.21)	14.60 (13.36-15.83)	1.07 (0.96-1.18)	0.23
Hospitalisation	17.85 (16.72-18.97)	19.47 (18.35-20.57)	0.90 (0.84-0.97)	0.008
Hypercoagulopathy/DVT/PE	9.96 (8.95-10.95)	12.00 (10.96-13.03)	0.81 (0.72-0.91)	0.0003
Hyperlipidaemia	44.74 (42.71-46.70)	43.84 (41.96-45.65)	1.02 (0.96-1.08)	0.58
Hypertension	53.69 (51.61-55.69)	52.67 (50.79-54.47)	0.98 (0.93-1.04)	0.51
Hypoxaemia	10.95 (9.97-11.92)	14.25 (13.26-15.22)	0.72 (0.65-0.80)	<0.0001
ICU admission	6.23 (5.51-6.94)	8.03 (7.25-8.81)	0.75 (0.65-0.85)	<0.0001
Interstitial lung disease	6.26 (5.47-7.06)	7.37 (6.52-8.21)	0.84 (0.73-0.98)	0.02
Intubation/Ventilation	4.32 (3.70-4.93)	5.66 (5.01-6.30)	0.72 (0.61-0.84)	<0.0001
Ischaemic stroke	6.88 (6.01-7.75)	7.61 (6.73-8.47)	0.84 (0.73-0.97)	0.02
Joint pain	21.07 (19.39-22.72)	20.63 (19.08-22.15)	0.98 (0.89-1.08)	0.7
Kidney disease	18.14 (16.85-19.42)	19.90 (18.61-21.18)	0.94 (0.86-1.02)	0.15
Liver disease	10.06 (9.06-11.04)	10.80 (9.78-11.80)	0.94 (0.84-1.06)	0.33
Long COVID feature (any)	64.18 (62.26-66.00)	65.57 (63.68-67.36)	1.01 (0.96-1.05)	0.83
Mood disorder	22.47 (20.87-24.04)	20.55 (19.15-21.93)	1.05 (0.96-1.15)	0.27
Myalgia	6.90 (5.96-7.82)	8.22 (7.28-9.16)	0.78 (0.67-0.91)	0.001
Myocarditis	3.97 (3.33-4.62)	4.70 (4.06-5.33)	0.77 (0.64-0.92)	0.004
Myoneural junction/muscle disease	4.44 (3.79-5.09)	5.46 (4.76-6.15)	0.78 (0.66-0.92)	0.004
Nerve/nerve root/plexus disorder	8.37 (7.32-9.40)	8.92 (7.95-9.89)	0.82 (0.72-0.95)	0.006
Obesity	39.63 (37.81-41.39)	40.15 (38.38-41.87)	0.97 (0.91-1.04)	0.39
Other pain	18.09 (16.60-19.56)	20.01 (18.50-21.49)	0.90 (0.81-0.99)	0.03
Oxygen requirement	11.81 (10.73-12.88)	13.83 (12.75-14.90)	0.83 (0.75-0.92)	0.0002
Peripheral neuropathy	8.83 (7.77-9.87)	9.10 (8.06-10.13)	0.93 (0.81-1.07)	0.29
Psychotic disorder	4.36 (3.72-5.00)	5.62 (4.92-6.30)	0.75 (0.63-0.89)	0.0008
Respiratory failure	10.28 (9.32-11.23)	13.95 (12.94-14.94)	0.70 (0.63-0.78)	<0.0001
Seizures	5.15 (4.39-5.90)	6.29 (5.54-7.04)	0.73 (0.62-0.86)	0.0001

Sleep disorders	23.00 (21.34-24.62)	23.04 (21.52-24.53)	0.95 (0.88-1.04)	0.29
Type 2 diabetes mellitus	27.63 (26.10-29.13)	27.43 (25.99-28.85)	0.97 (0.90-1.05)	0.45
Urticaria	4.34 (3.67-5.00)	5.05 (4.41-5.69)	0.77 (0.65-0.92)	0.004

Table A9 – P-values for the test of proportional hazards (obtained using the generalized Schoenfeld test) for the primary analysis. A value lower than 0.05 indicates evidence for non-proportional hazards.

Outcome	p-value for the proportionality assumption
Abdominal symptoms	0.35
Abnormal breathing	0.49
Anosmia	0.025
Anxiety disorder	0.96
Anxiety/Depression	0.85
Arrhythmia	0.88
Cardiac failure	0.63
Cardiomyopathy	0.13
Cerebral haemorrhage	0.029
Chest/Throat pain	0.29
Cognitive symptoms	0.79
Coronary disease	0.064
Death	0.011
Fatigue	0.009
GORD	0.62
Hair loss	0.082
Headache	0.54
Hospitalisation	0.052
Hypercoagulopathy/DVT/PE	0.62
Hyperlipidaemia	0.12
Hypertension	0.85
Hypoxaemia	0.76
ICU admission	0.13
Interstitial lung disease	0.49
Intubation/Ventilation	0.075
Ischaemic stroke	0.054
Joint pain	0.16
Kidney disease	0.0053
Liver disease	0.83
Long COVID feature (any)	0.0047
Mood disorder	0.81
Myalgia	0.082
Myocarditis	0.016
Myoneural junction/muscle disease	0.08
Nerve/nerve root/plexus disorder	0.00018
Obesity	0.4
Other pain	0.72
Oxygen requirement	0.72
Peripheral neuropathy	0.052

Psychotic disorder	0.14
Respiratory failure	0.48
Seizures	0.019
Sleep disorders	0.5
Type 2 diabetes mellitus	0.99
Urticaria	0.0083

Table A10 – Percent incidences and HRs (95% CI) for all outcomes (each as part of a composite endpoint with death as the other component) in the matched vaccinated (2 doses only) and unvaccinated cohorts ($n=6957$ individuals in each cohort).

Outcome	Incidence % (95% CI) in vaccinated cohort	Incidence % (95% CI) in unvaccinated cohort	HR (95% CI)	p-value
Abdominal symptoms	20.08 (18.06-22.04)	21.07 (18.99-23.09)	1.00 (0.89-1.12)	0.99
Abnormal breathing	24.41 (22.42-26.35)	25.29 (23.53-27.01)	0.89 (0.81-0.98)	0.01
Anosmia	4.13 (3.24-5.02)	5.36 (4.56-6.15)	0.68 (0.55-0.84)	0.0004
Anxiety disorder	22.96 (21.05-24.82)	25.15 (23.06-27.19)	1.00 (0.90-1.10)	0.93
Anxiety/Depression	31.04 (28.75-33.26)	32.27 (29.94-34.52)	1.03 (0.94-1.12)	0.55
Arrhythmia	20.47 (18.83-22.07)	23.37 (21.53-25.16)	0.90 (0.81-0.99)	0.03
Cardiac failure	13.83 (12.26-15.36)	14.84 (13.31-16.34)	0.95 (0.84-1.07)	0.37
Cardiomyopathy	8.79 (7.47-10.10)	9.22 (8.07-10.36)	0.85 (0.72-0.99)	0.04
Cerebral haemorrhage	3.83 (3.10-4.55)	5.35 (4.54-6.16)	0.69 (0.56-0.85)	0.0005
Chest/Throat pain	16.72 (14.56-18.82)	16.67 (14.94-18.37)	0.92 (0.82-1.04)	0.2
Cognitive symptoms	11.94 (10.49-13.37)	12.95 (11.68-14.21)	0.87 (0.76-0.99)	0.04
Coronary disease	8.90 (7.32-10.46)	7.90 (6.84-8.95)	0.85 (0.72-1.01)	0.06
Death	3.35 (2.66-4.03)	4.98 (4.21-5.74)	0.62 (0.49-0.78)	<0.0001
Fatigue	20.75 (18.41-23.03)	20.33 (18.62-22.01)	0.86 (0.77-0.96)	0.005
GORD	26.94 (24.68-29.14)	25.64 (23.55-27.68)	1.02 (0.93-1.13)	0.65
Hair loss	4.63 (3.75-5.49)	6.64 (5.66-7.62)	0.66 (0.54-0.81)	<0.0001
Headache	16.13 (14.43-17.80)	15.62 (14.01-17.20)	1.00 (0.88-1.13)	0.95
Hospitalisation	18.59 (16.93-20.21)	19.57 (18.17-20.94)	0.91 (0.83-1.00)	0.04
Hypercoagulopathy/DVT/PE	9.91 (8.63-11.18)	11.81 (10.45-13.14)	0.80 (0.70-0.92)	0.002
Hyperlipidaemia	49.72 (46.64-52.63)	44.74 (42.33-47.06)	1.05 (0.98-1.13)	0.17
Hypertension	57.88 (54.73-60.82)	52.55 (50.08-54.89)	1.05 (0.98-1.12)	0.15
Hypoxaemia	10.65 (9.27-12.02)	14.82 (13.49-16.14)	0.66 (0.58-0.74)	<0.0001
ICU admission	6.24 (5.30-7.18)	8.21 (7.25-9.16)	0.72 (0.61-0.85)	<0.0001
Interstitial lung disease	5.97 (5.00-6.93)	8.24 (7.16-9.32)	0.74 (0.62-0.88)	0.0006
Intubation/Ventilation	4.20 (3.45-4.95)	6.22 (5.38-7.05)	0.63 (0.52-0.76)	<0.0001
Ischaemic stroke	6.77 (5.68-7.85)	8.14 (7.05-9.23)	0.77 (0.64-0.91)	0.002
Joint pain	21.07 (18.84-23.23)	22.55 (20.40-24.63)	0.91 (0.81-1.02)	0.11
Kidney disease	19.24 (17.48-20.96)	19.80 (18.14-21.44)	0.97 (0.87-1.07)	0.52
Liver disease	10.69 (9.37-11.99)	11.84 (10.50-13.16)	0.93 (0.81-1.07)	0.31
Long COVID feature (any)	64.94 (62.30-67.40)	65.63 (63.08-68.01)	1.00 (0.95-1.06)	0.98
Mood disorder	22.55 (20.30-24.75)	21.84 (19.83-23.81)	1.03 (0.92-1.14)	0.63
Myalgia	6.37 (5.32-7.41)	9.27 (7.98-10.53)	0.70 (0.59-0.84)	<0.0001
Myocarditis	3.49 (2.79-4.18)	5.08 (4.31-5.85)	0.64 (0.51-0.80)	<0.0001
Myoneural junction/muscle disease	4.15 (3.40-4.89)	6.01 (5.12-6.89)	0.67 (0.54-0.82)	<0.0001
Nerve/nerve root/plexus disorder	7.66 (6.43-8.88)	8.69 (7.51- 9.86)	0.78 (0.66-0.92)	0.003
Obesity	37.16 (34.83-39.40)	37.27 (35.09-39.38)	0.97 (0.89-1.04)	0.37
Other pain	17.75 (15.86-19.60)	21.22 (19.16-23.23)	0.85 (0.76-0.96)	0.007
Oxygen requirement	10.84 (9.60-12.07)	14.00 (12.65-15.33)	0.75 (0.67-0.85)	<0.0001
Peripheral neuropathy	8.27 (7.04-9.48)	9.54 (8.18-10.88)	0.82 (0.70-0.97)	0.02
Psychotic disorder	4.11 (3.33-4.88)	6.00 (5.07-6.93)	0.65 (0.52-0.79)	<0.0001
Respiratory failure	10.12 (8.80-11.42)	14.76 (13.40-16.10)	0.63 (0.56-0.71)	<0.0001
Seizures	5.13 (4.12-6.14)	6.59 (5.67-7.50)	0.67 (0.55-0.82)	<0.0001

Sleep disorders	22.85 (20.60-25.03)	22.92 (20.89-24.89)	0.96 (0.86-1.06)	0.41
Type 2 diabetes mellitus	28.89 (26.80-30.92)	28.23 (26.29-30.12)	1.03 (0.94-1.12)	0.55
Urticaria	3.98 (3.20-4.76)	5.58 (4.75-6.41)	0.65 (0.52-0.80)	<0.0001

Table A11 – Percent incidences and HRs (95% CI) for all outcomes (each as part of a composite endpoint with death as the other component) in the matched vaccinated (1 dose only) and unvaccinated cohorts ($n=2996$ individuals in each cohort).

