OFFICE OF THE UNDER SECRETARY OF WAR
4000 DEFENSE PENTAGON
WASHINGTON, D.C. 20301-4000

PERSONNEL AND
READINESS

The Honorable Roger F. Wicker
Chairman
Committee on Armed Services
United States Senate
Washington, DC 20510

MAR - 9 2026

Dear Mr. Chairman:

The Department's response to section 725 of the National Defense Authorization Act for Fiscal Year 2024 (Public Law 118–31), "Study and Report on Health Conditions of Members of the Armed Forces on Active Duty Developed after Administration of COVID-19 Vaccine," is enclosed.

This report covers findings of the requested study assessing health conditions among active duty Service members following the coronavirus disease 2019 (COVID-19) vaccination. The Department conducted a study assessing health conditions that represent potential adverse events arising in active duty Service members following the COVID-19 vaccination. Eighteen health outcomes were analyzed for the period of 2017-2024, including cardiac diagnoses, acute kidney injury, thrombotic disorders, neurovascular events, other neurologic conditions, appendicitis, and anaphylaxis.

Results of this study are consistent with the Department's prior section 725 report submitted on July 25, 2025. The study found that incidence of myocarditis and pericarditis increased in the short term after vaccination, but this was not sustained over a 1-year period and the increase was small relative to post-infection incidence rates. Incidence of eight conditions decreased following vaccination, while incidence of 14 conditions increased following SARS-CoV-2 infection; for most conditions, incidence was highest among those who had been infected but not vaccinated. Among the vaccinated population, incidence sometimes varied by vaccine type or by age.

Thank you for your continued strong support for the health and well-being of our Service members. I am sending a similar letter to the House Armed Services Committee.

Sincerely,

[redacted]

Sean O'Keefe
Deputy Under Secretary of War for Personnel
and Readiness

Enclosure:
As stated

cc:
The Honorable Jack Reed
Ranking Member

[redacted]

OFFICE OF THE UNDER SECRETARY OF WAR
4000 DEFENSE PENTAGON
WASHINGTON, D.C. 20301-4000

PERSONNEL AND
READINESS

The Honorable Mike D. Rogers
Chairman
Committee on Armed Services
U.S. House of Representatives
Washington, DC 20515

MAR - 9 2026

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Sincerely,

[redacted]

Sean O'Keefe
Deputy Under Secretary of War for Personnel
and Readiness

Enclosure:
As stated

cc:
The Honorable Adam Smith
Ranking Member

[redacted]

Report to the Committees on Armed Services of the Senate and the House of Representatives

Study and Report on Health Conditions of Members of the Armed Forces on Active Duty Developed after Administration of COVID-19 Vaccine

March 2026

The estimated cost of this report for the Department of War (DoW) is approximately $12,000 for the 2025 Fiscal Year. This includes $0 in expenses and $12,000 in DoW labor.
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Purpose

Section 725 of the National Defense Authorization Act (NDAA) for Fiscal Year (FY) 2024 (Public Law 118–31) required the following:[1]

> (a) STUDY.—The Secretary of Defense shall conduct a study to assess and evaluate any health conditions arising in members of the Armed Forces on active duty one year after receiving the first dose of a COVID-19 vaccine.
>
> (b) STUDY PARAMETERS.—In conducting the study under sub-section (a), the Secretary shall—
>
> (1) disaggregate data collected by—
>
> (A) vaccine type and manufacturer;
>
> (B) age group at the time such first dose was administered;
>
> (C) any health condition developed after receiving such first dose, regardless of whether the condition is attributable to the receipt of such first dose; and
>
> (D) an accounting of adverse events (including hyperimmune response), including further disaggregation by history of infection; and
>
> (2) assess the prevalence of each such health condition by each age group specified in paragraph (1)(B) among the unvaccinated population for each of years 2017, 2018, and 2019.
>
> (c) REPORT.—Not later than one year after the date of the enactment of this Act and each year thereafter for the subsequent four years, the Secretary shall submit to the Committees on Armed Services of the House of Representatives and the Senate a report on the results of each study conducted under subsection (a).
>
> (d) COVID-19 VACCINE DEFINED.—The term "COVID-19 vaccine" means a vaccine licensed under section 351 of the Public Health Service Act (42 U.S.C. 262) or authorized for emergency use under section 564 of the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 360bbb-3) for immunization against the virus responsible for COVID-19.

This is the second annual report submitted in accordance with section 725 of the NDAA for FY 2024.

Background and Approach

To ensure warfighter safety and medical readiness, the Department of War (DoW) continually reviews its health surveillance data and the broader scientific literature to assess and mitigate any potential areas of risk to warfighter health. Prior large-scale, global evaluations of the coronavirus disease 2019 (COVID-19) vaccine effectiveness and safety have shown that vaccination has resulted in substantial reduction of COVID-19 disease burden, specifically hospitalizations and deaths, and that severe adverse events following immunization with COVID-19 vaccine are rare.[2-5] Pursuant to section 725 of the NDAA for FY 2024, this report builds upon the existing body of evidence by specifically examining the Department's data on post-vaccination health outcomes and adverse events among active duty Service members.

Available Vaccine Types and Manufacturers

There are three primary types of COVID-19 vaccines that have been, or are currently, available in the United States. These include messenger RNA (mRNA) vaccines manufactured by Moderna and Pfizer-BioNTech, a viral vector vaccine manufactured by Janssen/Johnson & Johnson, and a protein subunit vaccine manufactured by Novavax. In May 2023, the manufacturer requested the voluntary withdrawal of the emergency use authorization (EUA) of the Janssen COVID-19 vaccine, and the EUA was subsequently revoked by the Food and Drug Administration (FDA) in June 2023. As a result, the vaccines produced by Moderna, Pfizer, and Novavax are the COVID-19 vaccines currently available in the United States. The relevant dates of U.S. availability of all COVID-19 vaccines are shown in Table 1.

Table 1: Available COVID-19 Vaccines

Vaccine Manufacturer	Vaccine Name	Date granted EUA	Date granted full FDA approval
Pfizer-BioNTech	Comirnaty	December 11, 2020	August 23, 2021
Moderna	Spikevax	December 18, 2020	January 31, 2022
Janssen/Johnson & Johnson	Jcovden	February 27, 2021 (revoked June 1, 2023)	N/A
Novavax	Nuvaxovid	July 13, 2022	May 16, 2025

COVID-19 vaccine distribution to the DoW's vaccination sites began in December 2020 following FDA EUA issuance and in accordance with the Centers for Disease Control and Prevention's (CDC) Advisory Committee on Immunization Practices (ACIP) interim recommendations for use and allocation of COVID-19 vaccines. Vaccines were initially made available to all Service members who chose to be vaccinated under EUA and as of August 2021, voluntary vaccination (at least one dose) represented more than 70 percent of the active duty Service member population.[1] Following FDA licensure of Pfizer vaccines in August 2021, Service members were required to be vaccinated. This mandate was repealed in January 2023 in accordance with section 525 of the James M. Inhofe NDAA for FY 2023 (Public Law 117–263), once again making COVID-19 vaccination voluntary. Of the COVID-19 vaccine doses that were

[1] Data was pulled from DoD's ADVANA data system in August 2021.

administered to active duty Service members between 2021 and 2024, approximately two-thirds were manufactured by Pfizer-BioNTech, and one-third were manufactured by Moderna.

Prior DoW Studies

DoW published its first annual report pursuant to section 725 of the NDAA for FY 2024 on July 25, 2025.[6] That initial study examined the incidence of 15 health conditions among active duty Service members following COVID-19 vaccination and SARS-CoV-2 infection during 2021-2023. Overall, the study found that incidence of myocarditis and pericarditis modestly increased following COVID-19 vaccination, consistent with known vaccine safety evaluations, while incidence of six conditions decreased following vaccination. Additionally, incidence of 14 conditions increased following SARS-CoV-2 infection and, for most conditions, incidence was highest among those who had been infected but not vaccinated. This second annual report builds on the first, as described in the following section.

In parallel, DoW has also conducted specific studies to examine incidence of adverse reproductive health outcomes among female active duty Service members following COVID-19 vaccination, accounting for broader trends as well as demographic and medical covariates. Thus far, DoW analysis has found that COVID-19 vaccination, including during pregnancy, has no association with increased incidence of ovarian dysfunction such polycystic ovary syndrome (PCOS);[7] adverse pregnancy outcomes such as antepartum hemorrhage, gestational diabetes, eclampsia, pre-eclampsia, pre-term labor or delivery, premature rupture of membranes, and stillbirth;[8] and adverse neonatal outcomes such as preterm birth, small for gestational age, low birthweight, and neonatal intensive care unit admission in the first 28 days of life.[9] These studies have shown potential associations between SARS-CoV-2 infection and some adverse reproductive health outcomes, notably PCOS, antepartum hemorrhage, and eclampsia. By addressing female reproductive health outcomes, these focused studies provide an important complement to the broad, annual section 725 studies.

Study Approach

The study's design and methodology are summarized here, and a detailed overview can be found in Appendix A. Overall, the study is designed to address the requirements in section 725, assessing the incidence of adverse health outcomes among active duty Service members following COVID-19 vaccination by examining the Department's medical surveillance data.

This report examines a range of health outcomes, including cardiac conditions (myocarditis, pericarditis, acute myocardial infarction, life-threatening arrhythmias, non-life-threatening arrhythmias), acute kidney injury, thrombotic disorders (immune thrombocytopenia, pulmonary embolism, deep venous thrombosis), neurovascular events (ischemic stroke, hemorrhagic stroke, retinal vascular occlusion), other neurologic conditions (Bell's palsy, Guillain-Barre Syndrome, acute disseminated encephalomyelitis (ADEM), optic neuritis), and appendicitis, along with anaphylaxis, a type of hypersensitivity reaction that can occur following any type of vaccination. In selecting these 18 outcomes, DoW considered stakeholder concerns alongside evidence from the Military Health System and broader global scientific community.[10-13] The study addresses all of the adverse events of interest previously identified by the CDC as

part of ongoing assessments of COVID-19 vaccine safety — anaphylaxis, myocarditis and pericarditis, Guillain-Barre syndrome, and thrombotic disorders such as pulmonary embolism — and additionally examines a broader range of biologically plausible health outcomes to proactively monitor other potential areas of interest for warfighter health.

The study addresses risks from both the first COVID-19 vaccine dose and any subsequent doses and considers outcomes over a 1-year period and within epidemiologically informed "risk windows" following vaccination. To address section 725's requirement to disaggregate post-vaccination outcomes by history of infection, the study additionally examines health outcomes following SARS-CoV-2 infection and all combinations of vaccination and infection history.[2] To enable a holistic understanding of health risks associated with exposure to COVID-19 vaccinations and infections, the study considers baseline incidence rates prior to the emergence of SARS-CoV-2, dating back to 2017, and then compares incidence rates between vaccinated and/or infected groups and parts of the population who have not been exposed during 2021-2024, after adjusting for demographic or health factors, to ascertain whether the exposures may increase or decrease risk of a given health outcome.

Results

Overview and Key Findings

This report's findings are summarized in this section and visualized in the following section of figures and tables. More detailed data tables are provided in Appendix B.

Per section 725(b)(2) of the NDAA for FY 2024, this report provides an overview of the overall incidence of each of the health conditions for 2017-2019 — the pre-pandemic period representing when Service members were unvaccinated and never-before-infected. It additionally examines the incidence of each condition for 2020 (when COVID-19 infections began but vaccines were not yet available) and 2021-2024 (when both infections and vaccinations occurred) to allow for observation of trends. The overall trend is visualized in Figure 1 and is further broken down by age group in Appendix B, Table B1.

- **Finding 1:** For most conditions (14 of 17), the overall incidence rates trended higher in 2021-2024 than incidence rates in 2017-2019. This pattern was not observed for pericarditis, immune thrombocytopenia, and ADEM.

To examine the increased incidence of several health conditions during the pandemic and to address section 725(b)(1)(C), DoW first compared incidence following SARS-CoV-2 infections and COVID-19 vaccinations in 2021-2024 with incidence among those who had never previously been diagnosed with SARS-CoV-2 or vaccinated, respectively. This comparative analysis was adjusted for demographic and medical covariates and thus represents the Department's best possible information based on existing data for determining associations

[2] With the exception of anaphylaxis, which is a specific hypersensitivity reaction and was therefore examined following vaccination alone.

between vaccination or infection and health outcomes. The adjusted incidence rate ratios for each condition are shown in Table 2.

- **Finding 2:** Following SARS-CoV-2 infection, incidence of 14 of 17 health conditions increased during the risk window. Of those 14 conditions, 10 showed significantly increased incidence beyond the risk window. Immune thrombocytopenia, retinal vascular occlusion, and optic neuritis showed no statistically significant association with SARS-CoV-2 infection.

- **Finding 3:** Following COVID-19 vaccination, incidence of myocarditis and pericarditis increased during the risk window (21 days). The increases were smaller than those for infection and were not observed beyond the risk window. This observation is consistent with findings in prior vaccine safety evaluations.

- **Finding 4:** Following COVID-19 vaccination, incidence of eight conditions — life threatening and non-life-threatening arrythmias, acute kidney failure, immune thrombocytopenia, pulmonary embolism, deep vein thrombosis, hemorrhagic stroke, and Bell's palsy — decreased during the risk window. These decreases were observed beyond the risk window for six of the eight conditions (excluding life threatening arrhythmias and hemorrhagic stroke). For the remaining seven conditions, there was no statistically significant association with COVID-19 vaccination.

To address section 725(b)(1)(D), this report presents the incidence rates for each condition following vaccination and infection, along with incidence rates disaggregated across all combinations of vaccination and infection history, in Figure 2. A full accounting of incidence for each health condition following vaccination, infection, and every combination thereof, broken out by year, is provided in Appendix B, Table B2. The findings below, based on these data, are often observing small numbers, not adjusted for demographic differences, and without tests of statistical significance for comparing differences, and should be interpreted with those caveats in mind.

- **Finding 5:** Incidence following infection exceeded incidence following vaccination for 16 of 17 conditions (all but retinal vascular occlusion) within the risk window, and for 16 of 17 conditions (all but ADEM) within 1 year.

- **Finding 6:** When fully disaggregated, the highest incidence rates were observed among those who had been infected within the risk window but not vaccinated for most (10 of 17) conditions. For the remaining conditions, the highest incidence was among those who had been both infected and vaccinated within the risk window (six conditions), or among those not vaccinated and not infected (one condition); no condition showed the highest incidence among those who had been vaccinated but not infected in the risk window. While incidence rates were generally substantially lower across the board for a 1-year period following vaccination or infection, the overall pattern of relative incidence remained consistent; notably, within 1 year, the lowest

incidence of 12 conditions was among those who had been vaccinated but not infected.

The report further disaggregates the post-vaccination incidence rates for each condition by vaccine type and manufacturer and age group, to address section 725(b)(1)(A) and 725(b)(1)(B), respectively, in Appendix B, Tables B3 and B4. The findings below are often observing small numbers, not adjusted for demographic differences, and without tests of statistical significance for comparing differences, and should be interpreted with those caveats in mind.

- **Finding 7:** Results by vaccine type were consistent in demonstrating a small increase in myocarditis incidence after mRNA vaccination; this incidence remained lower than incidence of myocarditis after SARS-CoV-2 infection.

- **Finding 8:** When evaluating age effects, the incidence of most conditions appeared to increase with increasing age, while myocarditis incidence rates appeared to be higher in younger people. These findings were consistent with established age-based risks in the general population.