Outcome	Incidence % (95% CI) in vaccinated cohort	Incidence % (95% CI) in unvaccinated cohort	HR (95% CI)	p-value
Abdominal symptoms	18.87 (16.84-20.86)	19.11 (17.03-21.14)	0.97 (0.83-1.12)	0.65
Abnormal breathing	24.32 (22.24-26.35)	24.23 (22.07-26.34)	1.00 (0.88-1.13)	0.95
Anosmia	3.82 (2.99-4.64)	5.16 (4.10-6.22)	0.82 (0.62-1.09)	0.17
Anxiety disorder	24.47 (22.25-26.62)	25.86 (23.52-28.14)	0.95 (0.84-1.08)	0.43
Anxiety/Depression	30.36 (28.03-32.61)	31.91 (29.49-34.24)	0.96 (0.85-1.07)	0.43
Arrhythmia	20.26 (18.38-22.09)	21.04 (19.09-22.95)	0.96 (0.84-1.09)	0.5
Cardiac failure	12.46 (10.99-13.90)	12.72 (11.12-14.30)	1.01 (0.86-1.20)	0.86
Cardiomyopathy	7.21 (6.04-8.36)	7.21 (5.99-8.42)	1.02 (0.81-1.27)	0.88
Cerebral haemorrhage	3.68 (2.89-4.47)	5.06 (3.97-6.14)	0.82 (0.61-1.09)	0.17
Chest/Throat pain	15.23 (13.32-17.09)	14.74 (12.91-16.53)	1.03 (0.87-1.21)	0.75
Cognitive symptoms	10.92 (9.49-12.32)	13.61 (11.87-15.31)	0.81 (0.68-0.97)	0.02
Coronary disease	6.56 (5.41-7.71)	6.84 (5.60-8.05)	0.95 (0.75-1.20)	0.67
Death	2.95 (2.26-3.63)	4.73 (3.70-5.74)	0.72 (0.53-0.98)	0.03
Fatigue	18.28 (16.25-20.25)	18.93 (17.04-20.78)	0.87 (0.76-1.01)	0.07
GORD	25.14 (22.87-27.33)	26.09 (23.65-28.44)	0.99 (0.87-1.12)	0.84
Hair loss	4.59 (3.65-5.53)	6.75 (5.46-8.02)	0.74 (0.57-0.97)	0.03
Headache	15.92 (14.10-17.71)	15.47 (13.48-17.41)	1.12 (0.95-1.32)	0.16
Hospitalisation	17.99 (16.41-19.54)	20.57 (18.75-22.35)	0.90 (0.80-1.02)	0.11
Hypercoagulopathy/DVT/PE	8.68 (7.45- 9.89)	10.45 (8.99-11.89)	0.88 (0.73-1.07)	0.19
Hyperlipidaemia	42.91 (40.19-45.50)	44.36 (41.50-47.08)	0.98 (0.89-1.08)	0.72
Hypertension	51.16 (48.45-53.72)	53.90 (50.96-56.68)	0.98 (0.90-1.07)	0.64
Hypoxaemia	10.58 (9.30-11.83)	13.50 (12.01-14.96)	0.78 (0.66-0.92)	0.003
ICU admission	5.51 (4.58-6.42)	7.98 (6.72-9.22)	0.72 (0.58-0.90)	0.004
Interstitial lung disease	5.10 (4.15-6.05)	6.69 (5.56-7.80)	0.79 (0.62-1.00)	0.05
Intubation/Ventilation	3.75 (2.97-4.52)	5.67 (4.59-6.74)	0.71 (0.54-0.93)	0.01
Ischaemic stroke	6.32 (5.20-7.43)	6.73 (5.47-7.97)	0.99 (0.78-1.25)	0.92
Joint pain	19.96 (17.75-22.12)	21.00 (18.71-23.22)	0.95 (0.82-1.10)	0.52
Kidney disease	16.05 (14.39-17.68)	19.78 (17.80-21.70)	0.86 (0.74-0.99)	0.03
Liver disease	9.17 (7.84-10.48)	10.18 (8.75-11.60)	0.91 (0.75-1.10)	0.33
Long COVID feature (any)	64.33 (61.54-66.92)	66.26 (63.46-68.85)	0.96 (0.89-1.03)	0.24
Mood disorder	20.17 (18.09-22.19)	21.27 (19.21-23.29)	0.93 (0.81-1.07)	0.31
Myalgia	5.41 (4.32-6.48)	7.39 (6.04-8.72)	0.75 (0.59-0.97)	0.03
Myocarditis	3.24 (2.51-3.96)	4.94 (3.84-6.03)	0.77 (0.57-1.04)	0.09
Myoneural junction/muscle disease	3.58 (2.79-4.37)	4.98 (3.97-5.99)	0.77 (0.57-1.02)	0.07
Nerve/nerve root/plexus disorder	7.04 (5.76-8.30)	8.79 (7.32-10.25)	0.81 (0.64-1.01)	0.06
Obesity	42.08 (39.50-44.55)	43.89 (41.17-46.48)	0.98 (0.89-1.08)	0.7
Other pain	17.97 (15.91-19.99)	19.43 (17.27-21.53)	0.87 (0.75-1.01)	0.07
Oxygen requirement	11.61 (10.14-13.06)	13.54 (11.99-15.05)	0.84 (0.71-0.99)	0.04
Peripheral neuropathy	7.96 (6.68-9.22)	7.88 (6.50-9.24)	1.05 (0.84-1.31)	0.67
Psychotic disorder	3.61 (2.85-4.36)	5.98 (4.87-7.08)	0.65 (0.49-0.85)	0.002
Respiratory failure	9.68 (8.44-10.89)	12.89 (11.40-14.36)	0.75 (0.64-0.89)	0.001
Seizures	4.43 (3.54-5.32)	6.16 (5.07-7.25)	0.71 (0.55-0.92)	0.009

Sleep disorders	21.74 (19.59-23.83)	22.26 (20.01-24.45)	0.96 (0.84-1.10)	0.57
Type 2 diabetes mellitus	25.56 (23.54-27.53)	27.02 (24.85-29.13)	0.95 (0.85-1.07)	0.41
Urticaria	3.78 (2.95-4.60)	5.11 (4.02-6.19)	0.81 (0.60-1.08)	0.14

Table A12 – HRs (95% CI) for outcomes (each as part of a composite endpoint with death as the other component) comparing vaccinated (1 dose only) to unvaccinated individuals ($n=2996$ in each group), and vaccinated (2 doses only) to unvaccinated individuals ($n=6957$ in each group), both identical to those presented in Table S8 and S9 respectively, as well as their ratio (95% CI) obtained by fitting an interaction term in the Cox model, and the p-value for the test of the null hypothesis that the latter ratio is equal to 1.

Outcome	HR (95% CI) in the 1-dose cohort	HR (95% CI) in the 2-dose cohort	Ratio between HR (95% CI)	p-value
Abdominal symptoms	0.97 (0.83-1.12)	1.00 (0.89-1.12)	0.97 (0.81-1.16)	0.73
Abnormal breathing	1.00 (0.88-1.13)	0.89 (0.81-0.98)	1.12 (0.96-1.31)	0.16
Anosmia	0.82 (0.62-1.09)	0.68 (0.55-0.84)	1.20 (0.84-1.70)	0.32
Anxiety disorder	0.95 (0.84-1.08)	1.00 (0.90-1.10)	0.96 (0.81-1.12)	0.57
Anxiety/Depression	0.96 (0.85-1.07)	1.03 (0.94-1.12)	0.93 (0.81-1.07)	0.32
Arrhythmia	0.96 (0.84-1.09)	0.90 (0.81-0.99)	1.06 (0.90-1.25)	0.46
Cardiac failure	1.01 (0.86-1.20)	0.95 (0.84-1.07)	1.07 (0.87-1.32)	0.51
Cardiomyopathy	1.02 (0.81-1.27)	0.85 (0.72-0.99)	1.20 (0.91-1.58)	0.19
Cerebral haemorrhage	0.82 (0.61-1.09)	0.69 (0.56-0.85)	1.19 (0.83-1.70)	0.35
Chest/Throat pain	1.03 (0.87-1.21)	0.92 (0.82-1.04)	1.11 (0.91-1.36)	0.31
Cognitive symptoms	0.81 (0.68-0.97)	0.87 (0.76-0.99)	0.93 (0.75-1.16)	0.54
Coronary disease	0.95 (0.75-1.20)	0.85 (0.72-1.01)	1.11 (0.84-1.49)	0.46
Death	0.72 (0.53-0.98)	0.62 (0.49-0.78)	1.16 (0.79-1.69)	0.46
Fatigue	0.87 (0.76-1.01)	0.86 (0.77-0.96)	1.02 (0.85-1.22)	0.84
GORD	0.99 (0.87-1.12)	1.02 (0.93-1.13)	0.96 (0.82-1.13)	0.65
Hair loss	0.74 (0.57-0.97)	0.66 (0.54-0.81)	1.13 (0.81-1.58)	0.47
Headache	1.12 (0.95-1.32)	1.00 (0.88-1.13)	1.12 (0.92-1.38)	0.26
Hospitalisation	0.90 (0.80-1.02)	0.91 (0.83-1.00)	0.99 (0.85-1.16)	0.9
Hypercoagulopathy/DVT/PE	0.88 (0.73-1.07)	0.80 (0.70-0.92)	1.09 (0.86-1.39)	0.46
Hyperlipidaemia	0.98 (0.89-1.08)	1.05 (0.98-1.13)	0.93 (0.83-1.05)	0.26
Hypertension	0.98 (0.90-1.07)	1.05 (0.98-1.12)	0.93 (0.84-1.04)	0.22
Hypoxaemia	0.78 (0.66-0.92)	0.66 (0.58-0.74)	1.18 (0.96-1.45)	0.11
ICU admission	0.72 (0.58-0.90)	0.72 (0.61-0.85)	1.00 (0.76-1.32)	0.99
Interstitial lung disease	0.79 (0.62-1.00)	0.74 (0.62-0.88)	1.07 (0.79-1.45)	0.65
Intubation/Ventilation	0.71 (0.54-0.93)	0.63 (0.52-0.76)	1.12 (0.80-1.56)	0.5
Ischaemic stroke	0.99 (0.78-1.25)	0.77 (0.64-0.91)	1.28 (0.96-1.72)	0.098
Joint pain	0.95 (0.82-1.10)	0.91 (0.81-1.02)	1.04 (0.87-1.26)	0.65
Kidney disease	0.86 (0.74-0.99)	0.97 (0.87-1.07)	0.88 (0.74-1.05)	0.17
Liver disease	0.91 (0.75-1.10)	0.93 (0.81-1.07)	0.98 (0.77-1.24)	0.85
Long COVID feature (any)	0.96 (0.89-1.03)	1.00 (0.95-1.06)	0.96 (0.87-1.05)	0.34
Mood disorder	0.93 (0.81-1.07)	1.03 (0.92-1.14)	0.91 (0.76-1.08)	0.27
Myalgia	0.75 (0.59-0.97)	0.70 (0.59-0.84)	1.08 (0.79-1.46)	0.63
Myocarditis	0.77 (0.57-1.04)	0.64 (0.51-0.80)	1.21 (0.84-1.76)	0.31
Myoneural junction/muscle disease	0.77 (0.57-1.02)	0.67 (0.54-0.82)	1.15 (0.81-1.63)	0.45
Nerve/nerve root/plexus disorder	0.81 (0.64-1.01)	0.78 (0.66-0.92)	1.04 (0.78-1.37)	0.8
Obesity	0.98 (0.89-1.08)	0.97 (0.89-1.04)	1.02 (0.90-1.15)	0.78
Other pain	0.87 (0.75-1.01)	0.85 (0.76-0.96)	1.02 (0.84-1.23)	0.84
Oxygen requirement	0.84 (0.71-0.99)	0.75 (0.67-0.85)	1.11 (0.91-1.36)	0.31
Peripheral neuropathy	1.05 (0.84-1.31)	0.82 (0.70-0.97)	1.28 (0.97-1.69)	0.082
Psychotic disorder	0.65 (0.49-0.85)	0.65 (0.52-0.79)	1.01 (0.71-1.42)	0.97

Respiratory failure	0.75 (0.64-0.89)	0.63 (0.56-0.71)	1.20 (0.97-1.48)	0.098
Seizures	0.71 (0.55-0.92)	0.67 (0.55-0.82)	1.05 (0.76-1.46)	0.76
Sleep disorders	0.96 (0.84-1.10)	0.96 (0.86-1.06)	1.00 (0.85-1.19)	0.97
Type 2 diabetes mellitus	0.95 (0.85-1.07)	1.03 (0.94-1.12)	0.93 (0.80-1.07)	0.32
Urticaria	0.81 (0.60-1.08)	0.65 (0.52-0.80)	1.24 (0.87-1.78)	0.23

Table A13 – Percent incidences and HRs (95% CI) for all outcomes (each as part of a composite endpoint with death as the other component) in the matched vaccinated (infected 2 weeks to 4 months after the first vaccine dose) and unvaccinated cohorts ($n=5985$ individuals in each cohort).