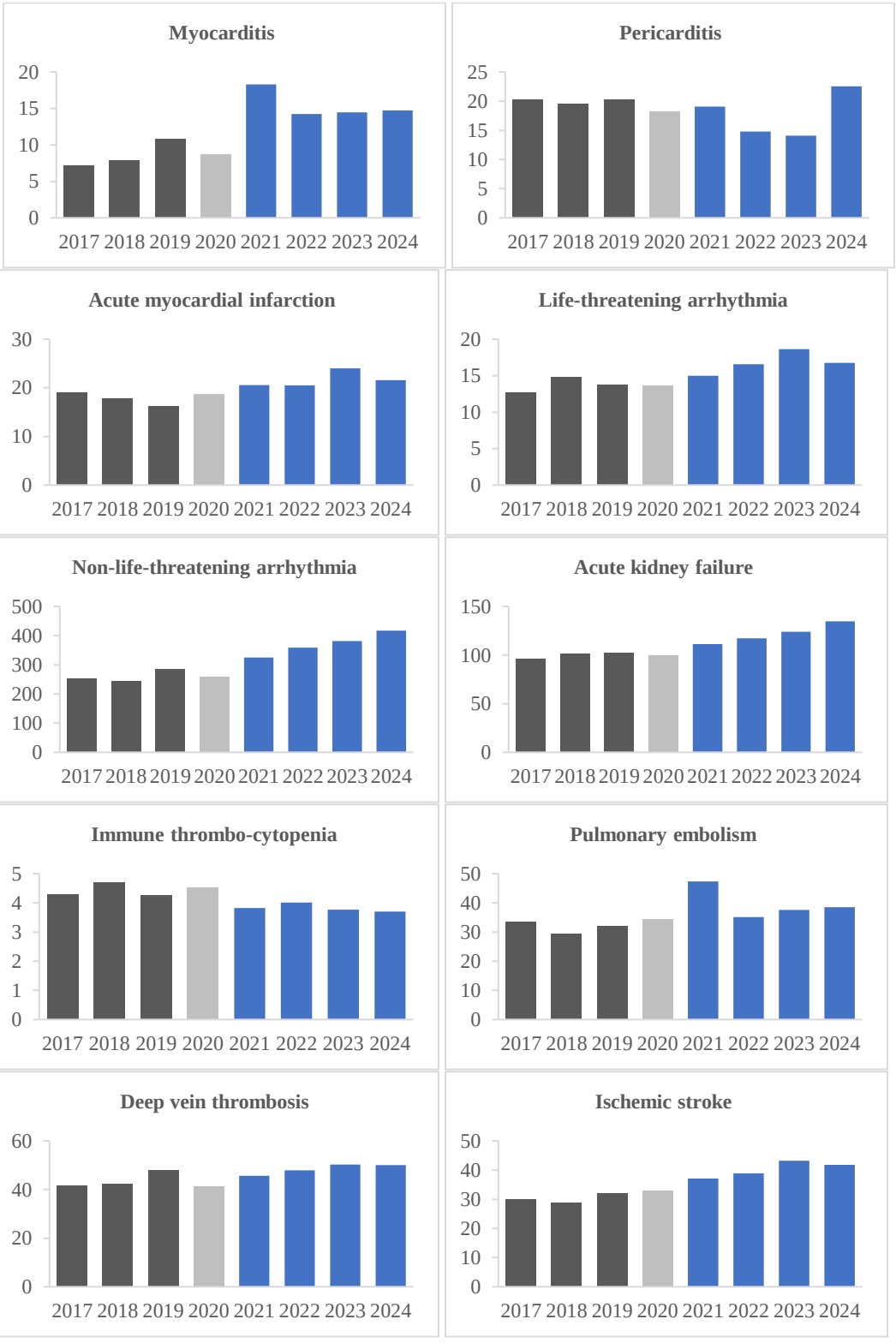
Finally, the report provides an accounting of reported cases of anaphylaxis within 7 days on or after receipt of a COVID-19 vaccine in 2021-2024, as required by section 725(b)(1)(D). These are disaggregated by vaccine type and manufacturer as well as age group in Table 3, though small sample size precludes meaningful analysis.

- **Finding 7:** Anaphylaxis is rare, representing only 16 cases among the over 3.1 million vaccine doses administered, or 0.000515 percent incidence. No cases were recorded in 2023-2024.

These analyses are consistent with the experiences of the U.S. and global public health communities, as well as prior DoW analysis, in evaluations of the safety of COVID-19 vaccines. The referenced figures and tables illustrating these findings are provided below.

Figures and Tables

Figure 1: Unadjusted incidence rate of each health condition per 100,000 person-years, 2017-2024



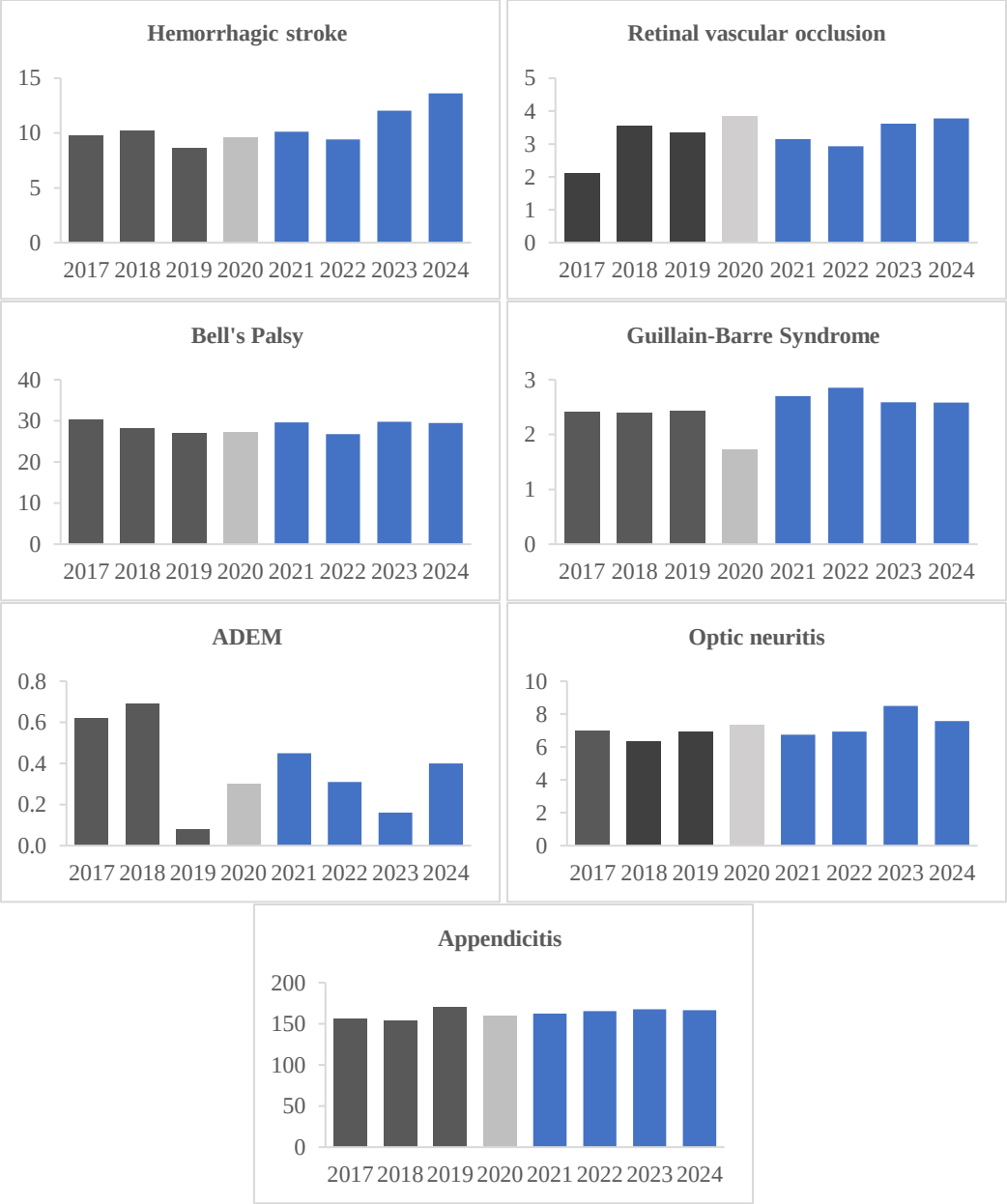

Hemorrhagic stroke
15
10
5
0
2017 2018 2019 2020 2021 2022 2023 2024
Retinal vascular occlusion
5
4
3
2
1
0
2017 2018 2019 2020 2021 2022 2023 2024
Bell's Palsy
40
30
20
10
0
2017 2018 2019 2020 2021 2022 2023 2024
Guillain-Barre Syndrome
3
2
1
0
2017 2018 2019 2020 2021 2022 2023 2024
ADEM
0.8
0.6
0.4
0.2
0.0
2017 2018 2019 2020 2021 2022 2023 2024
Optic neuritis
10
8
6
4
2
0
2017 2018 2019 2020 2021 2022 2023 2024
Appendicitis
200
150
100
50
0
2017 2018 2019 2020 2021 2022 2023 2024

Table 2: Adjusted incidence rate ratios (IRRs) for health conditions, by SARS-CoV-2 infection and COVID-19 vaccination, 2021-2024

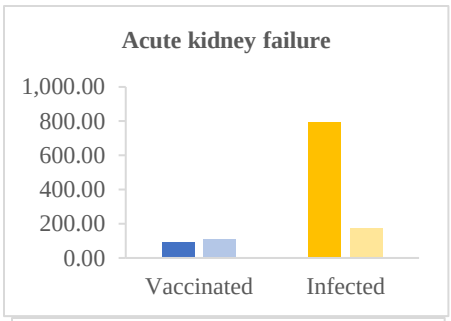
Health Condition	Within or Beyond Risk Window	SARS-CoV-2 Infection		COVID-19 Vaccination	
		IRR	95% confidence limits	IRR	95% confidence limits
Myocarditis	Within 21 days	14.33*	10.92 - 18.79	2.14*	1.60 - 2.87
	>21 days	1.88*	1.61 - 2.19	0.77	0.63 - 0.93
Pericarditis	Within 21 days	6.52*	4.64 - 9.18	1.81*	1.34 - 2.44
	>21 days	1.42*	1.23 - 1.64	0.88	0.74 - 1.06
Acute myocardial infarction	Within 21 days	4.78*	3.39 - 6.74	0.97	0.69 - 1.35
	>21 days	1.06	0.93 - 1.22	0.86	0.72 - 1.03
Life-threatening arrhythmias	Within 21 days	4.60*	3.06 - 6.92	0.49*	0.30 - 0.82
	>21 days	1.28*	1.11 - 1.49	0.91	0.74 - 1.11
Non-life-threatening arrhythmias	Within 21 days	4.31*	3.94 - 4.72	0.88*	0.80 - 0.95
	>21 days	1.40*	1.36 - 1.45	0.87*	0.84 - 0.91
Acute kidney failure	Within 21 days	7.02*	6.21 - 7.95	0.66*	0.56 - 0.78
	>21 days	1.17*	1.11 - 1.24	0.83*	0.78 - 0.89
Immune thrombocytopenia	Within 42 days	1.81	0.74 - 4.43	0.29*	0.12 - 0.74
	>42 days	1.17	0.85 - 1.61	0.65*	0.46 - 0.94
Pulmonary embolism	Within 28 days	13.46*	11.64 - 15.56	0.64*	0.51 - 0.81
	>28 days	1.31*	1.18 - 1.44	0.61*	0.54 - 0.68
Deep vein thrombosis	Within 28 days	3.25*	2.55 - 4.13	0.65*	0.51 - 0.82
	>28 days	1.16*	1.06 - 1.27	0.81*	0.72 - 0.91
Ischemic stroke	Within 28 days	2.81*	2.11 - 3.75	0.92	0.72 - 1.17
	>28 days	1.27*	1.16 - 1.40	0.91	0.80 - 1.05
Hemorrhagic stroke	Within 28 days	2.48*	1.39 - 4.40	0.57*	0.34 - 0.96
	>28 days	1.17	0.97 - 1.41	0.86	0.68 - 1.08
Retinal vascular occlusion	Within 21 days	0.88	0.12 - 6.32	0.81	0.33 - 2.01
	>21 days	1.11	0.80 - 1.55	0.85	0.54 - 1.34
Bell's palsy	Within 42 days	1.96*	1.42 - 2.71	0.75*	0.58 - 0.96
	>42 days	1.21*	1.08 - 1.36	0.79*	0.68 - 0.91
Guillain-Barre Syndrome	Within 42 days	5.77*	3.00 - 11.08	1.31	0.65 - 2.63
	>42 days	1.05	0.69 - 1.58	0.89	0.56 - 1.41
Acute disseminated encephalomyelitis	Within 42 days	9.79*	2.18 - 43.94	4.70	0.78 - 28.46
	>42 days	0.87	0.24 - 3.18	1.66	0.35 - 7.84
Optic neuritis	Within 21 days	1.49	0.56 - 4.00	0.54	0.27 - 1.08
	>21 days	1.09	0.86 - 1.36	0.80	0.61 - 1.06
Appendicitis	Within 21 days	3.54*	3.06 - 4.10	0.99	0.87 - 1.13
	>21 days	1.25*	1.19 - 1.32	1.00	0.94 - 1.07

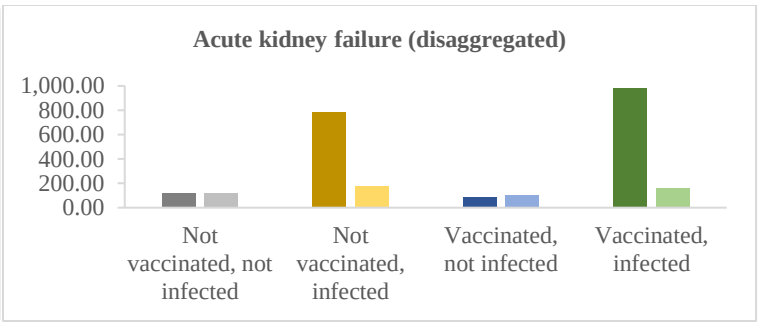
Models were adjusted for age, sex, race/ethnicity, obesity status, and either SARS-CoV-2 infection or COVID-19 vaccination. The reference group is "Never" previously infected or vaccinated, respectively.

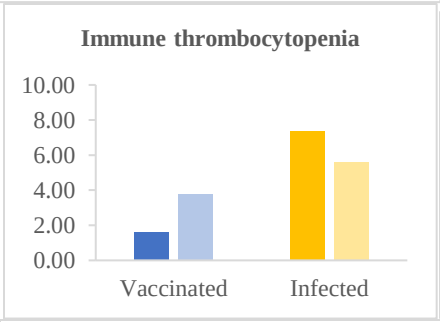
*Statistically significant, p-value <0.05

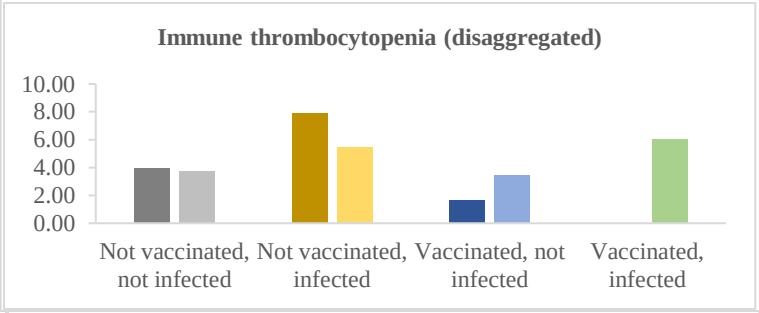
Figure 2: Unadjusted incidence of each health condition per 100,000 person-years in 2021-2024, after vaccination or infection (left) and disaggregated by vaccination and infection history (right), within risk windows (dark bars) and within 1 year* (light bars)

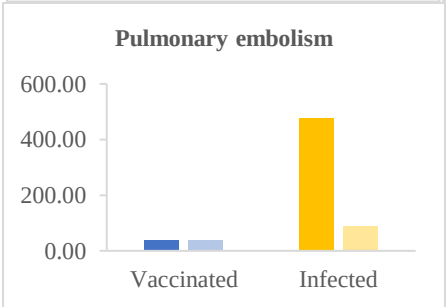
**Represents one year after* first *vaccine dose. All other categories are following* any *vaccine dose or infection.*