Outcome	Incidence % (95% CI) in vaccinated cohort	Incidence % (95% CI) in unvaccinated cohort	HR (95% CI)	p-value
Abdominal symptoms	22.55 (21.35-23.74)	19.69 (18.53-20.83)	1.20 (1.10-1.30)	<0.0001
Abnormal breathing	24.89 (23.65-26.10)	24.16 (22.94-25.37)	1.04 (0.96-1.13)	0.29
Anosmia	3.78 (3.24-4.32)	4.65 (4.06-5.24)	0.80 (0.66-0.97)	0.02
Anxiety disorder	23.72 (22.49-24.94)	21.16 (19.97-22.33)	1.14 (1.05-1.24)	0.002
Anxiety/Depression	31.70 (30.35-33.02)	28.41 (27.09-29.71)	1.17 (1.09-1.26)	<0.0001
Arrhythmia	21.38 (20.21-22.54)	19.49 (18.36-20.60)	1.10 (1.01-1.20)	0.03
Cardiac failure	13.16 (12.21-14.09)	12.23 (11.31-13.15)	1.09 (0.98-1.22)	0.11
Cardiomyopathy	7.66 (6.91-8.41)	7.52 (6.78-8.27)	1.03 (0.89-1.18)	0.72
Cerebral haemorrhage	4.64 (4.05-5.23)	5.14 (4.52-5.75)	0.89 (0.74-1.06)	0.18
Chest/Throat pain	18.30 (17.19-19.40)	16.89 (15.81-17.96)	1.11 (1.01-1.22)	0.02
Cognitive symptoms	13.06 (12.10-14.02)	12.62 (11.67-13.56)	1.04 (0.93-1.16)	0.48
Coronary disease	7.08 (6.36-7.79)	6.93 (6.22-7.64)	1.03 (0.89-1.19)	0.72
Death	3.48 (2.96-4.00)	4.38 (3.81-4.95)	0.77 (0.63-0.94)	0.01
Fatigue	19.77 (18.62-20.91)	19.48 (18.33-20.61)	1.03 (0.94-1.12)	0.58
GORD	23.48 (22.25-24.69)	21.54 (20.34-22.71)	1.12 (1.03-1.22)	0.009
Hair loss	5.21 (4.56-5.85)	6.45 (5.74-7.15)	0.78 (0.66-0.93)	0.004
Headache	16.73 (15.66-17.79)	15.18 (14.15-16.20)	1.12 (1.01-1.23)	0.03
Hospitalisation	14.83 (13.86-15.79)	15.96 (14.95-16.96)	0.94 (0.85-1.03)	0.2
Hypercoagulopathy/DVT/PE	10.76 (9.89-11.62)	11.28 (10.39-12.17)	0.96 (0.86-1.08)	0.51
Hyperlipidaemia	39.01 (37.56-40.42)	35.23 (33.83-36.61)	1.15 (1.07-1.23)	<0.0001
Hypertension	45.77 (44.30-47.21)	42.11 (40.66-43.52)	1.14 (1.07-1.21)	<0.0001
Hypoxaemia	10.52 (9.66-11.37)	14.44 (13.46-15.40)	0.71 (0.64-0.79)	<0.0001
ICU admission	5.60 (4.95-6.24)	7.01 (6.30-7.71)	0.77 (0.66-0.90)	0.001
Interstitial lung disease	5.48 (4.84-6.12)	6.74 (6.03-7.44)	0.80 (0.68-0.94)	0.006
Intubation/Ventilation	4.23 (3.66-4.79)	5.51 (4.88-6.14)	0.74 (0.62-0.88)	0.0008
Ischaemic stroke	6.43 (5.74-7.11)	6.91 (6.19-7.62)	0.92 (0.79-1.08)	0.31
Joint pain	20.02 (18.84-21.18)	18.57 (17.42-19.71)	1.10 (1.00-1.21)	0.04
Kidney disease	16.99 (15.93-18.04)	16.33 (15.28-17.36)	1.05 (0.96-1.16)	0.3
Liver disease	10.39 (9.52-11.25)	9.26 (8.43-10.08)	1.14 (1.01-1.30)	0.04
Long COVID feature (any)	60.40 (58.95-61.80)	59.42 (57.95-60.84)	1.06 (1.01-1.12)	0.02
Mood disorder	22.84 (21.62-24.03)	19.74 (18.59-20.88)	1.18 (1.08-1.29)	0.0002
Myalgia	8.28 (7.49-9.06)	8.04 (7.26-8.80)	1.02 (0.89-1.17)	0.76
Myocarditis	3.71 (3.17-4.24)	4.67 (4.08-5.26)	0.77 (0.64-0.94)	0.009
Myoneural junction/muscle disease	4.29 (3.72-4.86)	5.14 (4.52-5.75)	0.82 (0.68-0.99)	0.03
Nerve/nerve root/plexus disorder	6.78 (6.05-7.51)	7.63 (6.87-8.38)	0.86 (0.74-1.00)	0.05
Obesity	37.80 (36.41-39.17)	34.31 (32.94-35.65)	1.13 (1.06-1.20)	0.0003
Other pain	21.89 (20.70-23.06)	19.32 (18.19-20.45)	1.19 (1.09-1.30)	<0.0001
Oxygen requirement	12.24 (11.33-13.15)	13.76 (12.80-14.71)	0.88 (0.79-0.98)	0.02
Peripheral neuropathy	7.41 (6.66-8.15)	7.70 (6.93-8.46)	0.96 (0.83-1.11)	0.56
Psychotic disorder	4.48 (3.90-5.07)	5.30 (4.67-5.93)	0.83 (0.69-0.99)	0.04
Respiratory failure	9.37 (8.56-10.17)	13.16 (12.22-14.09)	0.70 (0.62-0.79)	<0.0001
Seizures	5.26 (4.62-5.89)	6.33 (5.63-7.02)	0.82 (0.69-0.97)	0.02

Sleep disorders	20.73 (19.55-21.88)	19.37 (18.22-20.51)	1.10 (1.00-1.20)	0.04
Type 2 diabetes mellitus	23.98 (22.75-25.18)	22.05 (20.87-23.21)	1.09 (1.01-1.19)	0.03
Urticaria	4.60 (4.01-5.20)	5.22 (4.59-5.84)	0.86 (0.72-1.03)	0.09

Table A14 – Percent incidences and HRs (95% CI) for all outcomes (each as part of a composite endpoint with death as the other component) in the matched vaccinated (infected >4 months after the first vaccine dose) and unvaccinated cohorts (*n*=6431 individuals in each cohort).

Outcome	Incidence % (95% CI) in vaccinated cohort	Incidence % (95% CI) in unvaccinated cohort	HR (95% CI)	p-value
Abdominal symptoms	16.62 (15.18-18.04)	16.45 (15.06-17.82)	1.00 (0.91-1.11)	0.93
Abnormal breathing	20.94 (19.34-22.51)	20.36 (18.77-21.91)	1.03 (0.94-1.12)	0.56
Anosmia	0.52 (0.25-0.78)	0.56 (0.29-0.82)	0.91 (0.51-1.63)	0.76
Anxiety disorder	19.43 (17.92-20.91)	18.59 (17.17-20.00)	1.04 (0.95-1.15)	0.39
Anxiety/Depression	26.43 (24.69-28.13)	25.50 (23.84-27.13)	1.04 (0.96-1.13)	0.33
Arrhythmia	17.47 (16.18-18.74)	17.94 (16.53-19.33)	1.00 (0.91-1.10)	0.94
Cardiac failure	8.79 (7.89- 9.69)	8.84 (7.90- 9.76)	1.00 (0.88-1.15)	0.96
Cardiomyopathy	3.53 (2.70-4.36)	3.50 (2.61-4.37)	1.03 (0.82-1.30)	0.8
Cerebral haemorrhage	0.89 (0.62-1.15)	0.75 (0.50-0.99)	1.19 (0.77-1.83)	0.43
Chest/Throat pain	12.77 (11.51-14.02)	12.13 (10.96-13.28)	1.04 (0.92-1.16)	0.56
Cognitive symptoms	9.57 (8.69-10.43)	9.48 (8.59-10.36)	1.02 (0.90-1.16)	0.76
Coronary disease	3.37 (2.82-3.92)	3.54 (2.95-4.12)	0.98 (0.79-1.22)	0.87
Death	3.50 (2.98-4.02)	3.69 (3.15-4.23)	0.95 (0.77-1.16)	0.61
Fatigue	16.52 (15.14-17.88)	16.59 (15.16-17.99)	1.00 (0.91-1.11)	0.98
GORD	20.47 (18.95-21.97)	19.95 (18.38-21.49)	1.05 (0.95-1.15)	0.33
Hair loss	2.11 (1.40-2.81)	1.80 (1.17-2.43)	1.21 (0.86-1.70)	0.27
Headache	11.44 (10.43-12.45)	10.56 (9.60-11.50)	1.07 (0.95-1.21)	0.28
Hospitalisation	11.85 (10.97-12.72)	11.60 (10.70-12.49)	1.03 (0.93-1.15)	0.58
Hypercoagulopathy/DVT/PE	6.55 (5.82-7.28)	6.59 (5.83-7.34)	1.01 (0.87-1.18)	0.9
Hyperlipidaemia	38.80 (36.93-40.62)	38.82 (36.88-40.70)	1.02 (0.95-1.09)	0.57
Hypertension	47.51 (45.53-49.42)	48.29 (46.11-50.37)	1.01 (0.95-1.07)	0.74
Hypoxaemia	8.30 (7.44-9.16)	8.19 (7.34-9.04)	1.02 (0.89-1.16)	0.82
ICU admission	2.97 (2.52-3.43)	2.91 (2.46-3.36)	1.02 (0.82-1.26)	0.88
Interstitial lung disease	1.65 (1.24-2.05)	1.58 (1.17-1.99)	1.06 (0.77-1.46)	0.72
Intubation/Ventilation	1.71 (1.36-2.06)	1.81 (1.45-2.17)	0.94 (0.71-1.25)	0.68
Ischaemic stroke	3.29 (2.73-3.84)	3.17 (2.62-3.72)	1.05 (0.84-1.31)	0.69
Joint pain	16.54 (15.06-18.00)	16.75 (15.12-18.36)	1.01 (0.91-1.13)	0.81
Kidney disease	14.26 (12.98-15.52)	14.23 (12.92-15.51)	1.01 (0.91-1.12)	0.89
Liver disease	5.89 (5.14-6.64)	5.99 (5.23-6.74)	0.99 (0.83-1.16)	0.87
Long COVID feature (any)	59.28 (57.22-61.24)	58.60 (56.59-60.52)	1.02 (0.96-1.07)	0.56
Mood disorder	16.91 (15.53-18.26)	16.23 (14.90-17.55)	1.05 (0.95-1.16)	0.36
Myalgia	4.26 (3.60-4.91)	4.16 (3.50-4.81)	1.02 (0.84-1.25)	0.81
Myocarditis	0.12 (0.02-0.21)	0.10 (0.01-0.19)	1.20 (0.37-3.94)	0.76
Myoneural junction/muscle disease	0.93 (0.60-1.25)	0.87 (0.56-1.19)	1.08 (0.70-1.65)	0.74
Nerve/nerve root/plexus disorder	3.67 (2.99-4.35)	3.52 (2.84-4.19)	1.04 (0.82-1.32)	0.73
Obesity	34.20 (32.34-36.01)	34.11 (32.12-36.04)	1.02 (0.95-1.09)	0.57
Other pain	16.10 (14.61-17.56)	16.79 (14.94-18.60)	1.01 (0.91-1.13)	0.79
Oxygen requirement	9.28 (8.31-10.23)	9.33 (8.36-10.28)	0.99 (0.87-1.12)	0.88
Peripheral neuropathy	3.75 (2.97-4.52)	3.87 (2.89-4.84)	1.04 (0.83-1.29)	0.75
Psychotic disorder	0.55 (0.32-0.79)	0.58 (0.34-0.82)	0.96 (0.56-1.64)	0.87
Respiratory failure	7.79 (7.01-8.57)	7.59 (6.82-8.36)	1.03 (0.90-1.17)	0.72
Seizures	1.50 (1.16-1.85)	1.47 (1.13-1.81)	1.01 (0.73-1.39)	0.97

Sleep disorders	17.29 (15.86-18.69)	17.23 (15.78-18.66)	1.01 (0.92-1.12)	0.83
Type 2 diabetes mellitus	21.36 (20.08-22.62)	21.71 (20.35-23.04)	1.01 (0.92-1.10)	0.88
Urticaria	0.99 (0.64-1.34)	0.90 (0.57-1.23)	1.11 (0.72-1.70)	0.64

Table A15 – Percent incidences and HRs (95% CI) for all outcomes (each as part of a composite endpoint with death as the other component) in the matched under-60 vaccinated and unvaccinated cohorts ($n=4633$ individuals in each cohort).

Outcome	Incidence % (95% CI) in vaccinated cohort	Incidence % (95% CI) in unvaccinated cohort	HR (95% CI)	p-value
Abdominal symptoms	20.00 (17.22-22.70)	19.22 (16.79-21.58)	0.99 (0.85-1.15)	0.87
Abnormal breathing	20.70 (18.38-22.96)	20.44 (18.46-22.37)	0.88 (0.77-1.00)	0.05
Anosmia	2.17 (1.25-3.09)	2.85 (2.06-3.62)	0.62 (0.42-0.92)	0.02
Anxiety disorder	26.49 (23.85-29.03)	22.32 (20.20-24.37)	1.12 (1.00-1.27)	0.06
Anxiety/Depression	32.49 (29.71-35.16)	29.02 (26.48-31.47)	1.09 (0.97-1.21)	0.14
Arrhythmia	12.48 (10.69-14.25)	11.92 (10.41-13.41)	0.91 (0.77-1.08)	0.28
Cardiac failure	5.39 (4.16-6.60)	5.88 (4.86-6.90)	0.85 (0.67-1.08)	0.19
Cardiomyopathy	5.27 (3.77-6.74)	3.95 (3.11-4.78)	1.00 (0.75-1.32)	1
Cerebral haemorrhage	1.37 (0.84-1.89)	2.50 (1.83-3.18)	0.47 (0.31-0.73)	0.0004
Chest/Throat pain	14.68 (12.10-17.18)	14.26 (12.24-16.23)	0.91 (0.77-1.08)	0.27
Cognitive symptoms	5.32 (4.13-6.50)	6.19 (4.93-7.42)	0.82 (0.64-1.06)	0.13
Coronary disease	2.71 (1.68-3.72)	3.28 (2.49-4.05)	0.60 (0.42-0.86)	0.004
Death	1.17 (0.67-1.68)	2.25 (1.60-2.89)	0.43 (0.26-0.68)	0.0002
Fatigue	15.49 (13.03-17.89)	12.98 (11.22-14.70)	0.96 (0.81-1.13)	0.61
GORD	21.81 (19.01-24.51)	19.08 (16.72-21.38)	1.08 (0.94-1.25)	0.29
Hair loss	2.87 (2.05-3.69)	4.88 (3.75-5.99)	0.59 (0.42-0.81)	0.001
Headache	18.14 (15.70-20.51)	17.76 (15.58-19.88)	1.03 (0.89-1.20)	0.69
Hospitalisation	9.84 (8.44-11.23)	11.63 (10.31-12.93)	0.81 (0.70-0.94)	0.006
Hypercoagulopathy/DVT/PE	5.84 (4.51-7.15)	6.92 (5.78-8.04)	0.72 (0.57-0.90)	0.004
Hyperlipidaemia	27.45 (24.67-30.13)	27.44 (24.75-30.04)	1.01 (0.90-1.14)	0.83
Hypertension	35.59 (32.45-38.58)	35.02 (32.27-37.66)	0.97 (0.88-1.08)	0.56
Hypoxaemia	6.01 (4.67-7.32)	8.93 (7.75-10.10)	0.52 (0.42-0.64)	<0.0001
ICU admission	2.83 (1.90-3.75)	4.53 (3.61-5.43)	0.50 (0.38-0.68)	<0.0001
Interstitial lung disease	2.42 (1.76-3.08)	4.38 (3.43-5.32)	0.55 (0.40-0.75)	0.0002
Intubation/Ventilation	1.87 (1.11-2.62)	3.02 (2.32-3.73)	0.48 (0.33-0.69)	<0.0001
Ischaemic stroke	2.13 (1.46-2.79)	3.42 (2.52-4.31)	0.62 (0.44-0.89)	0.008
Joint pain	18.92 (16.13-21.63)	17.94 (15.50-20.31)	1.01 (0.86-1.18)	0.93
Kidney disease	8.45 (7.23- 9.66)	10.50 (8.97-12.00)	0.86 (0.71-1.02)	0.09
Liver disease	8.42 (6.73-10.08)	7.99 (6.65-9.31)	0.93 (0.75-1.15)	0.5
Long COVID feature (any)	62.45 (59.19-65.46)	61.90 (58.90-64.67)	0.97 (0.90-1.05)	0.45
Mood disorder	21.85 (19.19-24.43)	18.68 (16.28-21.01)	1.15 (1.00-1.33)	0.04
Myalgia	4.45 (3.23-5.66)	5.58 (4.47-6.68)	0.65 (0.49-0.86)	0.002
Myocarditis	1.42 (0.87-1.98)	2.41 (1.74-3.08)	0.49 (0.32-0.76)	0.001
Myoneural junction/muscle disease	1.68 (1.10-2.27)	2.70 (2.00-3.39)	0.55 (0.37-0.82)	0.003
Nerve/nerve root/plexus disorder	5.00 (3.64-6.34)	6.17 (4.89-7.43)	0.68 (0.52-0.89)	0.005
Obesity	40.91 (37.97-43.71)	43.94 (40.91-46.82)	0.95 (0.87-1.05)	0.32
Other pain	14.96 (12.77-17.09)	14.75 (12.69-16.77)	0.97 (0.82-1.14)	0.71
Oxygen requirement	6.75 (5.36-8.12)	8.09 (6.91-9.26)	0.67 (0.54-0.82)	<0.0001
Peripheral neuropathy	4.22 (3.05-5.38)	4.12 (3.09-5.14)	0.86 (0.63-1.18)	0.34
Psychotic disorder	2.07 (1.28-2.85)	3.47 (2.63-4.30)	0.50 (0.35-0.72)	0.0001
Respiratory failure	4.85 (3.78-5.91)	8.26 (7.16-9.35)	0.48 (0.39-0.60)	<0.0001
Seizures	2.41 (1.55-3.27)	4.09 (3.21-4.95)	0.45 (0.32-0.64)	<0.0001

Sleep disorders	20.24 (17.65-22.75)	16.44 (14.34-18.48)	1.06 (0.92-1.23)	0.41
Type 2 diabetes mellitus	19.11 (16.92-21.23)	18.24 (16.24-20.19)	1.00 (0.87-1.14)	0.98
Urticaria	1.85 (1.13-2.57)	2.84 (2.07-3.60)	0.51 (0.34-0.77)	0.0009

Table A16 – Percent incidences and HRs (95% CI) for all outcomes (each as part of a composite endpoint with death as the other component) in the matched over-60 vaccinated and unvaccinated cohorts ($n=4657$ individuals in each cohort).

Outcome	Incidence % (95% CI) in vaccinated cohort	Incidence % (95% CI) in unvaccinated cohort	HR (95% CI)	p-value
Abdominal symptoms	20.55 (18.69-22.37)	20.14 (18.15-22.08)	1.13 (1.00-1.27)	0.05
Abnormal breathing	28.86 (26.75-30.92)	29.70 (27.46-31.87)	1.01 (0.91-1.11)	0.86
Anosmia	5.99 (5.06-6.91)	6.93 (5.80-8.06)	0.93 (0.76-1.13)	0.45
Anxiety disorder	24.22 (22.07-26.30)	22.26 (20.23-24.23)	1.11 (0.99-1.25)	0.07
Anxiety/Depression	33.16 (30.81-35.43)	30.76 (28.48-32.97)	1.12 (1.02-1.23)	0.02
Arrhythmia	28.63 (26.59-30.61)	28.61 (26.52-30.65)	1.04 (0.94-1.14)	0.46
Cardiac failure	20.44 (18.63-22.21)	19.33 (17.61-21.00)	1.09 (0.97-1.22)	0.15
Cardiomyopathy	11.26 (9.80-12.70)	12.33 (10.81-13.82)	0.96 (0.82-1.12)	0.6
Cerebral haemorrhage	6.53 (5.55-7.50)	7.42 (6.20-8.61)	0.97 (0.80-1.18)	0.77
Chest/Throat pain	18.57 (16.64-20.45)	18.41 (16.55-20.23)	1.04 (0.91-1.18)	0.58
Cognitive symptoms	17.50 (15.81-19.17)	17.75 (16.08-19.39)	1.00 (0.89-1.14)	0.96
Coronary disease	11.98 (10.44-13.50)	10.51 (9.11-11.89)	1.10 (0.94-1.29)	0.22
Death	5.68 (4.78-6.57)	6.68 (5.56-7.79)	0.91 (0.74-1.12)	0.38
Fatigue	23.59 (21.53-25.60)	24.61 (22.53-26.63)	0.92 (0.83-1.03)	0.14
GORD	29.99 (27.75-32.15)	30.57 (28.30-32.77)	1.02 (0.93-1.13)	0.64
Hair loss	7.14 (6.04-8.23)	7.99 (6.76-9.20)	0.91 (0.75-1.10)	0.32
Headache	14.51 (12.87-16.11)	15.52 (13.73-17.28)	0.98 (0.85-1.13)	0.75
Hospitalisation	24.91 (23.24-26.54)	25.14 (23.42-26.82)	1.03 (0.94-1.13)	0.51
Hypercoagulopathy/DVT/PE	13.43 (11.97-14.87)	15.14 (13.55-16.70)	0.93 (0.81-1.07)	0.3
Hyperlipidaemia	58.90 (56.11-61.51)	55.48 (52.90-57.92)	1.10 (1.03-1.18)	0.008
Hypertension	69.12 (66.35-71.65)	65.97 (63.37-68.38)	1.10 (1.03-1.17)	0.004
Hypoxaemia	15.33 (13.94-16.69)	17.77 (16.20-19.31)	0.90 (0.80-1.02)	0.09
ICU admission	9.24 (8.15-10.32)	10.82 (9.49-12.13)	0.92 (0.79-1.08)	0.31
Interstitial lung disease	9.16 (7.93-10.37)	10.85 (9.47-12.22)	0.88 (0.75-1.04)	0.14
Intubation/Ventilation	6.36 (5.46-7.25)	8.19 (7.01-9.35)	0.85 (0.71-1.03)	0.09
Ischaemic stroke	10.33 (8.99-11.64)	11.13 (9.62-12.62)	0.98 (0.83-1.15)	0.79
Joint pain	23.35 (21.16-25.48)	25.15 (22.81-27.43)	0.99 (0.88-1.12)	0.89
Kidney disease	25.97 (23.97-27.92)	25.93 (23.97-27.85)	1.05 (0.95-1.16)	0.33
Liver disease	11.81 (10.49-13.11)	13.20 (11.71-14.66)	0.95 (0.82-1.10)	0.48
Long COVID feature (any)	67.18 (64.67-69.50)	69.39 (66.89-71.71)	1.02 (0.95-1.08)	0.6
Mood disorder	24.24 (22.03-26.39)	22.67 (20.64-24.64)	1.07 (0.95-1.20)	0.25
Myalgia	8.78 (7.50-10.05)	9.50 (8.07-10.90)	0.95 (0.80-1.14)	0.61
Myocarditis	5.78 (4.88-6.68)	7.05 (5.87-8.21)	0.90 (0.73-1.10)	0.3
Myoneural junction/muscle disease	6.64 (5.66-7.62)	8.13 (6.92-9.32)	0.87 (0.72-1.05)	0.16
Nerve/nerve root/plexus disorder	10.81 (9.37-12.22)	10.78 (9.38-12.16)	0.95 (0.81-1.12)	0.56
Obesity	39.35 (36.99-41.62)	38.65 (36.29-40.92)	1.03 (0.95-1.12)	0.46
Other pain	21.06 (18.97-23.09)	22.97 (20.90-24.98)	0.91 (0.81-1.02)	0.11
Oxygen requirement	16.21 (14.67-17.71)	16.38 (14.88-17.85)	1.02 (0.91-1.15)	0.71
Peripheral neuropathy	12.24 (10.74-13.71)	12.51 (10.88-14.11)	1.04 (0.89-1.21)	0.64
Psychotic disorder	6.28 (5.34-7.21)	7.94 (6.72-9.15)	0.86 (0.71-1.05)	0.14
Respiratory failure	14.83 (13.43-16.21)	18.20 (16.61-19.75)	0.85 (0.76-0.96)	0.009
Seizures	7.37 (6.24-8.49)	8.54 (7.27-9.79)	0.88 (0.73-1.06)	0.18