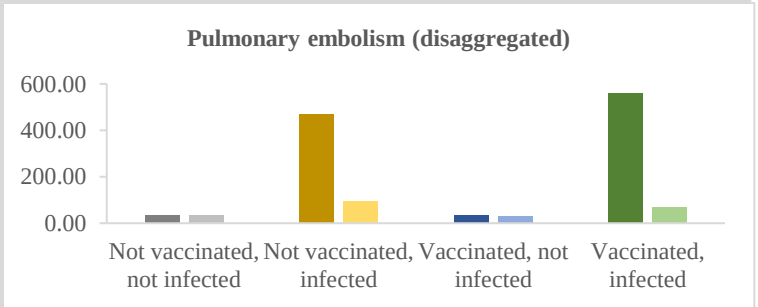

Acute kidney failure
1,000.00
800.00
600.00
400.00
200.00
0.00
Vaccinated
Infected

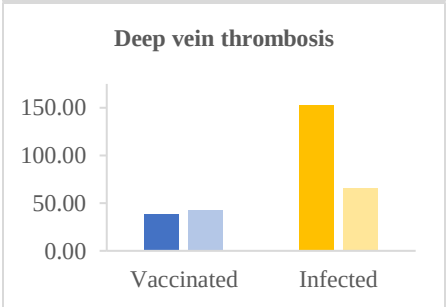

Acute kidney failure (disaggregated)
1,000.00
800.00
600.00
400.00
200.00
0.00
Not vaccinated, not infected
Not vaccinated, infected
Vaccinated, not infected
Vaccinated, infected

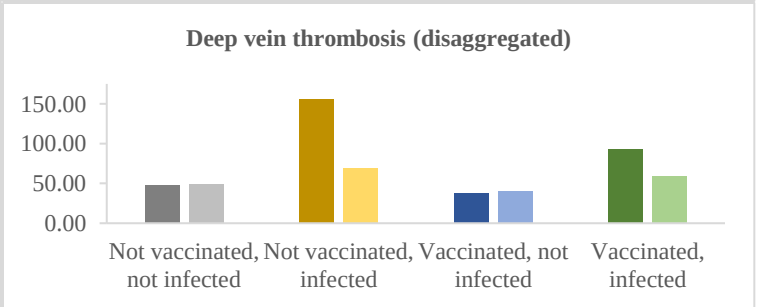

Immune thrombocytopenia
10.00
8.00
6.00
4.00
2.00
0.00
Vaccinated
Infected

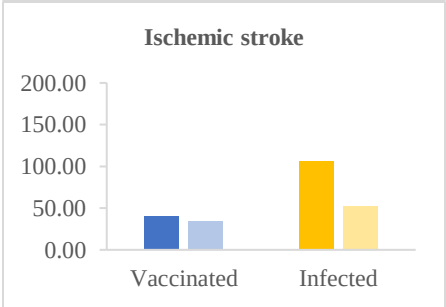

Immune thrombocytopenia (disaggregated)
10.00
8.00
6.00
4.00
2.00
0.00
Not vaccinated, not infected
Not vaccinated, infected
Vaccinated, not infected
Vaccinated, infected

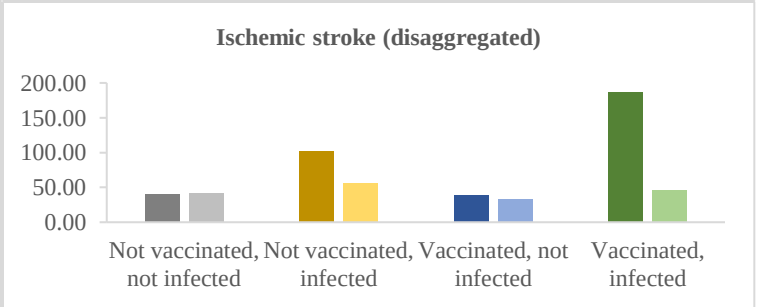

Pulmonary embolism
600.00
400.00
200.00
0.00
Vaccinated
Infected

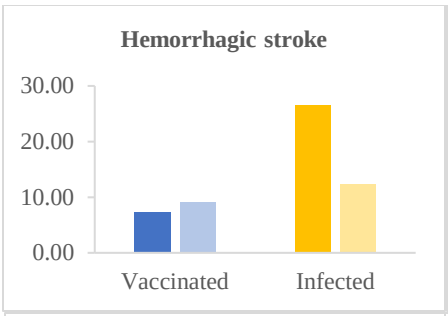

Pulmonary embolism (disaggregated)
600.00
400.00
200.00
0.00
Not vaccinated, not infected
Not vaccinated, infected
Vaccinated, not infected
Vaccinated, infected

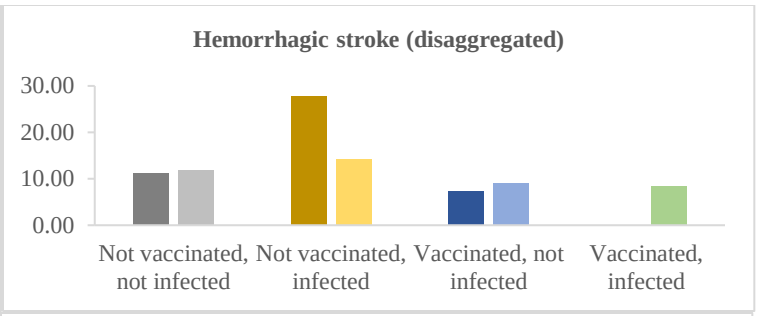

Deep vein thrombosis
150.00
100.00
50.00
0.00
Vaccinated
Infected

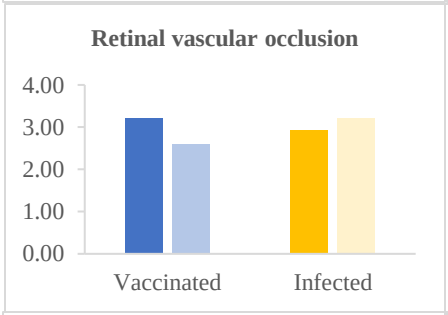

Deep vein thrombosis (disaggregated)
150.00
100.00
50.00
0.00
Not vaccinated, not infected
Not vaccinated, infected
Vaccinated, not infected
Vaccinated, infected

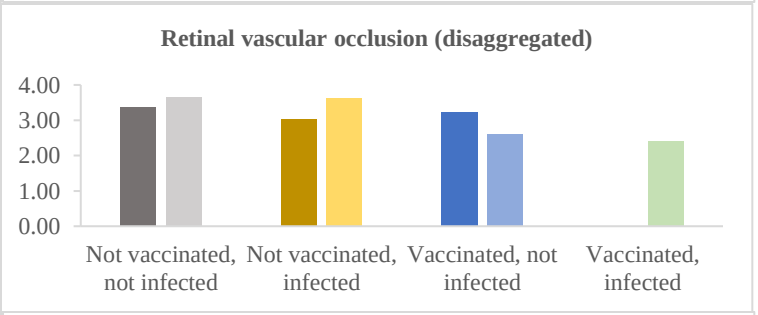

Ischemic stroke
200.00
150.00
100.00
50.00
0.00
Vaccinated
Infected

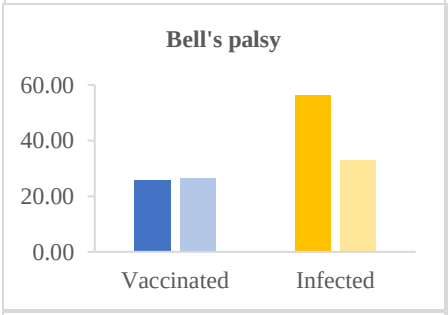

Ischemic stroke (disaggregated)
200.00
150.00
100.00
50.00
0.00
Not vaccinated, not infected
Not vaccinated, infected
Vaccinated, not infected
Vaccinated, infected

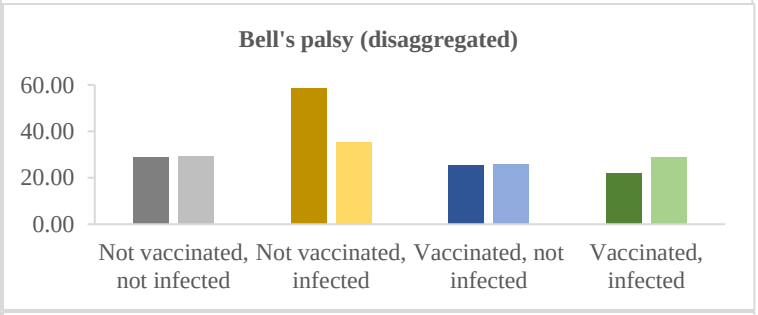

Hemorrhagic stroke
30.00
20.00
10.00
0.00
Vaccinated
Infected

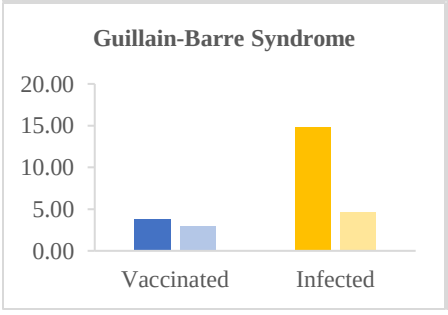

Hemorrhagic stroke (disaggregated)
30.00
20.00
10.00
0.00
Not vaccinated, not infected
Not vaccinated, infected
Vaccinated, not infected
Vaccinated, infected

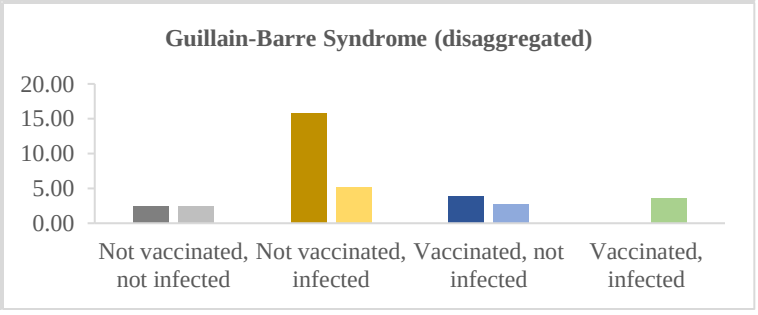

Retinal vascular occlusion
4.00
3.00
2.00
1.00
0.00
Vaccinated
Infected

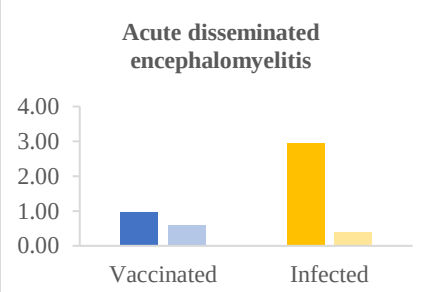

Retinal vascular occlusion (disaggregated)
4.00
3.00
2.00
1.00
0.00
Not vaccinated, not infected
Not vaccinated, infected
Vaccinated, not infected
Vaccinated, infected

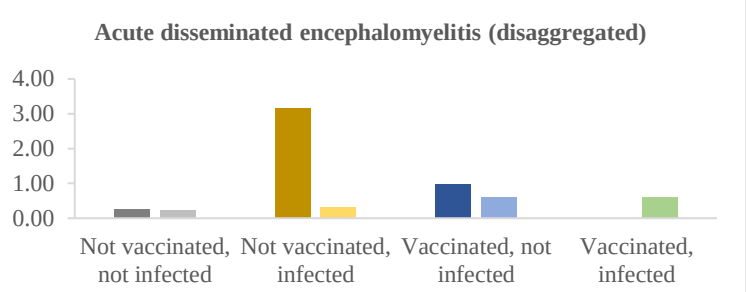

Bell's palsy
60.00
40.00
20.00
0.00
Vaccinated
Infected

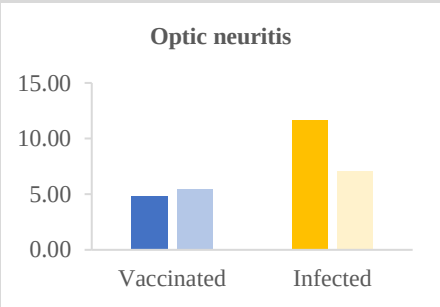

Bell's palsy (disaggregated)
60.00
40.00
20.00
0.00
Not vaccinated, not infected
Not vaccinated, infected
Vaccinated, not infected
Vaccinated, infected

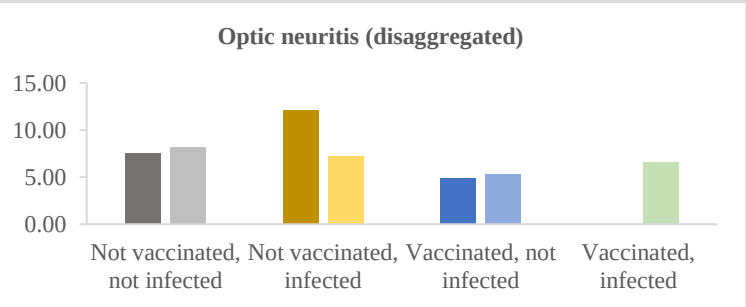

Guillain-Barre Syndrome
20.00
15.00
10.00
5.00
0.00
Vaccinated
Infected

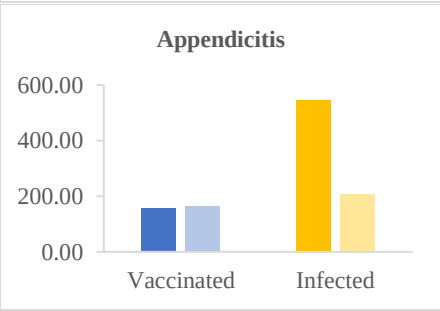

Guillain-Barre Syndrome (disaggregated)
20.00
15.00
10.00
5.00
0.00
Not vaccinated, not infected
Not vaccinated, infected
Vaccinated, not infected
Vaccinated, infected


Acute disseminated encephalomyelitis
4.00
3.00
2.00
1.00
0.00
Vaccinated
Infected


Acute disseminated encephalomyelitis (disaggregated)
4.00
3.00
2.00
1.00
0.00
Not vaccinated, not infected
Not vaccinated, infected
Vaccinated, not infected
Vaccinated, infected


Optic neuritis
15.00
10.00
5.00
0.00
Vaccinated
Infected


Optic neuritis (disaggregated)
15.00
10.00
5.00
0.00
Not vaccinated, not infected
Not vaccinated, infected
Vaccinated, not infected
Vaccinated, infected


Appendicitis
600.00
400.00
200.00
0.00
Vaccinated
Infected

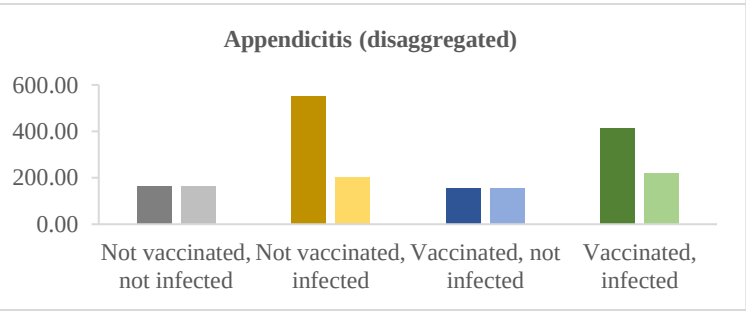

Appendicitis (disaggregated)
600.00
400.00
200.00
0.00
Not vaccinated, not infected
Not vaccinated, infected
Vaccinated, not infected
Vaccinated, infected

Table 3: Cases of anaphylaxis within 7 days on or after a COVID-19 vaccine dose, active duty Service members, 2021-2024

	Total			2021			2022			2023			2024		
	Cases	**Doses**	**%**	**Cases**	**Doses**	**%**	**Cases**	**Doses**	**%**	**Cases**	**Doses**	**%**	**Cases**	**Doses**	**%**
All	**16**	**3,107,034**	**0.000515**	**13**	**2,611,610**	**0.000498**	**3**	**426,764**	**0.000703**	**0**	**42,986**	**0**	**0**	**25,674**	**0**
By age (in years)															
<20 years	**1**	**283,586**	**0.000353**	1	203,642	0.000491	0	75,559	0	0	4,226	0	0	159	0
20-24 years	**5**	**932,115**	**0.000536**	5	805,123	0.000621	0	118,395	0	0	7,165	0	0	1,432	0
25-29 years	**3**	**682,769**	**0.000439**	1	594,111	0.000168	2	78,762	0.002539	0	6,421	0	0	3,475	0
30-34 years	**4**	**486,337**	**0.000822**	3	416,126	0.000721	1	58,361	0.001713	0	6,905	0	0	4,945	0
35-39 years	**1**	**381,929**	**0.000262**	1	321,226	0.000311	0	47,904	0	0	7,147	0	0	5,652	0
40-44 years	**1**	**205,261**	**0.000487**	1	167,347	0.000598	0	27,213	0	0	5,628	0	0	5,073	0
45+ years	**1**	**135,037**	**0.000741**	1	104,035	0.000961	0	20,570	0	0	5,494	0	0	4,938	0
By vaccine type and manufacturer															
mRNA Moderna	**4**	**989,228**	**0.000404**	4	846,872	0.000472	0	123,577	0	0	11,956	0	0	6,823	0
mRNA Pfizer	**11**	**1,985,873**	**0.000554**	9	1,637,064	0.00055	2	299,586	0.000668	0	30,797	0	0	18,426	0
Janssen	**0**	**129,970**	**0**	0	127,349	0	0	2,571	0	0	47	0	0	3	0
Novavax	**1**	**1,559**	**0.064144**	0	89	0	1	921	0.108578	0	152	0	0	397	0
Other	**0**	**404**	**0**	0	236	0	0	109	0	0	34	0	0	25	0

Appendix A: Study Design, Methodology, and Limitations

Health Conditions and Potential Adverse Events

Section 725 of the NDAA for FY 2024 requires this report to "evaluate any health conditions arising in members of the Armed Forces on active duty one year after receiving the first dose of a COVID-19 vaccine," as well as provide "an accounting of adverse events (including hyperimmune response)."[1] DoW selected a range of health conditions to evaluate in this report based on a review of existing DoW surveillance data, broader scientific literature on vaccines and health outcomes, biologic plausibility of various health outcomes from vaccines, and concerns previously expressed by the House Armed Services Committee regarding vaccine safety.[10-13] This report addresses 18 health outcomes: cardiac conditions (myocarditis, pericarditis, acute myocardial infarction, life-threatening arrhythmias, non-life-threatening arrhythmias), acute kidney injury, thrombotic disorders (immune thrombocytopenia, pulmonary embolism, deep venous thrombosis), neurovascular events (ischemic stroke, hemorrhagic stroke, retinal vascular occlusion), other neurologic conditions (Bell's palsy, Guillain-Barre Syndrome, acute disseminated encephalomyelitis, optic neuritis), appendicitis, and anaphylaxis.

DoW continuously assesses relevant scientific literature regarding vaccine safety and accordingly expanded the scope of the study to include three additional health conditions beyond the 15 outcomes examined in the first annual report: retinal vascular occlusion,[14] optic neuritis,[15] and anaphylaxis. Anaphylaxis, in particular, was added to address the section 725 requirement for an accounting of "hyperimmune response." While "hyperimmune response" or "hyperimmune reaction" are non-specific terms used in the literature to apply to various autoimmune disorders, cytokine storm-like reactions, or robust/aberrant immune-mediated reactions,[16-19] anaphylaxis is particularly salient in the vaccine safety literature. It is an immediate allergic reaction — specifically a type I hypersensitivity reaction, categorized as severe and immediate — that can occur after any type of vaccination.

The selected set of outcomes is also consistent with ACIP and CDC practice. Since 2021, the CDC has continuously evaluated at least 4 adverse events of interest (anaphylaxis, myocarditis, Guillain-Barre syndrome, and thrombotic disorders (e.g., pulmonary embolism)) as part of ongoing assessment of COVID-19 vaccine safety. While such events are rare, DoW took a broad view for the purposes of this report, incorporating these events and other known risks (such as pericarditis among young men), along with many other types of potential adverse events or health conditions following immunization into our analysis.

Health Outcomes Data

All data presented in this report represent active duty Service members who served between 2017 and 2024, and the primary data source was the Defense Medical Surveillance System (DMSS). All health outcomes included in this report were identified using International Classification of Diseases diagnostic codes from inpatient, outpatient, and in-theater medical encounter records in the DMSS. Data on post-vaccination health outcomes are restricted to the 2021-2024 time period, following COVID-19 vaccine EUA rollout in 2020.

All conditions (except anaphylaxis) required at least two medical encounters with a qualifying diagnosis within 60 days of each other to be counted as a case, which was done to reduce the likelihood of including false positive cases due to presumptive diagnoses being listed in the electronic healthcare record. For anaphylaxis, only a single encounter with a qualifying diagnosis was required; however, all cases of anaphylaxis were confirmed by medical chart review. Anaphylaxis was only assessed following COVID-19 vaccination; it was not assessed following SARS-CoV-2 infection. As data quality limitations can impact epidemiological analysis — clinicians may over-report, under-report, or miscode health conditions — the requirement for repeat coding and clinical review of coding serves to mitigate these challenges.

Incidence Rates and Risk Windows

Section 725 of the NDAA for FY 2024 requires an assessment of the "prevalence of health conditions by age group among the unvaccinated population for each of years 2017, 2018, 2019." From the perspective of epidemiological analysis, "prevalence" is the measure of how many people in a population have a condition at one specific point in time. In contrast, "incidence" measures new-onset conditions over a defined time range. When trying to evaluate the potential relationship between an exposure (such as vaccination) and an outcome (such as a health condition), incidence metrics are most appropriate for encompassing risk over comparable time periods because incidence excludes cases of disease that occur prior to being exposed.[2,5] When evaluating relative post-exposure risk of for developing a health condition, it is important to exclude cases where a health condition occurred prior to exposure and could not have been caused by the exposure. Therefore, this study evaluates incidence of a range of health conditions rather than prevalence.

Incidence rates are a metric representing the number of new cases of a disease per 100,000 person-years of military service. They allow outcomes to be compared at a population level for different periods of time. Adjusted incidence rate ratios were calculated for this report. A rate ratio allows incidence rates of two groups to be compared to each other, after adjusting for differences in demographic features or other health factors. Interpretation of a rate ratio is straightforward: a rate ratio of 1.0 indicates equal rates within the groups being compared, a rate ratio greater than 1.0 indicates increased risk associated with the exposure (infection or vaccination), and a rate ratio less than 1.0 indicates decreased risk or a protective effect of the exposure (infection or vaccination).

In addition to evaluating incidence of health conditions one year after vaccination, the study also assessed incidence within a brief "risk window" for each outcome following vaccination. The consensus among epidemiological experts is that risk window analysis provides the best possible scientific evidence of an association between the exposure (e.g., COVID-19 vaccine or SARS-CoV-2 infection) and the health outcome. However, it should be noted that even if a health condition is diagnosed during the risk window, that health condition may still be caused by some other factor that is unrelated to the exposure, because the exposure does not rule out other clinical causes of disease. The specific risk windows for each health condition, as shown in Table A1 below, were selected based on a literature review of more than 50 published studies, review of pre-existing surveillance data,[10,11] and consultation with military clinicians.

Table A1: Conditions of interest and corresponding risk windows

Condition	COVID vaccine risk window	SARS-CoV-2 infection risk window
Myocarditis	21 days	21 days
Pericarditis	21 days	21 days
Acute myocardial infarction	21 days	21 days
Life-threatening arrhythmias	21 days	21 days
Non-life-threatening arrhythmias	21 days	21 days
Immune thrombocytopenia	42 days	42 days
Pulmonary embolism	28 days	28 days
Deep vein thrombosis	28 days	28 days
Acute kidney failure	21 days	21 days
Ischemic stroke	28 days	28 days
Hemorrhagic stroke	28 days	28 days
Retinal vascular occlusion	21 days	21 days
Bell's Palsy	42 days	42 days
Guillain-Barre Syndrome	42 days	42 days
Acute disseminated encephalomyelitis	42 days	42 days
Optic neuritis	21 days	21 days
Appendicitis	21 days	21 days
Anaphylaxis	7 days	N/A

Examination of COVID-19 Vaccination and SARS-CoV-2 Infection History

Because of requirements specified in section 725 to provide "disaggregation by history of infection,"[(1)] this analysis looked separately at incidence of health conditions following the COVID-19 vaccination, following severe acute coronavirus 2 (SARS-CoV-2) infection diagnosis, as well as all possible combinations (i.e., vaccinated and infected, vaccinated and not infected, not vaccinated and infected, not vaccinated and not infected). These incidence rates were compared with the overall incidence of the health conditions regardless of vaccine status or diagnosis. In addition to analyzing incidence following the first vaccine dose as specified in section 725, the analyses provided within this report evaluated incidence following all vaccine doses and all diagnosed SARS-CoV-2 infections. This approach enables a more holistic understanding of COVID-19 vaccination and risks, by examining potential vaccine-associated health conditions alongside SARS-CoV-2 infection-associated health conditions during similar timeframes.

Notably, exposure variables assessed from electronic health systems, including SARS-CoV-2 diagnoses and COVID-19 vaccinations, may under-represent or over-represent true exposures or infections. In the first 2 years of the COVID-19 pandemic, intense interest and investment of resources likely strengthened these data.[(20)] Changes in clinical practice over time, especially the wide adoption of at-home rapid antigen testing for SARS-CoV-2 in 2022, mean that infection data are likely to represent a more limited sample in later years, as more infections were likely to be self-diagnosed rather than laboratory-tested or otherwise officially reported — this makes ongoing evaluation of infection exposures more challenging.[(21)]

It is also important to note that SARS-CoV-2 infections have substantially evolved based on the emergence of many viral variants. Earlier variants of SARS-CoV-2 viruses, especially in the beta lineage, caused greater morbidity and mortality than more recent variants in the omicron lineage.[22] Similarly, COVID-19 vaccinations have been updated and reformulated over time to better target emerging viral variants. Changes in both SARS-CoV-2 infections and COVID-19 vaccinations must be considered when evaluating medical conditions associated with these exposures over time.

Analytic Approach

Multivariable Poisson regression models were used to calculate the adjusted incidence rate ratios for each of the outcomes, excluding anaphylaxis. The time period for these models was restricted to Calendar Years 2021-2024 to evaluate independent associations of recent SARS-CoV-2 infection and recent COVID-19 vaccination with each of the outcomes, compared to those who had never before been infected or vaccinated, respectively. These models were adjusted for age, sex, race and ethnicity, obesity status, and either SARS-CoV-2 infection within the risk window or COVID-19 vaccination within the risk window. These results, as shown in Table 2, present the best possible information based on existent data for determining associations of vaccination and infection with health outcome because the associations identified between vaccination and subsequent health conditions were not confounded by these variables.

When evaluating uncommon medical conditions in military Service members, analyses may be limited by small numbers of cases, especially in relatively young, healthy populations. As shown in Table 3 of this report, the number of COVID-19 vaccine doses administered to active duty service members decreased substantially in 2023 and 2024 following the repeal of the vaccine mandate. Continued changes in vaccine uptake will limit future evaluations of potentially rare adverse events following immunization.

These analyses are consistent with the experiences of the U.S. and global public health communities in evaluations of the safety of COVID-19 vaccines. This report will be updated annually in accordance with Congressional requirements. Additional evaluations may follow emerging changes in SARS-CoV-2 infections, other infectious disease risks, and/or new developments in vaccinology.

Appendix B: Supplementary Tables

Table B1: Unadjusted incidence of health conditions per 100,000 person-years by age group, 2017-2024

	2017		2018		2019		2020		2021		2022		2023		2024	
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
Myocarditis																
All ages	**92**	**7.17**	**102**	**7.87**	**142**	**10.80**	**115**	**8.67**	**244**	**18.29**	**185**	**14.25**	**184**	**14.47**	**183**	**14.74**
<20 years	10	10.29	7	6.88	9	8.66	6	6.02	22	23.48	15	17.92	8	9.86	13	15.83
20-24 years	33	8.08	38	9.12	63	14.88	50	11.72	96	22.37	59	14.30	71	18.08	57	15.17
25-29 years	19	6.42	22	7.38	31	10.20	16	5.20	51	16.45	38	12.51	40	13.39	42	14.38
30-34 years	11	5.33	14	6.83	17	8.25	14	6.70	29	13.68	33	15.65	24	11.41	22	10.64
35-39 years	10	6.78	11	7.33	10	6.53	14	8.92	23	14.37	20	12.54	27	16.83	34	21.47
40-44 years	5	6.43	3	3.95	8	10.44	10	12.65	16	19.71	15	18.40	10	12.06	10	12.04
45+ years	4	8.02	7	14.42	4	8.41	5	10.48	7	14.71	5	10.87	4	8.87	5	11.45
Pericarditis																
All ages	**260**	**20.28**	**254**	**19.62**	**267**	**20.33**	**242**	**18.26**	**254**	**19.06**	**192**	**14.80**	**179**	**14.09**	**280**	**22.56**
<20 years	16	16.46	14	13.76	26	25.01	20	20.06	6	6.40	10	11.95	7	8.62	24	29.23
20-24 years	95	23.26	97	23.30	104	24.57	90	21.09	106	24.70	63	15.28	61	15.53	95	25.29
25-29 years	56	18.95	61	20.48	59	19.43	56	18.23	47	15.17	52	17.13	34	11.38	64	21.91
30-34 years	32	15.52	31	15.14	32	15.55	37	17.72	45	21.24	28	13.29	34	16.18	41	19.84
35-39 years	34	23.08	29	19.37	25	16.36	19	12.13	25	15.64	27	16.95	18	11.24	35	22.13
40-44 years	17	21.92	15	19.78	13	17.01	11	13.94	16	19.75	7	8.60	17	20.54	13	15.68
45+ years	10	20.09	7	14.45	8	16.85	9	18.89	9	18.95	5	10.89	8	17.77	8	18.36
Acute myocardial infarction																
All ages	**244**	**19.02**	**231**	**17.83**	**213**	**16.21**	**249**	**18.78**	**274**	**20.55**	**266**	**20.50**	**305**	**23.99**	**268**	**21.59**
<20 years	4	4.11	7	6.88	3	2.89	7	7.02	5	5.34	7	8.36	5	6.16	6	7.31
20-24 years	15	3.67	32	7.68	28	6.61	32	7.50	46	10.72	32	7.76	29	7.38	32	8.52
25-29 years	36	12.17	20	6.71	21	6.91	31	10.08	38	12.26	42	13.82	41	13.72	42	14.37
30-34 years	28	13.56	31	15.13	34	16.50	35	16.74	28	13.20	38	18.02	45	21.39	46	22.25
35-39 years	49	33.22	42	28.01	44	28.75	54	34.44	56	35.01	49	30.73	68	42.41	65	41.06
40-44 years	63	81.17	44	58.00	41	53.62	41	51.96	47	57.99	35	43.00	56	67.66	45	54.25
45+ years	49	98.73	55	113.82	42	88.70	49	103.08	54	113.95	63	137.61	61	135.83	32	73.64
Life-threatening arrhythmia																
All ages	**163**	**12.70**	**192**	**14.82**	**181**	**13.77**	**181**	**13.65**	**200**	**15.00**	**215**	**16.57**	**237**	**18.64**	**208**	**16.75**
<20 years	8	8.23	9	8.85	3	2.89	9	9.03	6	6.40	9	10.75	7	8.62	9	10.96
20-24 years	25	6.12	33	7.92	35	8.27	30	7.03	25	5.82	52	12.60	45	11.45	29	7.72
25-29 years	22	7.44	24	8.05	32	10.53	32	10.41	32	10.32	31	10.20	35	11.71	29	9.92