Sleep disorders	25.28 (23.14-27.37)	25.83 (23.73-27.88)	1.00 (0.90-1.11)	0.99
Type 2 diabetes mellitus	34.83 (32.70-36.90)	34.51 (32.31-36.64)	1.07 (0.98-1.17)	0.14
Urticaria	6.31 (5.33-7.27)	7.09 (5.95-8.22)	0.93 (0.76-1.14)	0.48

Table A17 – HRs (95% CI) for outcomes (each as part of a composite endpoint with death as the other component) comparing younger (< 60 years-old) vaccinated to younger unvaccinated individuals (*n*=4633 in each group), and older (≥ 60 years-old) vaccinated to younger unvaccinated individuals (*n*=4657 in each group), both identical to those presented in Table S11 and S12 respectively, as well as their ratio (95% CI) obtained by fitting an interaction term in the Cox model, and the p-value for the test of the null hypothesis that the latter ratio is equal to 1.

Outcome	HR (95% CI) in the over-60 cohort	HR (95% CI) in the under-60 cohort	Ratio between HR (95% CI)	p-value
Abdominal symptoms	1.13 (1.00-1.27)	0.99 (0.85-1.15)	1.15 (0.95-1.39)	0.16
Abnormal breathing	1.01 (0.91-1.11)	0.88 (0.77-1.00)	1.15 (0.98-1.35)	0.096
Anosmia	0.93 (0.76-1.13)	0.62 (0.42-0.92)	1.47 (0.95-2.28)	0.084
Anxiety disorder	1.11 (0.99-1.25)	1.12 (1.00-1.27)	0.99 (0.83-1.17)	0.87
Anxiety/Depression	1.12 (1.02-1.23)	1.09 (0.97-1.21)	1.03 (0.89-1.19)	0.68
Arrhythmia	1.04 (0.94-1.14)	0.91 (0.77-1.08)	1.13 (0.93-1.37)	0.21
Cardiac failure	1.09 (0.97-1.22)	0.85 (0.67-1.08)	1.28 (0.98-1.67)	0.066
Cardiomyopathy	0.96 (0.82-1.12)	1.00 (0.75-1.32)	0.96 (0.70-1.33)	0.82
Cerebral haemorrhage	0.97 (0.80-1.18)	0.47 (0.31-0.73)	2.06 (1.28-3.30)	0.0029
Chest/Throat pain	1.04 (0.91-1.18)	0.91 (0.77-1.08)	1.14 (0.93-1.41)	0.21
Cognitive symptoms	1.00 (0.89-1.14)	0.82 (0.64-1.06)	1.22 (0.92-1.61)	0.17
Coronary disease	1.10 (0.94-1.29)	0.60 (0.42-0.86)	1.81 (1.23-2.66)	0.0025
Death	0.91 (0.74-1.12)	0.43 (0.26-0.68)	2.13 (1.27-3.58)	0.0041
Fatigue	0.92 (0.83-1.03)	0.96 (0.81-1.13)	0.97 (0.79-1.19)	0.76
GORD	1.02 (0.93-1.13)	1.08 (0.94-1.25)	0.95 (0.80-1.13)	0.57
Hair loss	0.91 (0.75-1.10)	0.59 (0.42-0.81)	1.53 (1.04-2.25)	0.029
Headache	0.98 (0.85-1.13)	1.03 (0.89-1.20)	0.95 (0.77-1.16)	0.61
Hospitalisation	1.03 (0.94-1.13)	0.81 (0.70-0.94)	1.27 (1.07-1.51)	0.0075
Hypercoagulopathy/DVT/PE	0.93 (0.81-1.07)	0.72 (0.57-0.90)	1.30 (1.00-1.70)	0.054
Hyperlipidaemia	1.10 (1.03-1.18)	1.01 (0.90-1.14)	1.09 (0.95-1.25)	0.24
Hypertension	1.10 (1.03-1.17)	0.97 (0.88-1.08)	1.13 (1.00-1.28)	0.045
Hypoxaemia	0.90 (0.80-1.02)	0.52 (0.42-0.64)	1.74 (1.37-2.20)	<0.0001
ICU admission	0.92 (0.79-1.08)	0.50 (0.38-0.68)	1.82 (1.31-2.54)	0.00042
Interstitial lung disease	0.88 (0.75-1.04)	0.55 (0.40-0.75)	1.63 (1.14-2.33)	0.0077
Intubation/Ventilation	0.85 (0.71-1.03)	0.48 (0.33-0.69)	1.79 (1.18-2.70)	0.006
Ischaemic stroke	0.98 (0.83-1.15)	0.62 (0.44-0.89)	1.57 (1.07-2.32)	0.022
Joint pain	0.99 (0.88-1.12)	1.01 (0.86-1.18)	0.99 (0.81-1.20)	0.89
Kidney disease	1.05 (0.95-1.16)	0.86 (0.71-1.02)	1.23 (1.00-1.51)	0.05
Liver disease	0.95 (0.82-1.10)	0.93 (0.75-1.15)	1.02 (0.79-1.32)	0.89
Long COVID feature (any)	1.02 (0.95-1.08)	0.97 (0.90-1.05)	1.05 (0.95-1.15)	0.35
Mood disorder	1.07 (0.95-1.20)	1.15 (1.00-1.33)	0.93 (0.78-1.11)	0.42
Myalgia	0.95 (0.80-1.14)	0.65 (0.49-0.86)	1.48 (1.06-2.07)	0.023
Myocarditis	0.90 (0.73-1.10)	0.49 (0.32-0.76)	1.79 (1.11-2.90)	0.017
Myoneural junction/muscle disease	0.87 (0.72-1.05)	0.55 (0.37-0.82)	1.58 (1.01-2.45)	0.044
Nerve/nerve root/plexus disorder	0.95 (0.81-1.12)	0.68 (0.52-0.89)	1.41 (1.02-1.94)	0.037
Obesity	1.03 (0.95-1.12)	0.95 (0.87-1.05)	1.08 (0.95-1.22)	0.22
Other pain	0.91 (0.81-1.02)	0.97 (0.82-1.14)	0.94 (0.76-1.15)	0.53
Oxygen requirement	1.02 (0.91-1.15)	0.67 (0.54-0.82)	1.54 (1.21-1.95)	0.00036
Peripheral neuropathy	1.04 (0.89-1.21)	0.86 (0.63-1.18)	1.21 (0.85-1.71)	0.3
Psychotic disorder	0.86 (0.71-1.05)	0.50 (0.35-0.72)	1.71 (1.13-2.59)	0.011

Respiratory failure	0.85 (0.76-0.96)	0.48 (0.39-0.60)	1.77 (1.38-2.26)	<0.0001
Seizures	0.88 (0.73-1.06)	0.45 (0.32-0.64)	1.95 (1.31-2.89)	0.00092
Sleep disorders	1.00 (0.90-1.11)	1.06 (0.92-1.23)	0.94 (0.79-1.13)	0.53
Type 2 diabetes mellitus	1.07 (0.98-1.17)	1.00 (0.87-1.14)	1.07 (0.91-1.26)	0.41
Urticaria	0.93 (0.76-1.14)	0.51 (0.34-0.77)	1.82 (1.16-2.85)	0.0097

Table A18 – Percent incidences and HRs (95% CI) for all distinct outcomes (i.e. not as part of a composite endpoint with death as the other component, and thus subject to survivorship bias) in the matched vaccinated and unvaccinated cohorts ($n=9479$ individuals in each cohort).