	2017		2018		2019		2020		2021		2022		2023		2024	
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
30-34 years	28	13.56	26	12.69	40	19.41	28	13.40	30	14.15	22	10.43	19	9.03	29	14.02
35-39 years	28	18.98	40	26.67	31	20.25	27	17.22	40	25.00	35	21.95	57	35.54	43	27.16
40-44 years	28	36.05	29	38.20	12	15.68	28	35.45	32	39.44	34	41.74	44	53.12	32	38.55
45+ years	24	48.25	31	64.02	28	59.02	27	56.69	35	73.72	32	69.74	30	66.65	37	84.95
Non-life-threatening arrhythmia																
All ages	**3,206**	**252.49**	**3,132**	**244.22**	**3,729**	**286.70**	**3,382**	**257.76**	**4,283**	**324.81**	**4,596**	**358.52**	**4,792**	**381.87**	**5,109**	**417.19**
<20 years	172	177.09	166	163.31	205	197.36	172	172.72	213	227.57	221	264.33	176	217.14	259	315.87
20-24 years	784	192.58	836	201.43	1,016	240.90	953	224.21	1,105	258.57	1,238	301.59	1,225	313.55	1,326	354.98
25-29 years	631	214.93	635	214.56	757	250.96	672	220.30	862	280.27	940	312.16	1,069	361.13	1,091	377.27
30-34 years	489	239.81	439	216.93	547	268.96	476	230.71	663	316.88	731	351.68	783	377.93	819	402.44
35-39 years	477	329.75	488	331.98	556	370.68	485	315.76	681	434.93	678	434.79	721	460.29	747	483.53
40-44 years	358	473.60	287	388.49	333	447.19	333	433.65	421	534.17	436	551.68	486	605.19	485	603.35
45+ years	295	617.08	281	603.70	315	691.42	291	636.99	338	743.26	352	802.12	332	772.30	382	919.94
Acute kidney failure																
All ages	**1,235**	**96.49**	**1,312**	**101.54**	**1,346**	**102.71**	**1,315**	**99.47**	**1,481**	**111.44**	**1,517**	**117.35**	**1,569**	**123.91**	**1,665**	**134.68**
<20 years	99	101.90	112	110.15	100	96.24	92	92.34	89	95.03	82	98.02	92	113.43	89	108.46
20-24 years	340	83.33	395	94.99	405	95.83	404	94.83	439	102.47	409	99.33	411	104.83	443	118.15
25-29 years	266	90.15	272	91.48	268	88.44	266	86.81	295	95.48	348	114.97	347	116.56	359	123.37
30-34 years	196	95.23	189	92.56	202	98.44	183	87.93	228	108.01	229	109.15	234	111.82	279	135.69
35-39 years	169	115.01	160	107.16	182	119.48	170	108.98	205	128.89	220	138.87	225	141.28	250	159.06
40-44 years	99	127.99	92	121.75	99	129.99	112	142.60	148	183.63	126	155.75	172	209.25	146	177.37
45+ years	66	133.16	92	190.74	90	190.63	88	185.85	77	163.25	103	226.14	88	197.08	99	229.20
Immune thrombo-cytopenia																
All ages	**55**	**4.29**	**61**	**4.71**	**56**	**4.26**	**60**	**4.52**	**51**	**3.82**	**52**	**4.01**	**48**	**3.77**	**46**	**3.70**
<20 years	6	6.17	4	3.93	2	1.92	4	4.01	3	3.20	4	4.78	2	2.46	1	1.22
20-24 years	21	5.14	16	3.84	14	3.31	17	3.98	11	2.56	12	2.91	12	3.05	19	5.06
25-29 years	13	4.39	19	6.37	16	5.26	16	5.20	12	3.87	13	4.28	14	4.68	11	3.76
30-34 years	9	4.36	8	3.90	11	5.34	8	3.83	11	5.19	13	6.17	14	6.65	8	3.87
35-39 years	4	2.71	9	6.00	9	5.88	10	6.37	6	3.75	7	4.39	5	3.12	5	3.16
40-44 years	1	1.29	3	3.95	1	1.30	4	5.06	3	3.69	2	2.45	0	0.00	1	1.20
45+ years	1	2.01	2	4.12	3	6.31	1	2.09	5	10.50	1	2.17	1	2.22	1	2.29
Pulmonary embolism																
All ages	**430**	**33.54**	**380**	**29.35**	**420**	**31.98**	**458**	**34.55**	**631**	**47.35**	**455**	**35.09**	**478**	**37.62**	**478**	**38.53**
<20 years	9	9.26	5	4.91	9	8.66	6	6.02	19	20.28	7	8.36	9	11.09	7	8.52
20-24 years	58	14.20	72	17.29	73	17.24	66	15.47	90	20.97	79	19.15	64	16.29	86	22.89
25-29 years	79	26.72	65	21.81	68	22.38	86	27.98	125	40.33	99	32.60	99	33.14	97	33.21

	2017		2018		2019		2020		2021		2022		2023		2024	
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
30-34 years	78	37.81	63	30.77	67	32.54	87	41.66	108	50.98	68	32.28	79	37.59	90	43.56
35-39 years	88	59.75	78	52.09	90	58.89	82	52.37	139	87.03	93	58.43	100	62.47	77	48.72
40-44 years	56	72.24	53	69.95	59	77.23	72	91.36	78	96.40	59	72.63	73	88.33	58	70.04
45+ years	62	125.14	44	91.23	54	114.28	59	124.39	72	152.24	50	109.39	54	120.44	63	145.23
Deep vein thrombosis																
All ages	**535**	**41.74**	**548**	**42.34**	**630**	**47.98**	**546**	**41.21**	**608**	**45.64**	**621**	**47.91**	**639**	**50.32**	**621**	**50.07**
<20 years	18	18.52	16	15.73	20	19.24	14	14.04	13	13.87	12	14.34	10	12.32	13	15.83
20-24 years	93	22.76	87	20.89	112	26.46	86	20.16	96	22.37	92	22.31	101	25.71	95	25.29
25-29 years	95	32.14	98	32.89	98	32.26	102	33.20	114	36.79	122	40.18	109	36.49	111	38.01
30-34 years	87	42.18	91	44.45	97	47.14	92	44.07	88	41.56	106	50.34	108	51.41	122	59.07
35-39 years	108	73.37	97	64.82	140	91.68	107	68.39	123	77.06	121	76.06	147	91.88	118	74.71
40-44 years	61	78.76	78	103.06	82	107.49	78	99.12	87	107.64	93	114.63	87	105.44	82	99.20
45+ years	73	147.43	81	168.13	81	171.68	67	141.48	87	184.28	75	164.39	77	172.14	80	184.87
Ischemic stroke																
All ages	**386**	**30.11**	**375**	**28.96**	**420**	**31.98**	**436**	**32.89**	**495**	**37.14**	**504**	**38.87**	**549**	**43.22**	**519**	**41.83**
<20 years	5	5.14	5	4.91	8	7.69	8	8.02	10	10.67	9	10.75	5	6.16	7	8.52
20-24 years	39	9.54	54	12.97	42	9.92	69	16.17	52	12.12	78	18.91	63	16.04	59	15.70
25-29 years	47	15.89	61	20.46	54	17.77	59	19.20	75	24.19	80	26.34	78	26.10	72	24.65
30-34 years	65	31.50	61	29.78	72	34.96	76	36.38	81	38.23	75	35.60	99	47.09	85	41.13
35-39 years	65	44.13	76	50.75	97	63.46	87	55.56	114	71.36	94	59.04	123	76.84	104	65.82
40-44 years	78	100.70	65	85.86	71	93.03	72	91.44	95	117.50	87	107.16	84	101.72	104	125.68
45+ years	87	175.79	53	109.99	76	161.00	65	137.20	68	143.99	81	177.51	97	216.86	88	203.39
Hemorrhagic stroke																
All ages	**125**	**9.74**	**132**	**10.19**	**113**	**8.60**	**127**	**9.57**	**135**	**10.12**	**122**	**9.40**	**153**	**12.03**	**169**	**13.61**
<20 years	8	8.23	4	3.93	3	2.89	11	11.03	4	4.27	8	9.56	5	6.16	13	15.83
20-24 years	43	10.52	47	11.29	38	8.98	31	7.26	49	11.42	47	11.39	46	11.71	48	12.77
25-29 years	16	5.41	22	7.38	22	7.24	22	7.16	29	9.35	26	8.56	35	11.71	32	10.95
30-34 years	22	10.66	16	7.81	24	11.65	22	10.53	18	8.49	13	6.17	23	10.93	28	13.54
35-39 years	18	12.20	16	10.67	10	6.53	20	12.75	19	11.87	8	5.01	23	14.34	22	13.89
40-44 years	10	12.86	16	21.06	8	10.44	11	13.92	8	9.86	11	13.50	16	19.30	18	21.67
45+ years	8	16.05	11	22.68	8	16.83	10	20.96	8	16.82	9	19.57	5	11.08	8	18.33
Retinal vascular occlusion																
All ages	**27**	**2.10**	**46**	**3.55**	**44**	**3.35**	**51**	**3.84**	**42**	**3.15**	**38**	**2.93**	**46**	**3.62**	**47**	**3.78**
<20 years	0	0.00	0	0.00	0	0.00	1	1.00	0	0.00	1	1.19	1	1.23	0	0.00
20-24 years	3	0.73	4	0.96	3	0.71	4	0.94	4	0.93	5	1.21	6	1.53	3	0.80
25-29 years	9	3.04	10	3.35	6	1.97	7	2.28	8	2.58	5	1.65	6	2.01	13	4.45

	2017		2018		2019		2020		2021		2022		2023		2024	
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
30-34 years	4	1.94	7	3.41	7	3.40	14	6.70	5	2.36	8	3.79	4	1.90	6	2.90
35-39 years	6	4.07	9	6.00	9	5.88	7	4.46	5	3.12	4	2.51	11	6.85	12	7.57
40-44 years	1	1.29	9	11.84	8	10.44	10	12.65	10	12.32	9	11.04	6	7.24	8	9.63
45+ years	4	8.03	7	14.44	11	23.15	8	16.78	10	21.03	6	13.06	12	26.61	5	11.46
Bell's palsy																
All ages	**387**	**30.21**	**365**	**28.21**	**355**	**27.05**	**360**	**27.18**	**394**	**29.58**	**347**	**26.77**	**378**	**29.77**	**365**	**29.43**
<20 years	7	7.20	9	8.85	11	10.58	15	15.05	13	13.87	7	8.36	9	11.09	14	17.05
20-24 years	91	22.28	96	23.06	71	16.77	88	20.62	85	19.81	84	20.37	104	26.48	87	23.16
25-29 years	99	33.50	63	21.15	73	24.04	67	21.81	102	32.93	98	32.28	94	31.48	92	31.51
30-34 years	81	39.31	69	33.74	70	34.04	64	30.68	78	36.85	61	28.99	61	29.05	67	32.45
35-39 years	54	36.73	59	39.47	76	49.80	69	44.14	66	41.38	53	33.34	54	33.77	57	36.10
40-44 years	30	38.77	42	55.54	29	38.04	32	40.67	27	33.41	26	32.04	35	42.40	29	35.06
45+ years	25	50.41	27	55.94	25	52.88	25	52.69	23	48.62	18	39.36	21	46.81	19	43.77
Guillain-Barre Syndrome																
All ages	**31**	**2.42**	**31**	**2.39**	**32**	**2.43**	**23**	**1.73**	**36**	**2.70**	**37**	**2.85**	**33**	**2.59**	**32**	**2.58**
<20 years	3	3.09	7	6.88	2	1.92	3	3.01	3	3.20	3	3.58	5	6.16	3	3.65
20-24 years	8	1.96	10	2.40	9	2.13	10	2.34	11	2.56	14	3.39	2	0.51	9	2.39
25-29 years	6	2.03	4	1.34	2	0.66	4	1.30	6	1.93	6	1.97	12	4.01	5	1.71
30-34 years	6	2.90	5	2.44	8	3.88	2	0.96	7	3.30	5	2.37	5	2.38	3	1.45
35-39 years	4	2.71	2	1.33	3	1.96	2	1.27	6	3.75	6	3.76	4	2.49	10	6.31
40-44 years	3	3.86	2	2.63	5	6.53	2	2.53	2	2.46	1	1.23	2	2.41	2	2.41
45+ years	1	2.01	1	2.06	3	6.31	0	0.00	1	2.10	2	4.35	3	6.65	0	0.00
Acute disseminated encephalomyelitis																
All ages	**8**	**0.62**	**9**	**0.69**	**1**	**0.08**	**4**	**0.30**	**6**	**0.45**	**4**	**0.31**	**2**	**0.16**	**5**	**0.40**
<20 years	0	0.00	1	0.98	0	0.00	1	1.00	1	1.07	2	2.39	0	0.00	0	0.00
20-24 years	1	0.24	2	0.48	1	0.24	0	0.00	3	0.70	0	0.00	0	0.00	1	0.27
25-29 years	3	1.01	2	0.67	0	0.00	3	0.98	1	0.32	1	0.33	1	0.33	3	1.03
30-34 years	0	0.00	2	0.98	0	0.00	0	0.00	0	0.00	1	0.47	1	0.48	1	0.48
35-39 years	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
40-44 years	2	2.57	0	0.00	0	0.00	0	0.00	1	1.23	0	0.00	0	0.00	0	0.00
45+ years	2	4.01	2	4.12	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Optic neuritis																
All ages	**90**	**7.01**	**82**	**6.33**	**91**	**6.92**	**97**	**7.31**	**90**	**6.75**	**90**	**6.93**	**108**	**8.49**	**94**	**7.57**
<20 years	5	5.14	4	3.93	7	6.73	9	9.03	5	5.34	4	4.78	5	6.16	2	2.44
20-24 years	20	4.89	28	6.72	22	5.20	27	6.33	26	6.06	28	6.79	22	5.60	15	3.99
25-29 years	21	7.10	18	6.04	19	6.25	22	7.16	21	6.77	20	6.58	22	7.36	19	6.50

	2017		2018		2019		2020		2021		2022		2023		2024	
	N	**Rate**	**N**	**Rate**	**N**	**Rate**	**N**	**Rate**	**N**	**Rate**	**N**	**Rate**	**N**	**Rate**	**N**	**Rate**
30-34 years	18	8.72	14	6.83	17	8.25	14	6.70	16	7.54	20	9.48	19	9.03	22	10.64
35-39 years	17	11.52	8	5.33	11	7.18	12	7.65	14	8.75	9	5.64	16	9.97	18	11.36
40-44 years	5	6.43	6	7.90	7	9.14	7	8.86	5	6.16	8	9.81	14	16.89	14	16.85
45+ years	4	8.03	4	8.24	8	16.83	6	12.57	3	6.31	1	2.17	10	22.17	4	9.16
Appendicitis																
All ages	**1,988**	**156.29**	**1,972**	**153.54**	**2,222**	**170.58**	**2,101**	**159.87**	**2,145**	**162.37**	**2,126**	**165.45**	**2,111**	**167.71**	**2,046**	**166.45**
<20 years	169	174.04	153	150.51	172	165.58	151	151.61	149	159.16	113	135.12	125	154.15	120	146.26
20-24 years	724	177.88	691	166.57	754	178.81	760	178.82	778	182.02	789	192.11	728	186.16	692	185.01
25-29 years	463	157.77	467	157.88	559	185.41	476	156.09	491	159.66	500	165.92	495	167.01	473	163.24
30-34 years	270	132.45	306	151.26	342	168.18	332	160.96	316	151.05	324	155.77	335	161.41	351	172.01
35-39 years	203	139.90	216	146.54	236	156.95	220	142.89	238	151.54	243	155.30	263	167.14	240	154.53
40-44 years	102	133.45	79	105.84	101	134.30	121	156.04	109	137.02	104	130.31	112	138.04	120	147.65
45+ years	57	116.22	60	125.79	58	124.27	41	87.59	64	137.23	53	117.67	53	120.04	50	117.06

Table B2: Unadjusted incidence of each health condition per 100,000 person-years, by vaccination and infection history, 2021-2024

	2021		2022		2023		2024	
	N	Rate	N	Rate	N	Rate	N	Rate
Myocarditis								
Recent SARS-CoV-2 infection history								
Never infected	159	13.45	99	10.78	99	11.46	113	13.05
Within 21 days after infection	17	196.57	17	88.80	12	319.09	13	471.86
>21 days after infection	68	47.54	69	19.17	73	18.08	57	15.28
Recent COVID-19 vaccination history								
Never vaccinated	89	17.89	12	31.24	10	12.55	30	15.83
Within 21 days after any vaccine dose	63	40.61	4	14.73	0	0.00	0	0.00
>21 days after any vaccine dose	92	13.51	169	13.71	174	14.63	153	14.56
SARS-CoV-2 infection and vaccination status, within 21 days after any vaccine dose or infection								
Not vaccinated, not infected	169	14.44	166	13.26	172	13.60	170	13.74
Not vaccinated, infected	12	150.52	15	80.62	12	319.89	13	472.23
Vaccinated, not infected	58	37.55	2	7.51	0	0.00	0	0.00
Vaccinated, infected	5	739.85	2	372.14	0	0.00	0	0.00
SARS-CoV-2 infection and vaccination status, within 365 days after first vaccine dose or infection								
Not vaccinated, not infected	49	11.12	24	27.84	157	13.57	167	13.82
Not vaccinated, infected	40	74.11	45	27.55	22	27.10	16	49.19
Vaccinated, not infected	116	15.26	48	12.16	4	12.65	0	0.00
Vaccinated, infected	39	49.42	24	27.84	1	63.92	0	0.00
Pericarditis								
Recent SARS-CoV-2 infection history								
Never infected	192	16.25	112	12.20	116	13.43	176	20.33
Within 21 days after infection	10	115.71	12	62.73	11	292.74	2	72.64
>21 days after infection	52	36.38	68	18.90	52	12.89	102	27.36
Recent COVID-19 vaccination history								
Never vaccinated	83	16.69	6	15.63	10	12.56	49	25.86
Within 21 days after any vaccine dose	50	32.25	8	29.48	2	70.47	0	0.00
>21 days after any vaccine dose	121	17.78	178	14.45	167	14.05	231	22.00
SARS-CoV-2 infection and vaccination status, within 21 days after any vaccine dose or infection								
Not vaccinated, not infected	196	16.75	172	13.75	166	13.13	278	22.48
Not vaccinated, infected	8	100.41	12	64.54	11	293.48	2	72.70
Vaccinated, not infected	48	31.10	8	30.08	2	70.71	0	0.00
Vaccinated, infected	2	296.30	0	0.00	0	0.00	0	0.00
SARS-CoV-2 infection and vaccination status, within 365 days following first vaccine dose or infection								
Not vaccinated, not infected	62	14.08	91	13.94	151	13.06	269	22.28
Not vaccinated, infected	21	38.93	28	17.16	23	28.35	10	30.76
Vaccinated, not infected	133	17.51	54	13.69	5	15.82	1	94.94
Vaccinated, infected	38	48.19	19	22.05	0	0.00	0	0.00
Acute myocardial infarction								
Recent SARS-CoV-2 infection history								
Never infected	241	20.39	169	18.40	189	21.88	175	20.21
Within 21 days after infection	8	92.51	19	99.27	3	79.77	4	145.21
>21 days after infection	25	17.48	78	21.67	113	27.98	89	23.86
Recent COVID-19 vaccination history								
Never vaccinated	104	20.91	12	31.24	5	6.28	26	13.72
Within 21 days after any vaccine dose	39	25.15	5	18.42	1	35.24	0	0.00
>21 days after any vaccine dose	131	19.24	249	20.21	299	25.15	242	23.04
SARS-CoV-2 infection and vaccination status, within 21 days after any vaccine dose or infection								
Not vaccinated, not infected	228	19.48	242	19.33	301	23.80	264	21.34
Not vaccinated, infected	7	87.81	19	102.14	3	79.97	4	145.33
Vaccinated, not infected	38	24.61	5	18.79	1	35.36	0	0.00
Vaccinated, infected	1	147.95	0	0.00	0	0.00	0	0.00

	2021		2022		2023		2024	
	N	Rate	N	Rate	N	Rate	N	Rate
SARS-CoV-2 infection and vaccination status, within 365 days following first vaccine dose or infection								
Not vaccinated, not infected	89	20.20	130	19.90	282	24.37	257	21.28
Not vaccinated, infected	15	27.79	53	32.46	18	22.18	11	33.82
Vaccinated, not infected	156	20.52	65	16.47	5	15.82	0	0.00
Vaccinated, infected	14	17.74	18	20.88	0	0.00	0	0.00
Life-threatening arrhythmias								
Recent SARS-CoV-2 infection history								
Never infected	166	14.04	144	15.68	140	16.21	120	13.86
Within 21 days after infection	8	92.50	11	57.45	4	106.34	1	36.28
>21 days after infection	26	18.17	60	16.66	93	23.03	87	23.32
Recent COVID-19 vaccination history								
Never vaccinated	81	16.28	11	28.63	8	10.04	16	8.44
Within 21 days after any vaccine dose	15	9.67	1	3.68	1	35.24	0	0.00
>21 days after any vaccine dose	104	15.27	203	16.47	228	19.17	192	18.27
SARS-CoV-2 infection and vaccination status, within 21 days after any vaccine dose or infection								
Not vaccinated, not infected	177	15.12	203	16.21	232	18.34	207	16.73
Not vaccinated, infected	8	100.34	11	59.11	4	106.61	1	36.31
Vaccinated, not infected	15	9.71	1	3.76	1	35.35	0	0.00
Vaccinated, infected	0	0.00	0	0.00	0	0.00	0	0.00
SARS-CoV-2 infection and vaccination status, within 365 days following first vaccine dose or infection								
Not vaccinated, not infected	66	14.98	103	15.76	206	17.80	199	16.47
Not vaccinated, infected	15	27.78	36	22.04	25	30.79	9	27.67
Vaccinated, not infected	104	13.68	59	14.94	6	18.98	0	0.00
Vaccinated, infected	15	19.01	17	19.71	0	0.00	0	0.00
Non-life-threatening arrhythmias								
Recent SARS-CoV-2 infection history								
Never infected	3,471	296.93	2,875	316.36	2,814	329.16	3,068	358.06
Within 21 days after infection	168	1968.17	184	976.46	77	2090.44	72	2670.14
>21 days after infection	644	456.37	1,537	433.81	1,901	479.71	1,969	539.32
Recent COVID-19 vaccination history								
Never vaccinated	1,807	366.99	232	613.44	225	283.96	569	301.09
Within 21 days after any vaccine dose	524	341.69	90	335.07	14	502.36	16	1052.96
>21 days after any vaccine dose	1,952	290.10	4,274	351.12	4,553	388.20	4,524	437.47
SARS-CoV-2 infection and vaccination status, within 21 days after any vaccine dose or infection								
Not vaccinated, not infected	3,607	311.65	4,327	349.87	4,701	376.56	5,021	411.42
Not vaccinated, infected	152	1931.78	179	977.50	77	2095.70	72	2672.22
Vaccinated, not infected	508	332.71	85	322.88	14	504.03	16	1054.41
Vaccinated, infected	16	2397.23	5	940.64	0	0.00	0	0.00
SARS-CoV-2 infection and vaccination status, within 365 days following first vaccine dose or infection								
Not vaccinated, not infected	1,448	332.05	2,148	332.91	4,251	372.19	4,863	408.10
Not vaccinated, infected	359	673.68	809	503.91	482	605.54	244	764.60
Vaccinated, not infected	2,085	277.47	1,199	306.56	53	168.01	2	190.48
Vaccinated, infected	391	502.54	440	517.30	6	384.95	0	0.00
Acute kidney failure								
Recent SARS-CoV-2 infection history								
Never infected	1,162	98.65	983	107.39	975	113.27	1,152	133.53
Within 21 days after infection	127	1474.88	84	440.59	37	988.76	22	803.11
>21 days after infection	192	134.82	450	125.59	557	138.66	491	132.39
Recent COVID-19 vaccination history								
Never vaccinated	631	127.27	64	167.21	127	159.77	259	136.85
Within 21 days after any vaccine dose	140	90.57	27	99.74	4	141.44	1	64.28
>21 days after any vaccine dose	710	104.63	1,426	116.18	1,438	121.46	1,405	134.39
SARS-CoV-2 infection and vaccination status, within 21 days after any vaccine dose or infection								
Not vaccinated, not infected	1,224	104.94	1,408	112.90	1,528	121.30	1,642	133.28
Not vaccinated, infected	117	1473.98	82	442.53	37	991.37	22	803.75

	2021		2022		2023		2024	
	N	Rate	N	Rate	N	Rate	N	Rate
Vaccinated, not infected	130	84.47	25	94.21	4	141.91	1	64.37
Vaccinated, infected	10	1485.48	2	373.61	0	0.00	0	0.00
SARS-CoV-2 infection and vaccination status, within 365 days following first vaccine dose or infection								
Not vaccinated, not infected	457	104.09	739	113.55	1,396	121.15	1,601	133.10
Not vaccinated, infected	173	321.89	221	135.91	128	158.38	62	191.67
Vaccinated, not infected	733	96.76	419	106.49	42	132.98	1	95.18
Vaccinated, infected	118	150.20	138	160.71	3	192.04	1	3,111.45
Immune thrombocytopenia								
Recent SARS-CoV-2 infection history								
Never infected	42	3.55	34	3.70	29	3.36	31	3.58
Within 42 days after infection	2	11.73	0	0.00	3	40.01	0	0.00
>42 days after infection	7	5.20	18	5.27	16	4.00	15	4.05
Recent COVID-19 vaccination history								
Never vaccinated	26	5.23	1	2.64	3	3.77	12	6.33
Within 42 days after any vaccine dose	5	2.01	0	0.00	0	0.00	0	0.00
>42 days after any vaccine dose	20	3.40	51	4.23	45	3.79	34	3.24
SARS-CoV-2 infection and vaccination status, within 42 days after any vaccine dose or infection								
Not vaccinated, not infected	44	4.11	52	4.31	45	3.58	46	3.73
Not vaccinated, infected	2	13.76	0	0.00	3	40.22	0	0.00
Vaccinated, not infected	5	2.03	0	0.00	0	0.00	0	0.00
Vaccinated, infected	0	0.00	0	0.00	0	0.00	0	0.00
SARS-CoV-2 infection and vaccination status, within 365 days following first vaccine dose or infection								
Not vaccinated, not infected	20	4.54	22	3.37	41	3.54	45	3.72
Not vaccinated, infected	5	9.26	7	4.28	5	6.15	1	3.07
Vaccinated, not infected	22	2.89	17	4.30	2	6.33	0	0.00
Vaccinated, infected	4	5.07	6	6.96	0	0.00	0	0.00
Pulmonary embolism								
Recent SARS-CoV-2 infection history								
Never infected	410	34.71	268	29.20	278	32.20	286	33.05
Within 28 days after infection	151	1328.11	38	150.29	16	321.51	10	272.40
>28 days after infection	70	49.96	149	42.16	184	45.75	182	48.97
Recent COVID-19 vaccination history								
Never vaccinated	304	61.20	16	41.99	16	20.10	42	22.17
Within 28 days after any vaccine dose	80	41.66	5	13.72	1	25.83	2	96.10
>28 days after any vaccine dose	247	38.36	434	35.51	461	38.84	434	41.37
SARS-CoV-2 infection and vaccination status, within 21 days after any vaccine dose or infection								
Not vaccinated, not infected	412	36.45	412	33.34	461	36.54	466	37.73
Not vaccinated, infected	139	1365.60	38	156.07	16	322.59	10	272.69
Vaccinated, not infected	68	35.63	5	14.08	1	25.95	2	96.29
Vaccinated, infected	12	1007.64	0	0.00	0	0.00	0	0.00
SARS-CoV-2 infection and vaccination status, within 365 days following first vaccine dose or infection								
Not vaccinated, not infected	159	36.12	203	31.10	421	36.41	454	37.61
Not vaccinated, infected	145	269.02	99	60.68	50	61.64	24	73.86
Vaccinated, not infected	255	33.57	111	28.13	6	18.98	0	0.00
Vaccinated, infected	72	91.39	42	48.78	1	63.89	0	0.00
Deep vein thrombosis								
Recent SARS-CoV-2 infection history								
Never infected	490	41.50	393	42.83	398	46.12	409	47.28
Within 28 days after infection	35	307.78	23	90.99	7	140.69	4	108.94
>28 days after infection	83	59.23	205	58.01	234	58.20	208	55.98
Recent COVID-19 vaccination history								
Never vaccinated	264	53.17	18	47.25	21	26.39	57	30.09
Within 28 days after any vaccine dose	72	37.51	14	38.42	1	25.85	2	96.25
>28 days after any vaccine dose	272	42.26	589	48.21	617	52.00	562	53.59
SARS-CoV-2 infection and vaccination status, within 28 days after any vaccine dose or infection								

	2021		2022		2023		2024	
	N	Rate	N	Rate	N	Rate	N	Rate
Not vaccinated, not infected	503	44.51	584	47.27	631	50.04	615	49.82
Not vaccinated, infected	33	324.16	23	94.49	7	141.16	4	109.06
Vaccinated, not infected	70	36.69	14	39.43	1	25.96	2	96.44
Vaccinated, infected	2	167.86	0	0.00	0	0.00	0	0.00
SARS-CoV-2 infection and vaccination status, within 365 days following first vaccine dose or infection								
Not vaccinated, not infected	207	47.04	297	45.52	583	50.45	601	49.81
Not vaccinated, infected	56	103.87	101	61.92	53	65.37	20	61.55
Vaccinated, not infected	296	38.98	174	44.11	3	9.49	0	0.00
Vaccinated, infected	49	62.18	49	56.90	0	0.00	0	0.00
Ischemic stroke								
Recent SARS-CoV-2 infection history								
Never infected	426	36.07	307	33.45	312	36.14	316	36.52
Within 28 days after infection	13	114.23	15	59.32	15	301.37	5	136.11
>28 days after infection	56	39.94	182	51.48	222	55.20	198	53.27
Recent COVID-19 vaccination history								
Never vaccinated	186	37.44	13	34.09	14	17.59	34	17.94
Within 28 days after any vaccine dose	78	40.62	9	24.69	5	129.21	1	48.09
>28 days after any vaccine dose	231	35.88	482	39.44	530	44.65	484	46.14
SARS-CoV-2 infection and vaccination status, within 28 days after any vaccine dose or infection								
Not vaccinated, not infected	406	35.92	481	38.92	530	42.01	513	41.54
Not vaccinated, infected	11	107.97	14	57.49	14	282.23	5	136.25
Vaccinated, not infected	76	39.82	8	22.52	4	103.82	1	48.18
Vaccinated, infected	2	167.80	1	106.92	1	5963.08	0	0.00
SARS-CoV-2 infection and vaccination status, within 365 days following first vaccine dose or infection								
Not vaccinated, not infected	159	36.11	267	40.90	490	42.38	498	41.26
Not vaccinated, infected	27	50.05	81	49.64	56	69.06	21	64.61
Vaccinated, not infected	272	35.81	116	29.40	3	9.49	0	0.00
Vaccinated, infected	37	46.92	40	46.42	0	0.00	0	0.00
Hemorrhagic stroke								
Recent SARS-CoV-2 infection history								
Never infected	111	9.39	81	8.82	100	11.57	117	13.51
Within 28 days after infection	7	61.45	2	7.90	3	60.19	0	0.00
>28 days after infection	17	12.11	39	11.02	50	12.41	52	13.97
Recent COVID-19 vaccination history								
Never vaccinated	58	11.67	3	7.86	6	7.54	32	16.89
Within 28 days after any vaccine dose	14	7.28	3	8.22	0	0.00	0	0.00
>28 days after any vaccine dose	63	9.78	116	9.48	147	12.37	137	13.04
SARS-CoV-2 infection and vaccination status, within 28 days after any vaccine dose or infection								
Not vaccinated, not infected	114	10.08	117	9.46	150	11.88	169	13.67
Not vaccinated, infected	7	68.64	2	8.20	3	60.40	0	0.00
Vaccinated, not infected	14	7.33	3	8.44	0	0.00	0	0.00
Vaccinated, infected	0	0.00	0	0.00	0	0.00	0	0.00
SARS-CoV-2 infection and vaccination status, within 365 days following first vaccine dose or infection								
Not vaccinated, not infected	44	9.99	62	9.49	138	11.92	166	13.74
Not vaccinated, infected	14	25.93	18	11.02	12	14.77	3	9.22
Vaccinated, not infected	69	9.08	36	9.12	3	9.49	0	0.00
Vaccinated, infected	8	10.13	6	6.96	0	0.00	0	0.00
Retinal vascular occlusion								
Recent SARS-CoV-2 infection history								
Never infected	37	3.13	31	3.37	30	3.47	23	2.66
Within 21 days after infection	0	0.00	1	5.22	0	0.00	0	0.00
>21 days after infection	5	3.49	6	1.67	16	3.96	24	6.43
Recent COVID-19 vaccination history								
Never vaccinated	15	3.01	2	5.20	3	3.77	2	1.06
Within 21 days after any vaccine dose	5	3.22	1	3.68	0	0.00	0	0.00