Outcome	Incidence % (95% CI) in vaccinated cohort	Incidence % (95% CI) in unvaccinated cohort	HR (95% CI)	p-value
Abdominal symptoms	16.97 (15.49-18.43)	15.94 (14.50-17.35)	1.16 (1.04-1.28)	0.008
Abnormal breathing	23.29 (21.72-24.83)	22.50 (21.01-23.97)	1.01 (0.93-1.10)	0.78
Anosmia	0.65 (0.36-0.94)	0.24 (0.11-0.37)	2.26 (1.20-4.27)	0.009
Anxiety disorder	22.08 (20.50-23.63)	20.08 (18.57-21.57)	1.13 (1.03-1.24)	0.008
Anxiety/Depression	29.95 (28.22-31.64)	27.27 (25.60-28.89)	1.13 (1.05-1.22)	0.001
Arrhythmia	19.79 (18.38-21.19)	19.48 (18.16-20.77)	0.99 (0.91-1.08)	0.77
Cardiac failure	11.27 (10.12-12.40)	10.39 (9.41-11.36)	1.06 (0.95-1.20)	0.3
Cardiomyopathy	4.72 (3.99-5.45)	4.11 (3.46-4.77)	1.18 (0.97-1.43)	0.1
Cerebral haemorrhage	0.59 (0.39-0.79)	0.51 (0.30-0.72)	1.33 (0.81-2.16)	0.25
Chest/Throat pain	12.90 (11.53-14.25)	12.31 (11.08-13.53)	1.08 (0.96-1.21)	0.21
Cognitive symptoms	9.67 (8.58-10.75)	9.65 (8.64-10.65)	1.02 (0.90-1.16)	0.77
Coronary disease	4.52 (3.68-5.34)	3.80 (3.13-4.46)	1.04 (0.86-1.27)	0.67
Death	3.74 (3.12-4.35)	4.50 (3.89-5.10)	0.75 (0.62-0.91)	0.003
Fatigue	17.56 (15.99-19.10)	16.89 (15.50-18.26)	0.96 (0.86-1.06)	0.38
GORD	23.41 (21.74-25.03)	21.60 (20.04-23.12)	1.10 (1.01-1.20)	0.03
Hair loss	1.66 (1.18-2.14)	2.30 (1.73-2.87)	0.77 (0.55-1.06)	0.11
Headache	12.54 (11.27-13.79)	10.26 (9.13-11.37)	1.25 (1.10-1.42)	0.0004
Hospitalisation	17.01 (15.90-18.10)	17.64 (16.56-18.71)	0.94 (0.87-1.02)	0.14
Hypercoagulopathy/DVT/PE	7.07 (6.21-7.93)	8.43 (7.51-9.34)	0.86 (0.75-0.99)	0.04
Hyperlipidaemia	42.67 (40.62-44.64)	41.48 (39.56-43.33)	1.05 (0.99-1.12)	0.12
Hypertension	52.28 (50.16-54.31)	50.89 (48.98-52.73)	1.00 (0.95-1.06)	0.96
Hypoxaemia	8.99 (8.10-9.86)	11.87 (10.97-12.76)	0.72 (0.65-0.81)	<0.0001
ICU admission	4.32 (3.77-4.87)	5.25 (4.62-5.87)	0.82 (0.70-0.96)	0.01
Interstitial lung disease	2.85 (2.30-3.39)	3.06 (2.45-3.67)	1.03 (0.82-1.30)	0.81
Intubation/Ventilation	2.12 (1.76-2.49)	2.59 (2.18-2.99)	0.81 (0.65-1.01)	0.06
Ischaemic stroke	3.28 (2.65-3.90)	3.21 (2.57-3.85)	1.01 (0.80-1.26)	0.94
Joint pain	17.84 (16.20-19.44)	16.70 (15.19-18.19)	1.08 (0.97-1.21)	0.17
Kidney disease	16.51 (15.24-17.76)	17.07 (15.83-18.29)	1.01 (0.92-1.11)	0.86
Liver disease	6.87 (6.02-7.71)	6.73 (5.87-7.58)	1.08 (0.93-1.26)	0.3
Long COVID feature (any)	63.37 (61.43-65.22)	64.51 (62.57-66.34)	1.02 (0.97-1.07)	0.43
Mood disorder	19.50 (17.95-21.03)	16.72 (15.38-18.04)	1.16 (1.05-1.27)	0.004
Myalgia	3.27 (2.53-3.99)	3.67 (2.95-4.40)	0.85 (0.67-1.08)	0.18
Myocarditis	0.21 (0.07-0.36)	0.22 (0.04-0.40)	1.15 (0.49-2.66)	0.75
Myoneural junction/muscle disease	0.77 (0.53-1.01)	0.97 (0.63-1.32)	0.96 (0.63-1.44)	0.83
Nerve/nerve root/plexus disorder	4.61 (3.77-5.45)	4.42 (3.64-5.19)	0.92 (0.75-1.13)	0.43
Obesity	37.58 (35.76-39.36)	37.58 (35.79-39.32)	1.00 (0.93-1.06)	0.93
Other pain	15.04 (13.60-16.46)	16.26 (14.79-17.71)	0.95 (0.85-1.06)	0.39
Oxygen requirement	10.12 (9.14-11.10)	11.76 (10.76-12.75)	0.86 (0.77-0.95)	0.005
Peripheral neuropathy	5.10 (4.24-5.94)	4.68 (3.81-5.53)	1.19 (0.97-1.46)	0.1
Psychotic disorder	0.73 (0.50-0.95)	1.11 (0.76-1.45)	0.79 (0.53-1.18)	0.24
Respiratory failure	8.39 (7.55-9.22)	11.75 (10.81-12.67)	0.71 (0.64-0.79)	<0.0001
Seizures	1.51 (1.02-1.99)	1.77 (1.34-2.19)	0.70 (0.51-0.97)	0.03

Sleep disorders	20.03 (18.41-21.61)	19.44 (17.96-20.89)	1.02 (0.92-1.12)	0.74
Type 2 diabetes mellitus	25.12 (23.61-26.60)	24.11 (22.70-25.49)	1.02 (0.94-1.10)	0.68
Urticaria	0.55 (0.31-0.79)	0.50 (0.31-0.70)	0.97 (0.57-1.64)	0.9

Table A19 – Percent incidences and HRs (95% CI) for all distinct outcomes (i.e. not as part of a composite endpoint with death as the other component, and thus subject to survivorship bias) in the matched vaccinated (1 dose only) and unvaccinated cohorts ($n=2996$ individuals in each cohort).

Outcome	Incidence % (95% CI) in vaccinated cohort	Incidence % (95% CI) in unvaccinated cohort	HR (95% CI)	p-value
Abdominal symptoms	16.12 (14.16-18.04)	16.25 (14.25-18.19)	0.97 (0.82-1.14)	0.71
Abnormal breathing	22.35 (20.29-24.36)	21.32 (19.24-23.35)	1.04 (0.92-1.19)	0.51
Anosmia	0.77 (0.37-1.17)	0.55 (0.24-0.85)	1.23 (0.60-2.52)	0.58
Anxiety disorder	22.01 (19.83-24.12)	22.35 (20.13-24.51)	0.98 (0.85-1.12)	0.73
Anxiety/Depression	28.34 (26.01-30.60)	28.33 (26.02-30.57)	0.99 (0.88-1.11)	0.86
Arrhythmia	18.89 (17.04-20.71)	18.56 (16.68-20.40)	1.01 (0.88-1.17)	0.85
Cardiac failure	10.55 (9.18-11.90)	10.44 (8.99-11.86)	1.03 (0.86-1.24)	0.72
Cardiomyopathy	4.17 (3.26-5.07)	3.58 (2.74-4.41)	1.16 (0.85-1.57)	0.35
Cerebral haemorrhage	1.04 (0.55-1.54)	0.36 (0.12-0.60)	2.06 (0.94-4.53)	0.06
Chest/Throat pain	12.20 (10.41-13.96)	12.04 (10.32-13.72)	1.00 (0.83-1.20)	1
Cognitive symptoms	8.73 (7.42-10.03)	10.36 (8.94-11.76)	0.81 (0.67-0.99)	0.04
Coronary disease	3.56 (2.69-4.42)	3.14 (2.31-3.97)	1.13 (0.81-1.58)	0.47
Death	2.95 (2.26-3.63)	4.73 (3.70-5.74)	0.72 (0.53-0.98)	0.03
Fatigue	15.89 (13.91-17.82)	16.27 (14.46-18.05)	0.88 (0.75-1.04)	0.13
GORD	22.76 (20.54-24.92)	22.87 (20.58-25.09)	1.01 (0.88-1.16)	0.88
Hair loss	1.47 (0.92-2.01)	1.91 (1.25-2.56)	0.74 (0.46-1.21)	0.23
Headache	13.20 (11.43-14.93)	11.75 (9.94-13.53)	1.25 (1.04-1.51)	0.02
Hospitalisation	17.56 (15.99-19.10)	18.52 (16.81-20.19)	0.97 (0.85-1.10)	0.63
Hypercoagulopathy/DVT/PE	6.40 (5.33-7.47)	7.20 (6.00-8.39)	0.94 (0.75-1.18)	0.61
Hyperlipidaemia	41.06 (38.31-43.67)	41.83 (38.95-44.58)	1.01 (0.91-1.11)	0.88
Hypertension	50.02 (47.27-52.61)	51.70 (48.71-54.51)	1.00 (0.92-1.10)	0.93
Hypoxaemia	8.78 (7.62-9.92)	10.91 (9.58-12.22)	0.80 (0.67-0.96)	0.02
ICU admission	3.89 (3.13-4.64)	5.75 (4.70-6.78)	0.74 (0.57-0.95)	0.02
Interstitial lung disease	2.31 (1.67-2.94)	2.96 (2.20-3.72)	0.81 (0.56-1.16)	0.24
Intubation/Ventilation	1.82 (1.30-2.33)	2.40 (1.79-3.01)	0.77 (0.53-1.12)	0.17
Ischaemic stroke	3.39 (2.52-4.25)	2.21 (1.54-2.88)	1.49 (1.04-2.14)	0.03
Joint pain	17.05 (14.90-19.14)	17.45 (15.27-19.57)	1.00 (0.85-1.18)	0.99
Kidney disease	14.96 (13.28-16.60)	17.14 (15.27-18.96)	0.90 (0.78-1.05)	0.19
Liver disease	6.57 (5.40-7.73)	7.23 (5.98-8.46)	0.91 (0.72-1.15)	0.45
Long COVID feature (any)	63.70 (60.88-66.32)	65.18 (62.35-67.79)	0.96 (0.89-1.04)	0.3
Mood disorder	17.64 (15.63-19.61)	17.47 (15.56-19.34)	0.98 (0.84-1.14)	0.82
Myalgia	2.40 (1.61-3.19)	3.40 (2.46-4.33)	0.69 (0.46-1.02)	0.06
Myocarditis	0.30 (0.07-0.52)	0.45 (0.04-0.86)	1.30 (0.41-4.09)	0.66
Myoneural junction/muscle disease	0.66 (0.31-1.01)	0.73 (0.38-1.09)	0.83 (0.41-1.66)	0.6
Nerve/nerve root/plexus disorder	4.34 (3.24-5.42)	4.20 (3.22-5.16)	0.91 (0.66-1.25)	0.55
Obesity	40.84 (38.21-43.36)	41.02 (38.31-43.61)	1.02 (0.93-1.13)	0.63
Other pain	15.06 (13.10-16.99)	16.06 (14.07-17.99)	0.86 (0.73-1.02)	0.08
Oxygen requirement	10.32 (8.95-11.67)	11.25 (9.89-12.60)	0.90 (0.76-1.07)	0.23
Peripheral neuropathy	4.84 (3.82-5.84)	3.97 (3.01-4.92)	1.27 (0.94-1.72)	0.12
Psychotic disorder	0.88 (0.52-1.24)	2.02 (1.37-2.67)	0.50 (0.30-0.84)	0.007
Respiratory failure	7.85 (6.76-8.93)	10.14 (8.85-11.40)	0.79 (0.65-0.95)	0.01
Seizures	1.49 (0.91-2.06)	2.10 (1.50-2.70)	0.59 (0.38-0.93)	0.02

Sleep disorders	19.05 (16.98-21.06)	18.66 (16.57-20.70)	1.01 (0.87-1.17)	0.95
Type 2 diabetes mellitus	23.41 (21.43-25.35)	24.05 (21.93-26.12)	0.98 (0.87-1.11)	0.79
Urticaria	0.67 (0.29-1.06)	0.47 (0.18-0.75)	1.25 (0.56-2.79)	0.59

Table A20 – Percent incidences and HRs (95% CI) for all distinct outcomes (i.e. not as part of a composite endpoint with death as the other component, and thus subject to survivorship bias) in the matched vaccinated (2 doses only) and unvaccinated cohorts ($n=6957$ individuals in each cohort).