	2021		2022		2023		2024	
	N	Rate	N	Rate	N	Rate	N	Rate
>21 days after any vaccine dose	22	3.23	35	2.84	43	3.61	45	4.28
SARS-CoV-2 infection and vaccination status, within 21 days after any vaccine dose or infection								
Not vaccinated, not infected	37	3.16	36	2.87	46	3.64	47	3.80
Not vaccinated, infected	0	0.00	1	5.37	0	0.00	0	0.00
Vaccinated, not infected	5	3.24	1	3.76	0	0.00	0	0.00
Vaccinated, infected	0	0.00	0	0.00	0	0.00	0	0.00
SARS-CoV-2 infection and vaccination status, within 365 days after first vaccine dose or infection								
Not vaccinated, not infected	15	3.40	27	4.13	39	3.37	45	3.72
Not vaccinated, infected	0	0.00	3	1.84	7	8.62	2	6.15
Vaccinated, not infected	24	3.16	7	1.77	0	0.00	0	0.00
Vaccinated, infected	3	3.80	1	1.16	0	0.00	0	0.00
Bell's palsy								
Recent SARS-CoV-2 infection history								
Never infected	344	29.14	224	24.42	219	25.38	224	25.90
Within 42 days after infection	8	47.00	18	48.00	6	80.18	6	108.00
>42 days after infection	42	31.23	105	30.78	153	38.30	135	36.53
Recent COVID-19 vaccination history								
Never vaccinated	174	35.08	11	29.12	17	21.37	42	22.17
Within 42 days after any vaccine dose	64	25.75	11	19.88	2	32.47	3	95.06
>42 days after any vaccine dose	156	26.57	325	27.02	359	30.32	320	30.55
SARS-CoV-2 infection and vaccination status, within 42 days after any vaccine dose or infection								
Not vaccinated, not infected	322	30.13	319	26.47	370	29.45	356	28.91
Not vaccinated, infected	8	55.15	17	47.90	6	80.59	6	108.20
Vaccinated, not infected	64	26.01	10	18.75	2	32.67	3	95.36
Vaccinated, infected	0	0.00	1	49.82	0	0.00	0	0.00
SARS-CoV-2 infection and vaccination status, within 365 days following first vaccine dose or infection								
Not vaccinated, not infected	145	32.95	172	26.36	344	29.77	351	29.09
Not vaccinated, infected	29	53.79	46	28.21	28	34.54	13	40.01
Vaccinated, not infected	203	26.74	100	25.36	4	12.65	1	94.92
Vaccinated, infected	17	21.58	29	33.68	2	127.87	0	0.00
Guillain-Barre Syndrome								
Recent SARS-CoV-2 infection history								
Never infected	30	2.54	22	2.39	20	2.31	24	2.77
Within 42 days after infection	2	11.73	4	10.65	2	26.67	2	35.91
>42 days after infection	4	2.97	11	3.22	11	2.75	6	1.62
Recent COVID-19 vaccination history								
Never vaccinated	12	2.42	1	2.64	3	3.77	8	4.22
Within 42 days after any vaccine dose	9	3.61	3	5.41	0	0.00	0	0.00
>42 days after any vaccine dose	15	2.55	33	2.74	30	2.53	24	2.29
SARS-CoV-2 infection and vaccination status, within 42 days after any vaccine dose or infection								
Not vaccinated, not infected	25	2.34	30	2.48	31	2.46	30	2.43
Not vaccinated, infected	2	13.76	4	11.25	2	26.81	2	35.97
Vaccinated, not infected	9	3.65	3	5.62	0	0.00	0	0.00
Vaccinated, infected	0	0.00	0	0.00	0	0.00	0	0.00
SARS-CoV-2 infection and vaccination status, within 365 days following first vaccine dose or infection								
Not vaccinated, not infected	11	2.50	14	2.14	28	2.42	29	2.40
Not vaccinated, infected	1	1.85	10	6.12	4	4.92	2	6.14
Vaccinated, not infected	19	2.50	12	3.04	1	3.16	1	94.98
Vaccinated, infected	5	6.33	1	1.16	0	0.00	0	0.00
Acute disseminated encephalomyelitis								
Recent SARS-CoV-2 infection history								
Never infected	5	0.42	1	0.11	2	0.23	4	0.46
Within 42 days after infection	1	5.86	1	2.66	0	0.00	0	0.00
>42 days after infection	0	0.00	2	0.58	0	0.00	1	0.27
Recent COVID-19 vaccination history								

	2021		2022		2023		2024	
	N	Rate	N	Rate	N	Rate	N	Rate
Never vaccinated	1	0.20	0	0.00	0	0.00	1	0.53
Within 42 days after any vaccine dose	2	0.80	1	1.80	0	0.00	0	0.00
>42 days after any vaccine dose	3	0.51	3	0.25	2	0.17	4	0.38
SARS-CoV-2 infection and vaccination status, within 42 days after any vaccine dose or infection								
Not vaccinated, not infected	3	0.28	2	0.17	2	0.16	5	0.41
Not vaccinated, infected	1	6.88	1	2.81	0	0.00	0	0.00
Vaccinated, not infected	2	0.81	1	1.87	0	0.00	0	0.00
Vaccinated, infected	0	0.00	0	0.00	0	0.00	0	0.00
SARS-CoV-2 infection and vaccination status, within 365 days following first vaccine dose or infection								
Not vaccinated, not infected	0	0.00	1	0.15	2	0.17	5	0.41
Not vaccinated, infected	1	1.85	0	0.00	0	0.00	0	0.00
Vaccinated, not infected	5	0.66	2	0.51	0	0.00	0	0.00
Vaccinated, infected	0	0.00	1	1.16	0	0.00	0	0.00
Optic neuritis								
Recent SARS-CoV-2 infection history								
Never infected	79	6.68	58	6.31	74	8.56	59	6.81
Within 21 days after infection	0	0.00	4	20.89	0	0.00	0	0.00
>21 days after infection	11	7.69	28	7.77	34	8.42	35	9.38
Recent COVID-19 vaccination history								
Never vaccinated	46	9.24	3	7.80	8	10.04	8	4.22
Within 21 days after any vaccine dose	7	4.51	1	3.68	1	35.21	0	0.00
>21 days after any vaccine dose	37	5.43	86	6.98	99	8.32	86	8.18
SARS-CoV-2 infection and vaccination status, within 21 days after any vaccine dose or infection								
Not vaccinated, not infected	83	7.09	85	6.79	107	8.46	94	7.59
Not vaccinated, infected	0	0.00	4	21.49	0	0.00	0	0.00
Vaccinated, not infected	7	4.53	1	3.76	1	35.33	0	0.00
Vaccinated, infected	0	0.00	0	0.00	0	0.00	0	0.00
SARS-CoV-2 infection and vaccination status, within 365 days after first vaccine dose or infection								
Not vaccinated, not infected	40	9.08	49	7.50	103	8.90	92	7.61
Not vaccinated, infected	6	11.11	12	7.34	4	4.92	2	6.15
Vaccinated, not infected	40	5.26	22	5.57	1	3.16	0	0.00
Vaccinated, infected	4	5.07	7	8.12	0	0.00	0	0.00
Appendicitis								
Recent SARS-CoV-2 infection history								
Never infected	1,836	156.81	1,327	145.76	1,331	155.38	1,326	154.39
Within 21 days after infection	48	560.46	100	528.67	27	725.92	10	367.50
>21 days after infection	261	184.30	699	196.51	753	189.00	710	193.14
Recent COVID-19 vaccination history								
Never vaccinated	854	173.13	58	152.33	87	109.54	286	151.20
Within 21 days after any vaccine dose	243	158.16	45	167.15	3	106.83	1	64.89
>21 days after any vaccine dose	1,048	155.46	2,023	165.82	2,021	171.77	1,759	169.38
SARS-CoV-2 infection and vaccination status, within 21 days after any vaccine dose or infection								
Not vaccinated, not infected	1,856	160.07	1,984	160.04	2,081	166.19	2,035	166.13
Not vaccinated, infected	46	582.67	97	527.66	27	727.76	10	367.80
Vaccinated, not infected	241	157.54	42	159.15	3	107.19	1	64.98
Vaccinated, infected	2	298.63	3	563.38	0	0.00	0	0.00
SARS-CoV-2 infection and vaccination status, within 365 days following first vaccine dose or infection								
Not vaccinated, not infected	725	165.98	971	150.14	1,912	166.92	1,978	165.40
Not vaccinated, infected	124	231.86	327	202.88	144	179.65	67	208.08
Vaccinated, not infected	1,146	152.26	623	159.03	49	155.19	1	95.27
Vaccinated, infected	150	192.10	205	240.26	6	384.28	0	0.00

Table B3: Unadjusted incidence per 100,000 person-years in 2021-2024 following vaccination, by health condition, vaccine type and manufacturer

	All vaccines		mRNA Moderna		mRNA Pfizer		Janssen		Novavax		Other	
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
Myocarditis												
Within 21 days of any dose	**67**	**35.89**	25	41.60	41	34.56	1	12.75	0	0.00	0	0.00
Within 365 days of first dose	**232**	**17.13**	75	18.71	143	17.28	13	10.36	1	184.84	0	0.00
Pericarditis												
Within 21 days of any dose	**60**	**32.16**	30	49.97	25	21.08	5	63.81	0	0.00	0	0.00
Within 365 days of first dose	**250**	**18.47**	71	17.72	154	18.63	25	19.94	0	0.00	0	0.00
Acute myocardial infarction												
Within 21 days of any dose	**45**	**24.11**	17	28.30	27	22.76	1	12.76	0	0.00	0	0.00
Within 365 days of first dose	**258**	**19.05**	88	21.96	145	17.53	25	19.93	0	0.00	0	0.00
Life-threatening arrhythmias												
Within 21 days of any dose	**17**	**9.11**	7	11.65	9	7.59	1	12.75	0	0.00	0	0.00
Within 365 days of first dose	**201**	**14.84**	76	18.96	111	13.42	14	11.16	0	0.00	0	0.00
Non-life-threatening arrhythmias												
Within 21 days of any dose	**644**	**349.01**	217	365.86	398	339.24	28	360.36	1	1,098.90	0	0.00
Within 365 days of first dose	**4,176**	**311.74**	1,232	311.23	2,578	314.90	362	291.32	4	754.72	0	0.00
Acute kidney failure												
Within 21 days of any dose	**172**	**92.45**	43	71.80	121	102.36	8	102.33	0	0.00	0	0.00
Within 365 days of first dose	**1,455**	**107.80**	369	92.35	956	115.98	128	102.36	1	185.53	1	340.14
Immune thrombocytopenia												
Within 42 days of any dose	**5**	**1.59**	1	0.96	3	1.54	1	6.52	0	0.00	0	0.00
Within 365 days of first dose	**51**	**3.76**	18	4.49	29	3.50	4	3.19	0	0.00	0	0.00
Pulmonary embolism												
Within 28 days of any dose	**88**	**37.54**	24	30.71	60	41.15	4	38.70	0	0.00	0	0.00
Within 365 days of first dose	**487**	**35.98**	133	33.20	303	36.66	51	40.67	0	0.00	0	0.00
Deep vein thrombosis												
Within 28 days of any dose	**89**	**37.98**	31	39.69	56	38.42	2	19.36	0	0.00	0	0.00
Within 365 days of first dose	**571**	**42.20**	174	43.46	340	41.14	57	45.48	0	0.00	0	0.00
Ischemic stroke												
Within 28 days of any dose	**93**	**39.67**	29	37.12	58	39.77	6	58.06	0	0.00	0	0.00
Within 365 days of first dose	**468**	**34.58**	131	32.71	300	36.29	36	28.72	0	0.00	1	338.98
Hemorrhagic stroke												
Within 28 days of any dose	**17**	**7.24**	4	5.11	13	8.91	0	0.00	0	0.00	0	0.00
Within 365 days of first dose	**122**	**9.01**	25	6.24	88	10.64	8	6.38	1	184.84	0	0.00
Retinal vascular occlusion												
Within 21 days of any dose	**6**	**3.21**	4	6.66	2	1.69	0	0.00	0	0.00	0	0.00
Within 365 days of first dose	**35**	**2.58**	12	2.99	19	2.30	4	3.19	0	0.00	0	0.00
Bell's palsy												
Within 42 days of any dose	**80**	**25.54**	21	20.29	54	27.81	5	32.65	0	0.00	0	0.00
Within 365 days of first dose	**356**	**26.32**	101	25.23	222	26.87	32	25.55	1	185.19	0	0.00
Guillain-Barre Syndrome												
Within 42 days of any dose	**12**	**3.82**	1	0.96	11	5.65	0	0.00	0	0.00	0	0.00
Within 365 days of first dose	**39**	**2.88**	12	2.99	23	2.78	4	3.19	0	0.00	0	0.00
Acute disseminated encephalomyelitis												
Within 42 days of any dose	**3**	**0.96**	0	0.00	2	1.03	1	6.52	0	0.00	0	0.00
Within 365 days of first dose	**8**	**0.59**	3	0.75	4	0.48	1	0.80	0	0.00	0	0.00
Optic neuritis												
Within 21 days of any dose	**9**	**4.82**	2	3.33	6	5.06	1	12.75	0	0.00	0	0.00
Within 365 days of first dose	**74**	**5.46**	22	5.49	43	5.20	9	7.17	0	0.00	0	0.00
Appendicitis												
Within 21 days of any dose	**292**	**157.90**	104	174.93	175	148.82	13	167.31	0	0.00	0	0.00
Within 365 days of first dose	**2,180**	**162.43**	665	167.61	1,323	161.29	190	152.85	2	373.13	0	0.00

Table B4: Unadjusted incidence following vaccination per 100,000 person-years, by health condition, age group (in years), and year

	2021		2022		2023		2024	
	N	**Rate**	**N**	**Rate**	**N**	**Rate**	**N**	**Rate**
Myocarditis								
By age (in years), within 21 days after any vaccine dose								
<20	7	59.02	1	22.02	0	0.00	0	0.00
20-24	30	62.60	1	13.61	0	0.00	0	0.00
25-29	12	33.93	1	19.80	0	0.00	0	0.00
30-34	4	16.16	0	0.00	0	0.00	0	0.00
35-39	6	31.44	1	31.36	0	0.00	0	0.00
40-44	4	40.28	0	0.00	0	0.00	0	0.00
45+	0	0.00	0	0.00	0	0.00	0	0.00
By age (in years), within 365 days after first vaccine dose								
<20	12	24.06	10	18.93	3	19.45	0	0.00
20-24	67	26.87	22	12.54	1	7.90	0	0.00
25-29	31	16.07	14	12.59	1	31.24	0	0.00
30-34	19	13.62	14	20.56	0	0.00	0	0.00
35-39	13	11.70	8	17.70	0	0.00	0	0.00
40-44	9	15.17	4	20.60	0	0.00	0	0.00
45+	4	10.79	0	0.00	0	0.00	0	0.00
Pericarditis								
By age (in years), within 21 days after any vaccine dose								
<20	2	16.86	3	66.06	0	0.00	0	0.00
20-24	20	41.74	2	27.23	0	0.00	0	0.00
25-29	11	31.12	2	39.62	0	0.00	0	0.00
30-34	9	36.39	1	26.19	0	0.00	0	0.00
35-39	5	26.24	0	0.00	0	0.00	0	0.00
40-44	2	20.18	0	0.00	1	283.33	0	0.00
45+	1	16.12	0	0.00	1	298.46	0	0.00
By age (in years), within 365 days after first vaccine dose								
<20	2	4.01	4	7.57	0	0.00	1	273.83
20-24	70	28.08	28	15.96	4	31.60	0	0.00
25-29	35	18.15	25	22.49	1	31.28	0	0.00
30-34	30	21.52	10	14.70	0	0.00	0	0.00
35-39	15	13.53	6	13.29	0	0.00	0	0.00
40-44	11	18.57	0	0.00	0	0.00	0	0.00
45+	8	21.62	0	0.00	0	0.00	0	0.00
Acute myocardial infarction								
By age (in years), within 21 days after any vaccine dose								
<20	1	8.43	1	22.02	0	0.00	0	0.00
20-24	7	14.61	0	0.00	0	0.00	0	0.00
25-29	7	19.79	0	0.00	0	0.00	0	0.00
30-34	8	32.32	0	0.00	0	0.00	0	0.00
35-39	5	26.22	0	0.00	0	0.00	0	0.00
40-44	6	60.53	0	0.00	1	283.33	0	0.00
45+	5	80.81	4	295.16	0	0.00	0	0.00
By age (in years), within 365 days after first vaccine dose								
<20	4	8.02	5	9.46	3	19.45	0	0.00
20-24	30	12.03	9	5.13	0	0.00	0	0.00
25-29	25	12.96	16	14.38	1	31.24	0	0.00
30-34	17	12.18	12	17.62	1	86.43	0	0.00
35-39	32	28.83	14	30.98	0	0.00	0	0.00