Outcome	Incidence % (95% CI) in vaccinated cohort	Incidence % (95% CI) in unvaccinated cohort	HR (95% CI)	p-value
Abdominal symptoms	17.31 (15.37-19.21)	16.19 (14.25-18.10)	1.21 (1.06-1.37)	0.004
Abnormal breathing	22.45 (20.51-24.35)	22.27 (20.39-24.10)	1.00 (0.91-1.11)	0.96
Anosmia	0.89 (0.44-1.35)	0.37 (0.17-0.58)	1.79 (0.95-3.37)	0.06
Anxiety disorder	20.36 (18.49-22.20)	22.58 (20.39-24.72)	1.09 (0.98-1.22)	0.1
Anxiety/Depression	28.70 (26.42-30.91)	30.82 (28.33-33.22)	1.09 (0.99-1.19)	0.07
Arrhythmia	18.62 (17.04-20.16)	21.27 (19.37-23.12)	0.95 (0.86-1.05)	0.34
Cardiac failure	11.07 (9.63-12.49)	10.79 (9.40-12.16)	1.06 (0.92-1.22)	0.42
Cardiomyopathy	5.37 (4.31-6.42)	4.11 (3.28-4.93)	1.19 (0.95-1.50)	0.13
Cerebral haemorrhage	0.48 (0.27-0.68)	0.28 (0.13-0.43)	1.71 (0.88-3.33)	0.11
Chest/Throat pain	13.22 (11.26-15.14)	12.94 (11.26-14.59)	1.09 (0.94-1.26)	0.24
Cognitive symptoms	9.66 (8.18-11.11)	9.56 (8.36-10.75)	1.00 (0.86-1.17)	0.96
Coronary disease	5.72 (4.33-7.08)	3.82 (2.93-4.69)	1.17 (0.92-1.48)	0.2
Death	3.35 (2.66-4.03)	4.98 (4.21-5.74)	0.62 (0.49-0.78)	<0.0001
Fatigue	17.51 (15.50-19.48)	16.80 (15.10-18.47)	0.96 (0.85-1.08)	0.51
GORD	24.58 (22.32-26.78)	21.22 (19.19-23.20)	1.17 (1.05-1.30)	0.004
Hair loss	1.17 (0.68-1.66)	0.90 (0.52-1.28)	1.23 (0.74-2.06)	0.42
Headache	13.18 (11.55-14.78)	11.96 (10.22-13.66)	1.19 (1.03-1.38)	0.02
Hospitalisation	17.64 (16.01-19.22)	18.14 (16.67-19.59)	0.97 (0.88-1.06)	0.51
Hypercoagulopathy/DVT/PE	6.97 (5.90-8.02)	7.30 (6.16-8.43)	0.98 (0.82-1.17)	0.83
Hyperlipidaemia	47.58 (44.48-50.51)	44.09 (41.37-46.67)	1.09 (1.01-1.18)	0.02
Hypertension	56.45 (53.23-59.45)	49.49 (46.99-51.88)	1.11 (1.04-1.19)	0.002
Hypoxaemia	8.89 (7.63-10.14)	12.24 (11.02-13.45)	0.69 (0.60-0.79)	<0.0001
ICU admission	4.59 (3.83-5.34)	6.21 (5.22-7.18)	0.80 (0.67-0.97)	0.02
Interstitial lung disease	2.81 (2.06-3.55)	3.68 (2.79-4.56)	0.92 (0.70-1.20)	0.53
Intubation/Ventilation	2.21 (1.77-2.65)	2.96 (2.31-3.60)	0.85 (0.65-1.10)	0.21
Ischaemic stroke	3.32 (2.50-4.12)	3.58 (2.76-4.38)	0.96 (0.74-1.25)	0.77
Joint pain	18.04 (15.81-20.22)	19.70 (17.39-21.95)	0.99 (0.87-1.13)	0.85
Kidney disease	17.56 (15.83-19.25)	18.01 (16.14-19.84)	1.06 (0.95-1.18)	0.31
Liver disease	7.76 (6.56-8.96)	7.56 (6.30-8.80)	1.20 (1.01-1.44)	0.04
Long COVID feature (any)	64.10 (61.44-66.57)	64.85 (62.18-67.33)	1.04 (0.98-1.10)	0.2
Mood disorder	19.23 (17.15-21.25)	18.07 (16.12-19.97)	1.14 (1.02-1.29)	0.03
Myalgia	3.19 (2.32-4.05)	3.79 (2.90-4.66)	0.89 (0.68-1.19)	0.44
Myocarditis	0.13 (0.03-0.23)	0.15 (0.05-0.25)	0.94 (0.34-2.60)	0.91
Myoneural junction/muscle disease	0.79 (0.51-1.08)	1.19 (0.77-1.60)	0.80 (0.50-1.26)	0.33
Nerve/nerve root/plexus disorder	4.18 (3.18-5.18)	4.72 (3.52-5.89)	0.96 (0.74-1.23)	0.73
Obesity	34.90 (32.59-37.13)	35.33 (32.94-37.64)	1.01 (0.93-1.10)	0.74
Other pain	15.13 (13.27-16.94)	17.58 (15.39-19.72)	0.96 (0.84-1.10)	0.59
Oxygen requirement	9.33 (8.23-10.42)	10.90 (9.85-11.94)	0.81 (0.71-0.92)	0.001
Peripheral neuropathy	4.83 (3.85-5.80)	5.57 (4.33-6.80)	1.03 (0.81-1.31)	0.82
Psychotic disorder	0.70 (0.39-1.01)	0.77 (0.50-1.03)	0.70 (0.42-1.18)	0.18
Respiratory failure	8.51 (7.30-9.70)	12.43 (11.16-13.67)	0.65 (0.57-0.75)	<0.0001
Seizures	1.78 (1.04-2.53)	1.32 (0.92-1.72)	0.97 (0.65-1.43)	0.87

Sleep disorders	19.96 (17.75-22.10)	19.11 (17.18-21.00)	1.07 (0.95-1.20)	0.28
Type 2 diabetes mellitus	26.51 (24.44-28.52)	24.90 (22.96-26.78)	1.11 (1.01-1.21)	0.03
Urticaria	0.51 (0.25-0.78)	0.74 (0.43-1.06)	0.68 (0.38-1.22)	0.19

Table A21 – Percent incidences and HRs (95% CI) for all distinct outcomes (i.e. not as part of a composite endpoint with death as the other component, and thus subject to survivorship bias) in the matched under-60 vaccinated and unvaccinated cohorts ($n=4633$ individuals in each cohort).

Outcome	Incidence % (95% CI) in vaccinated cohort	Incidence % (95% CI) in unvaccinated cohort	HR (95% CI)	p-value
Abdominal symptoms	18.93 (16.20-21.58)	17.18 (14.70-19.59)	1.12 (0.95-1.31)	0.17
Abnormal breathing	20.19 (17.80-22.51)	18.72 (16.68-20.71)	0.98 (0.86-1.12)	0.82
Anosmia	1.23 (0.59-1.86)	0.68 (0.35-1.02)	1.38 (0.73-2.58)	0.32
Anxiety disorder	25.90 (23.27-28.45)	23.09 (20.55-25.56)	1.16 (1.03-1.32)	0.02
Anxiety/Depression	31.83 (29.09-34.48)	30.57 (27.73-33.30)	1.10 (0.98-1.22)	0.1
Arrhythmia	11.97 (10.19-13.71)	11.31 (9.69-12.90)	0.97 (0.81-1.15)	0.7
Cardiac failure	4.28 (3.30-5.25)	4.67 (3.74-5.59)	0.93 (0.72-1.22)	0.61
Cardiomyopathy	3.87 (2.63-5.10)	2.46 (1.59-3.31)	1.49 (1.05-2.13)	0.02
Cerebral haemorrhage	0.26 (0.07-0.44)	1.02 (0.49-1.55)	0.43 (0.19-0.99)	0.04
Chest/Throat pain	13.45 (10.92-15.91)	11.88 (10.08-13.65)	1.04 (0.87-1.24)	0.68
Cognitive symptoms	4.22 (3.18-5.25)	5.24 (3.97-6.50)	0.88 (0.66-1.16)	0.36
Coronary disease	1.41 (0.64-2.17)	2.07 (1.22-2.92)	0.63 (0.39-1.01)	0.05
Death	1.17 (0.67-1.68)	2.25 (1.60-2.89)	0.43 (0.26-0.68)	0.0002
Fatigue	14.15 (11.78-16.46)	12.85 (10.92-14.74)	0.95 (0.80-1.14)	0.6
GORD	20.94 (18.20-23.59)	18.99 (16.39-21.50)	1.14 (0.98-1.32)	0.09
Hair loss	1.66 (1.05-2.26)	2.24 (1.41-3.06)	0.95 (0.60-1.53)	0.84
Headache	17.05 (14.66-19.37)	15.25 (13.21-17.24)	1.12 (0.96-1.31)	0.16
Hospitalisation	9.59 (8.21-10.96)	11.49 (10.23-12.74)	0.79 (0.68-0.92)	0.002
Hypercoagulopathy/DVT/PE	4.60 (3.50-5.70)	6.51 (5.25-7.75)	0.71 (0.55-0.91)	0.007
Hyperlipidaemia	26.18 (23.52-28.75)	27.92 (24.77-30.94)	1.08 (0.95-1.22)	0.24
Hypertension	35.04 (31.92-38.02)	33.30 (30.52-35.98)	1.00 (0.90-1.11)	0.95
Hypoxaemia	4.95 (3.77-6.12)	7.50 (6.38-8.61)	0.53 (0.43-0.66)	<0.0001
ICU admission	1.90 (1.33-2.45)	3.33 (2.61-4.03)	0.50 (0.36-0.69)	<0.0001
Interstitial lung disease	1.54 (1.03-2.05)	2.19 (1.54-2.84)	0.72 (0.48-1.08)	0.11
Intubation/Ventilation	0.95 (0.59-1.32)	2.07 (1.58-2.56)	0.41 (0.27-0.63)	<0.0001
Ischaemic stroke	1.11 (0.68-1.54)	1.42 (0.76-2.07)	1.05 (0.64-1.72)	0.86
Joint pain	17.18 (14.57-19.71)	15.51 (13.05-17.89)	1.12 (0.94-1.33)	0.19
Kidney disease	7.98 (6.79-9.16)	9.97 (8.45-11.47)	0.86 (0.71-1.03)	0.1
Liver disease	7.54 (5.89-9.16)	5.86 (4.62-7.08)	1.14 (0.90-1.45)	0.27
Long COVID feature (any)	62.16 (58.89-65.17)	63.87 (60.57-66.88)	0.98 (0.91-1.05)	0.51
Mood disorder	20.64 (18.06-23.15)	18.48 (16.10-20.79)	1.17 (1.02-1.35)	0.03
Myalgia	3.39 (2.28-4.50)	2.96 (2.10-3.82)	0.96 (0.67-1.38)	0.84
Myocarditis	0.29 (0.05-0.52)	0.05 (0.00-0.11)	3.81 (0.79-18.39)	0.07
Myoneural junction/muscle disease	0.46 (0.21-0.70)	0.87 (0.49-1.24)	0.60 (0.31-1.18)	0.13
Nerve/nerve root/plexus disorder	4.10 (2.73-5.45)	2.92 (1.96-3.87)	1.17 (0.83-1.67)	0.37
Obesity	40.48 (37.53-43.30)	41.95 (39.06-44.70)	0.94 (0.86-1.03)	0.21
Other pain	14.24 (12.07-16.35)	12.59 (10.47-14.66)	1.13 (0.95-1.35)	0.17
Oxygen requirement	5.64 (4.55-6.71)	7.17 (6.05-8.28)	0.65 (0.52-0.80)	<0.0001
Peripheral neuropathy	2.77 (1.87-3.66)	2.16 (1.29-3.03)	1.28 (0.84-1.94)	0.25
Psychotic disorder	0.82 (0.46-1.17)	0.99 (0.51-1.46)	1.02 (0.57-1.81)	0.95
Respiratory failure	3.83 (3.02-4.65)	7.35 (6.36-8.33)	0.46 (0.37-0.58)	<0.0001
Seizures	1.04 (0.58-1.50)	1.90 (1.26-2.54)	0.50 (0.31-0.82)	0.005

Sleep disorders	19.57 (16.88-22.18)	16.70 (14.48-18.87)	1.06 (0.91-1.24)	0.45
Type 2 diabetes mellitus	18.37 (16.22-20.46)	18.95 (16.80-21.04)	1.00 (0.87-1.15)	0.99
Urticaria	0.61 (0.26-0.97)	0.65 (0.33-0.98)	0.77 (0.39-1.54)	0.46

Table A22 – Percent incidences and HRs (95% CI) for all distinct outcomes (i.e. not as part of a composite endpoint with death as the other component, and thus subject to survivorship bias) in the matched over-60 vaccinated and unvaccinated cohorts ($n=4657$ individuals in each cohort).

Outcome	Incidence % (95% CI) in vaccinated cohort	Incidence % (95% CI) in unvaccinated cohort	HR (95% CI)	p-value
Abdominal symptoms	15.89 (14.13-17.61)	14.42 (12.58-16.21)	1.27 (1.10-1.47)	0.001
Abnormal breathing	25.56 (23.48-27.60)	25.38 (23.20-27.49)	1.05 (0.94-1.16)	0.42
Anosmia	0.26 (0.08-0.45)	0.24 (0.07-0.40)	1.07 (0.41-2.78)	0.89
Anxiety disorder	19.43 (17.37-21.44)	16.56 (14.74-18.35)	1.20 (1.05-1.37)	0.009
Anxiety/Depression	29.24 (26.87-31.54)	25.87 (23.69-27.99)	1.17 (1.05-1.30)	0.003
Arrhythmia	25.84 (23.82-27.81)	24.78 (22.78-26.73)	1.07 (0.97-1.19)	0.18
Cardiac failure	16.72 (14.97-18.43)	14.64 (13.09-16.17)	1.16 (1.02-1.33)	0.02
Cardiomyopathy	5.76 (4.67-6.85)	5.98 (4.89-7.05)	1.02 (0.81-1.28)	0.88
Cerebral haemorrhage	0.86 (0.53-1.19)	0.88 (0.46-1.30)	1.33 (0.77-2.31)	0.31
Chest/Throat pain	13.43 (11.62-15.21)	12.79 (11.13-14.41)	1.08 (0.92-1.26)	0.33
Cognitive symptoms	13.54 (11.98-15.07)	12.95 (11.48-14.41)	1.06 (0.92-1.23)	0.4
Coronary disease	6.87 (5.62-8.10)	4.85 (3.86-5.82)	1.34 (1.07-1.67)	0.01
Death	5.68 (4.78-6.57)	6.68 (5.56-7.79)	0.91 (0.74-1.12)	0.38
Fatigue	19.89 (17.86-21.87)	19.25 (17.32-21.14)	0.97 (0.86-1.10)	0.67
GORD	26.03 (23.80-28.19)	25.84 (23.61-28.01)	1.06 (0.95-1.18)	0.3
Hair loss	1.33 (0.76-1.89)	1.18 (0.74-1.63)	0.87 (0.52-1.46)	0.59
Headache	9.10 (7.66-10.52)	9.14 (7.67-10.59)	1.03 (0.85-1.25)	0.78
Hospitalisation	23.47 (21.85-25.06)	22.42 (20.78-24.02)	1.08 (0.98-1.18)	0.13
Hypercoagulopathy/DVT/PE	9.10 (7.83-10.36)	9.01 (7.79-10.21)	1.04 (0.87-1.23)	0.68
Hyperlipidaemia	56.36 (53.47-59.07)	52.82 (50.14-55.35)	1.13 (1.04-1.21)	0.002
Hypertension	67.01 (64.17-69.62)	64.03 (61.33-66.54)	1.11 (1.04-1.19)	0.002
Hypoxaemia	12.62 (11.34-13.88)	14.14 (12.76-15.51)	0.92 (0.81-1.05)	0.2
ICU admission	6.43 (5.56-7.28)	6.63 (5.66-7.59)	1.02 (0.85-1.22)	0.85
Interstitial lung disease	3.80 (2.94-4.65)	4.63 (3.66-5.60)	0.86 (0.66-1.11)	0.25
Intubation/Ventilation	3.11 (2.54-3.68)	3.38 (2.74-4.02)	0.96 (0.74-1.24)	0.76
Ischaemic stroke	4.82 (3.80-5.83)	4.92 (3.85-5.99)	1.03 (0.80-1.33)	0.81
Joint pain	18.21 (16.13-20.24)	18.94 (16.77-21.05)	1.03 (0.90-1.19)	0.64
Kidney disease	23.09 (21.15-24.97)	22.38 (20.49-24.22)	1.10 (0.98-1.22)	0.1
Liver disease	6.68 (5.63-7.72)	7.07 (6.02-8.10)	0.97 (0.79-1.18)	0.74
Long COVID feature (any)	65.82 (63.25-68.20)	67.68 (65.11-70.06)	1.03 (0.96-1.10)	0.4
Mood disorder	19.80 (17.62-21.92)	17.10 (15.26-18.90)	1.14 (1.00-1.30)	0.06
Myalgia	2.82 (2.00-3.64)	2.76 (1.89-3.62)	1.03 (0.72-1.46)	0.88
Myocarditis	0.09 (0.002-0.19)	0.38 (0.10-0.66)	0.45 (0.14-1.48)	0.17
Myoneural junction/muscle disease	1.02 (0.65-1.39)	1.46 (0.99-1.93)	0.74 (0.47-1.16)	0.19
Nerve/nerve root/plexus disorder	5.29 (4.07-6.50)	4.28 (3.35-5.20)	1.01 (0.77-1.31)	0.96
Obesity	35.92 (33.54-38.22)	34.59 (32.25-36.85)	1.05 (0.96-1.15)	0.31
Other pain	16.22 (14.19-18.21)	17.48 (15.58-19.33)	0.90 (0.78-1.03)	0.13
Oxygen requirement	14.10 (12.62-15.56)	13.57 (12.20-14.92)	1.08 (0.95-1.23)	0.26
Peripheral neuropathy	6.74 (5.48-7.99)	5.83 (4.63-7.02)	1.23 (0.97-1.56)	0.08
Psychotic disorder	0.69 (0.39-0.99)	1.13 (0.70-1.56)	0.66 (0.39-1.14)	0.13
Respiratory failure	12.22 (10.95-13.47)	14.61 (13.22-15.97)	0.87 (0.76-0.99)	0.04
Seizures	1.66 (1.03-2.28)	1.89 (1.28-2.49)	0.75 (0.50-1.14)	0.17

Sleep disorders	20.72 (18.63-22.75)	20.52 (18.55-22.45)	1.04 (0.92-1.17)	0.57
Type 2 diabetes mellitus	30.74 (28.66-32.75)	30.13 (28.03-32.17)	1.08 (0.98-1.19)	0.11
Urticaria	0.53 (0.22-0.84)	0.33 (0.15-0.51)	1.27 (0.60-2.72)	0.53

The RECORD statement – checklist of items, extended from the STROBE statement, that should be reported in observational studies using routinely collected health data.

Item No.	STROBE items	Location in manuscript where items are reported	RECORD items	Location in manuscript where items are reported
Title and abstract				
1	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found	Title and Abstract	RECORD 1.1: The type of data used should be specified in the title or abstract. When possible, the name of the databases used should be included. RECORD 1.2: If applicable, the geographic region and timeframe within which the study took place should be reported in the title or abstract. RECORD 1.3: If linkage between databases was conducted for the study, this should be clearly stated in the title or abstract.	Abstract (Methods) Abstract (Methods) and Appendix p. 1 N/A
Introduction				
Background rationale	2 Explain the scientific background and rationale for the investigation being reported	Abstract, Research in Context, and Introduction		
Objectives	3 State specific objectives, including any prespecified hypotheses	Abstract (Background) and Introduction		
Methods				
Study Design	4 Present key elements of study design early in the paper	Abstract and Methods (first subsection)		
Setting	5 Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Methods ('Data and study design', 'Covariates', and 'Outcomes')		

Participants	6	<p>(a) <i>Cohort study</i> - Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up</p> <p><i>Case-control study</i> - Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls</p> <p><i>Cross-sectional study</i> - Give the eligibility criteria, and the sources and methods of selection of participants</p> <p>(b) <i>Cohort study</i> - For matched studies, give matching criteria and number of exposed and unexposed</p> <p><i>Case-control study</i> - For matched studies, give matching criteria and the number of controls per case</p>	<p>Methods ('Data and study design', 'Cohorts', and 'Covariates') and Appendix ('Definition of cohorts', 'Definition of cohorts' and 'Definition of covariates')</p>	<p>RECORD 6.1: The methods of study population selection (such as codes or algorithms used to identify subjects) should be listed in detail. If this is not possible, an explanation should be provided.</p> <p>RECORD 6.2: Any validation studies of the codes or algorithms used to select the population should be referenced. If validation was conducted for this study and not published elsewhere, detailed methods and results should be provided.</p> <p>RECORD 6.3: If the study involved linkage of databases, consider use of a flow diagram or other graphical display to demonstrate the data linkage process, including the number of individuals with linked data at each stage.</p>	<p>Methods ('Data and study design', 'Cohorts', and 'Covariates') and Appendix ('Definition of cohorts' and 'Definition of covariates')</p> <p>Appendix ('TriNetX network – Quality control')</p> <p>N/A</p>
Variables	7	<p>Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable.</p>	<p>Methods ('Cohorts', 'Covariates', 'Outcomes') and Appendix ('Definition of cohorts', 'Definition of covariates', 'Definition of outcomes')</p>	<p>RECORD 7.1: A complete list of codes and algorithms used to classify exposures, outcomes, confounders, and effect modifiers should be provided. If these cannot be reported, an explanation should be provided.</p>	<p>Methods ('Cohorts', 'Covariates', 'Outcomes') and Appendix ('Definition of cohorts', 'Definition of covariates', 'Definition of outcomes')</p>
Data sources/ measurement	8	<p>For each variable of interest, give sources of data and details</p>	<p>Methods ('Cohorts', 'Covariates',</p>		

		of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	'Outcomes') and Appendix ('Definition of cohorts'; 'Definition of covariates'; 'Definition of outcomes')		
Bias	9	Describe any efforts to address potential sources of bias	Introduction, Methods ('Cohorts'), and Appendix ('Definition of cohorts')		
Study size	10	Explain how the study size was arrived at	Methods ('Cohorts')		
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	Methods ('Covariates'), Appendix ('Definition of covariates')		
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) <i>Cohort study</i> - If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> - If applicable, explain how matching of cases and controls was addressed <i>Cross-sectional study</i> - If applicable, describe analytical	Methods ('Statistical analyses') and Appendix ('Details on statistical analyses')		

		methods taking account of sampling strategy (e) Describe any sensitivity analyses				Author contribution section
Data access and cleaning methods	..			RECORD 12.1: Authors should describe the extent to which the investigators had access to the database population used to create the study population.	RECORD 12.2: Authors should provide information on the data cleaning methods used in the study.	Appendix ('TrINeX network')
Linkage	..			RECORD 12.3: State whether the study included person-level, institutional-level, or other data linkage across two or more databases. The methods of linkage and methods of linkage quality evaluation should be provided.	N/A	
Results						
Participants	13	(a) Report the numbers of individuals at each stage of the study (<i>e.g.</i> , numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed) (b) Give reasons for non-participation at each stage. (c) Consider use of a flow diagram	Results (first paragraph) and Table 1 and Appendix Tables S1–5.	RECORD 13.1: Describe in detail the selection of the persons included in the study (<i>i.e.</i> , study population selection) including filtering based on data quality, data availability and linkage. The selection of included persons can be described in the text and/or by means of the study flow diagram.	Methods ('Cohorts') and Appendix ('Definition of cohorts')	
Descriptive data	14	(a) Give characteristics of study participants (<i>e.g.</i> , demographic, clinical, social) and information on exposures and potential confounders	(a) Table 1 and Table S1-S5			

		(b) Indicate the number of participants with missing data for each variable of interest (c) <i>Cohort study</i> - summarise follow-up time (e.g., average and total amount)	(b) Table 1 and Table S1-S5 (c) Results, first paragraph		
Outcome data	15	<i>Cohort study</i> - Report numbers of outcome events or summary measures over time <i>Case-control study</i> - Report numbers in each exposure category, or summary measures of exposure <i>Cross-sectional study</i> - Report numbers of outcome events or summary measures	Fig. 1-3, and Fig. S1-S9		
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (e.g., 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Results section, Fig. 1-3, Fig. S1-S9 and Tables S6 and S8-S13 N/A N/A N/A		
Other analyses	17	Report other analyses done— e.g., analyses of subgroups and interactions, and sensitivity analyses	Results section and appendix		
Discussion					
Key results	18	Summarise key results with reference to study objectives	Discussion first paragraph		

Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Discussion, antepenultimate paragraph	RECORD 19.1: Discuss the implications of using data that were not created or collected to answer the specific research question(s). Include discussion of misclassification bias, unmeasured confounding, missing data, and changing eligibility over time, as they pertain to the study being reported.	Discussion, antepenultimate paragraph
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Discussion, last paragraph, Abstract, and Research in Context		
Generalisability	21	Discuss the generalisability (external validity) of the study results	Discussion		
Other Information					
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Declaration of interest		
Accessibility of protocol, raw data, and programming code		RECORD 22.1: Authors should provide information on how to access any supplemental information such as the study protocol, raw data, or programming code.	Data sharing section

*Reference: Benchimol EI, Smeeth L, Guttman A, Harron K, Moher D, Petersen J, Sørensen HT, von Elm E, Langan SM, the RECORD Working Committee. The REporting of studies Conducted using Observational Routinely-collected health Data (RECORD) Statement. *PLoS Medicine* 2015; in press.

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