	2021		2022		2023		2024	
	N	Rate	N	Rate	N	Rate	N	Rate
40-44	28	47.26	11	56.74	0	0.00	0	0.00
45+	34	92.08	16	183.30	0	0.00	0	0.00
Life-threatening arrhythmias								
By age (in years), within 21 days after any vaccine dose								
<20	1	8.43	0	0.00	0	0.00	0	0.00
20-24	4	8.35	0	0.00	1	193.75	0	0.00
25-29	1	2.83	0	0.00	0	0.00	0	0.00
30-34	2	8.08	0	0.00	0	0.00	0	0.00
35-39	2	10.48	0	0.00	0	0.00	0	0.00
40-44	2	20.15	0	0.00	0	0.00	0	0.00
45+	3	48.40	1	73.67	0	0.00	0	0.00
By age (in years), within 365 days after first vaccine dose								
<20	2	4.01	5	9.46	4	25.94	0	0.00
20-24	15	6.01	25	14.24	2	15.80	0	0.00
25-29	19	9.85	13	11.69	0	0.00	0	0.00
30-34	18	12.90	6	8.81	0	0.00	0	0.00
35-39	25	22.51	8	17.70	0	0.00	0	0.00
40-44	23	38.78	13	67.00	0	0.00	0	0.00
45+	17	45.96	6	68.57	0	0.00	0	0.00
Non-life-threatening arrhythmias								
By age (in years), within 21 days after any vaccine dose								
<20	27	227.85	16	352.43	1	354.69	0	0.00
20-24	145	303.82	13	177.53	2	388.87	0	0.00
25-29	91	259.36	14	279.25	2	459.00	1	484.23
30-34	91	372.49	10	264.88	4	897.13	3	1012.89
35-39	73	390.83	16	512.94	1	223.06	1	297.48
40-44	51	528.89	8	447.45	0	0.00	6	2009.30
45+	46	775.79	13	1,000.47	4	1,255.86	5	1,738.83
By age (in years), within 365 days after first vaccine dose								
<20	106	212.69	131	248.17	25	162.25	0	0.00
20-24	586	235.92	523	299.42	21	166.21	2	471.27
25-29	468	244.43	353	320.20	5	156.84	0	0.00
30-34	378	274.42	242	360.66	2	174.39	0	0.00
35-39	414	380.80	193	436.98	4	803.68	0	0.00
40-44	283	490.92	122	648.21	2	1,188.48	0	0.00
45+	241	680.44	75	895.56	0	0.00	0	0.00
Acute kidney failure								
By age (in years), within 21 days after any vaccine dose								
<20	15	126.52	11	242.26	0	0.00	0	0.00
20-24	46	96.16	1	13.63	0	0.00	0	0.00
25-29	24	68.08	4	79.38	2	455.84	0	0.00
30-34	19	77.10	3	78.82	0	0.00	0	0.00
35-39	16	84.36	4	126.23	1	219.00	1	291.37
40-44	14	141.97	3	164.17	0	0.00	0	0.00
45+	6	97.41	1	74.13	1	300.55	0	0.00
By age (in years), within 365 days after first vaccine dose								
<20	42	84.23	58	109.83	18	116.79	0	0.00
20-24	261	104.84	167	95.33	14	110.69	0	0.00
25-29	168	87.36	129	116.41	7	219.17	0	0.00
30-34	137	98.62	80	118.11	2	173.31	0	0.00
35-39	107	96.92	67	149.31	2	393.60	1	1,820.26

	2021		2022		2023		2024	
	N	Rate	N	Rate	N	Rate	N	Rate
40-44	89	151.01	30	155.82	2	1,182.70	1	6,071.67
45+	47	127.86	26	299.75	0	0.00	0	0.00
Immune thrombocytopenia								
By age (in years), within 42 days after any vaccine dose								
<20	1	5.23	0	0.00	0	0.00	0	0.00
20-24	1	1.29	0	0.00	0	0.00	0	0.00
25-29	1	1.76	0	0.00	0	0.00	0	0.00
30-34	1	2.53	0	0.00	0	0.00	0	0.00
35-39	0	0.00	0	0.00	0	0.00	0	0.00
40-44	0	0.00	0	0.00	0	0.00	0	0.00
45+	1	10.08	0	0.00	0	0.00	0	0.00
By age (in years), within 365 days after first vaccine dose								
<20	3	6.01	2	3.78	0	0.00	0	0.00
20-24	5	2.00	6	3.42	1	7.90	0	0.00
25-29	5	2.59	7	6.29	1	31.24	0	0.00
30-34	5	3.58	5	7.34	0	0.00	0	0.00
35-39	4	3.60	3	6.63	0	0.00	0	0.00
40-44	2	3.37	0	0.00	0	0.00	0	0.00
45+	2	5.39	0	0.00	0	0.00	0	0.00
Pulmonary embolism								
By age (in years), within 28 days after any vaccine dose								
<20	2	13.60	0	0.00	0	0.00	0	0.00
20-24	12	20.19	2	20.50	0	0.00	0	0.00
25-29	13	29.69	0	0.00	0	0.00	0	0.00
30-34	14	45.74	0	0.00	0	0.00	0	0.00
35-39	16	67.90	2	45.76	0	0.00	0	0.00
40-44	11	89.78	0	0.00	0	0.00	1	243.26
45+	12	156.70	1	53.65	1	225.52	1	247.15
By age (in years), within 365 days after first vaccine dose								
<20	9	18.04	3	5.68	2	12.97	0	0.00
20-24	48	19.25	29	16.53	2	15.80	0	0.00
25-29	50	25.92	35	31.48	0	0.00	0	0.00
30-34	54	38.73	21	30.88	0	0.00	0	0.00
35-39	67	60.44	36	79.83	2	393.54	0	0.00
40-44	51	86.20	19	98.22	1	580.09	0	0.00
45+	48	130.25	10	114.76	0	0.00	0	0.00
Deep vein thrombosis								
By age (in years), within 28 days after any vaccine dose								
<20	3	20.40	2	33.94	0	0.00	0	0.00
20-24	14	23.55	1	10.25	1	138.19	0	0.00
25-29	10	22.84	1	14.66	0	0.00	0	0.00
30-34	12	39.22	2	38.40	0	0.00	0	0.00
35-39	9	38.22	2	45.78	0	0.00	1	217.87
40-44	11	89.89	5	197.28	0	0.00	1	244.04
45+	13	170.08	1	53.72	0	0.00	0	0.00
By age (in years), within 365 days after first vaccine dose								
<20	3	6.01	8	15.14	0	0.00	0	0.00
20-24	46	18.45	49	27.93	2	15.80	0	0.00
25-29	56	29.04	43	38.68	0	0.00	0	0.00
30-34	46	33.01	35	51.46	0	0.00	0	0.00
35-39	71	64.08	42	93.19	1	196.70	0	0.00

	2021		2022		2023		2024	
	N	Rate	N	Rate	N	Rate	N	Rate
40-44	61	103.23	33	170.75	0	0.00	0	0.00
45+	62	168.56	13	149.42	0	0.00	0	0.00
Ischemic stroke								
By age (in years), within 28 days after any vaccine dose								
<20	1	6.80	0	0.00	0	0.00	0	0.00
20-24	12	20.19	0	0.00	0	0.00	0	0.00
25-29	15	34.24	2	29.31	0	0.00	0	0.00
30-34	10	32.66	2	38.38	0	0.00	0	0.00
35-39	12	50.92	2	45.74	1	162.17	1	217.76
40-44	14	114.37	1	39.39	0	0.00	0	0.00
45+	14	183.10	2	107.50	4	906.20	0	0.00
By age (in years), within 365 days after first vaccine dose								
<20	5	10.02	6	11.35	0	0.00	0	0.00
20-24	34	13.63	32	18.23	3	23.70	0	0.00
25-29	35	18.14	30	26.98	0	0.00	0	0.00
30-34	47	33.71	24	35.28	0	0.00	0	0.00
35-39	70	63.14	29	64.27	0	0.00	0	0.00
40-44	65	109.98	23	118.91	0	0.00	0	0.00
45+	53	144.04	12	137.89	0	0.00	0	0.00
Hemorrhagic stroke								
By age (in years), within 28 days after any vaccine dose								
<20	1	6.80	0	0.00	0	0.00	0	0.00
20-24	3	5.05	0	0.00	0	0.00	0	0.00
25-29	6	13.70	0	0.00	0	0.00	0	0.00
30-34	2	6.53	1	19.17	0	0.00	0	0.00
35-39	1	4.24	0	0.00	0	0.00	0	0.00
40-44	1	8.14	2	78.56	0	0.00	0	0.00
45+	0	0.00	0	0.00	0	0.00	0	0.00
By age (in years), within 365 days after first vaccine dose								
<20	4	8.02	4	7.57	1	6.48	0	0.00
20-24	26	10.42	21	11.97	1	7.90	0	0.00
25-29	20	10.37	9	8.09	0	0.00	0	0.00
30-34	9	6.45	3	4.41	0	0.00	0	0.00
35-39	10	9.00	1	2.21	1	196.46	0	0.00
40-44	4	6.74	3	15.45	0	0.00	0	0.00
45+	4	10.79	1	11.40	0	0.00	0	0.00
Retinal vascular occlusion								
By age (in years), within 21 days after any vaccine dose								
<20	0	0.00	0	0.00	0	0.00	0	0.00
20-24	2	4.17	0	0.00	0	0.00	0	0.00
25-29	1	2.83	0	0.00	0	0.00	0	0.00
30-34	1	4.04	0	0.00	0	0.00	0	0.00
35-39	1	5.24	0	0.00	0	0.00	0	0.00
40-44	0	0.00	1	54.33	0	0.00	0	0.00
45+	0	0.00	0	0.00	0	0.00	0	0.00
By age (in years), within 365 days after first vaccine dose								
<20	0	0.00	1	1.89	0	0.00	0	0.00
20-24	3	1.20	1	0.57	0	0.00	0	0.00
25-29	4	2.07	0	0.00	0	0.00	0	0.00
30-34	4	2.87	1	1.47	0	0.00	0	0.00
35-39	3	2.70	1	2.21	0	0.00	0	0.00

	2021		2022		2023		2024	
	N	Rate	N	Rate	N	Rate	N	Rate
40-44	4	6.74	3	15.45	0	0.00	0	0.00
45+	9	24.30	1	11.41	0	0.00	0	0.00
Bell's palsy								
By age (in years), within 42 days after any vaccine dose								
<20	1	5.23	0	0.00	1	152.41	0	0.00
20-24	12	15.51	3	20.74	0	0.00	0	0.00
25-29	14	24.69	3	28.61	0	0.00	0	0.00
30-34	11	27.86	1	12.23	0	0.00	1	164.88
35-39	14	46.20	2	28.76	0	0.00	0	0.00
40-44	7	44.52	2	48.80	0	0.00	0	0.00
45+	5	50.73	0	0.00	1	149.14	2	324.65
By age (in years), within 365 days after first vaccine dose								
<20	4	8.02	4	7.57	1	6.48	1	273.63
20-24	53	21.26	32	18.24	1	7.90	0	0.00
25-29	49	25.41	42	37.80	2	62.48	0	0.00
30-34	39	28.00	29	42.67	1	86.50	0	0.00
35-39	44	39.74	11	24.41	0	0.00	0	0.00
40-44	16	27.09	8	41.41	1	586.54	0	0.00
45+	15	40.69	3	34.40	0	0.00	0	0.00
Guillain-Barre Syndrome								
By age (in years), within 42 days after any vaccine dose								
<20	2	10.46	1	12.29	0	0.00	0	0.00
20-24	3	3.88	1	6.91	0	0.00	0	0.00
25-29	0	0.00	0	0.00	0	0.00	0	0.00
30-34	2	5.05	1	12.21	0	0.00	0	0.00
35-39	1	3.29	0	0.00	0	0.00	0	0.00
40-44	1	6.33	0	0.00	0	0.00	0	0.00
45+	0	0.00	0	0.00	0	0.00	0	0.00
By age (in years), within 365 days after first vaccine dose								
<20	3	6.01	2	3.78	1	6.48	1	274.13
20-24	7	2.81	5	2.85	0	0.00	0	0.00
25-29	4	2.07	3	2.70	0	0.00	0	0.00
30-34	4	2.87	2	2.94	0	0.00	0	0.00
35-39	4	3.60	1	2.21	0	0.00	0	0.00
40-44	2	3.37	0	0.00	0	0.00	0	0.00
45+	0	0.00	0	0.00	0	0.00	0	0.00
Acute disseminated encephalomyelitis								
By age (in years), within 42 days after any vaccine dose								
<20	1	5.23	0	0.00	0	0.00	0	0.00
20-24	1	1.29	0	0.00	0	0.00	0	0.00
25-29	0	0.00	0	0.00	0	0.00	0	0.00
30-34	0	0.00	1	12.20	0	0.00	0	0.00
35-39	0	0.00	0	0.00	0	0.00	0	0.00
40-44	0	0.00	0	0.00	0	0.00	0	0.00
45+	0	0.00	0	0.00	0	0.00	0	0.00
By age (in years), within 365 days after first vaccine dose								
<20	1	2.00	2	3.78	0	0.00	0	0.00
20-24	2	0.80	0	0.00	0	0.00	0	0.00
25-29	1	0.52	0	0.00	0	0.00	0	0.00
30-34	0	0.00	1	1.47	0	0.00	0	0.00
35-39	0	0.00	0	0.00	0	0.00	0	0.00

	2021		2022		2023		2024	
	N	Rate	N	Rate	N	Rate	N	Rate
40-44	1	1.68	0	0.00	0	0.00	0	0.00
45+	0	0.00	0	0.00	0	0.00	0	0.00
Optic neuritis								
By age (in years), within 21 days after any vaccine dose								
<20	0	0.00	1	22.02	0	0.00	0	0.00
20-24	3	6.26	0	0.00	0	0.00	0	0.00
25-29	1	2.83	0	0.00	0	0.00	0	0.00
30-34	2	8.08	0	0.00	0	0.00	0	0.00
35-39	0	0.00	0	0.00	0	0.00	0	0.00
40-44	0	0.00	0	0.00	0	0.00	0	0.00
45+	1	16.10	0	0.00	1	297.61	0	0.00
By age (in years), within 365 days after first vaccine dose								
<20	1	2.00	3	5.68	1	6.48	0	0.00
20-24	12	4.81	10	5.70	0	0.00	0	0.00
25-29	9	4.66	7	6.29	0	0.00	0	0.00
30-34	9	6.45	6	8.81	0	0.00	0	0.00
35-39	7	6.30	3	6.63	0	0.00	0	0.00
40-44	3	5.06	0	0.00	0	0.00	0	0.00
45+	3	8.09	0	0.00	0	0.00	0	0.00
Appendicitis								
By age (in years), within 21 days after any vaccine dose								
<20	13	109.70	4	88.09	0	0.00	0	0.00
20-24	87	182.27	11	150.20	0	0.00	1	1,165.72
25-29	51	145.38	9	179.44	2	457.51	0	0.00
30-34	33	135.10	6	158.89	0	0.00	0	0.00
35-39	30	160.17	6	191.70	0	0.00	0	0.00
40-44	18	184.94	7	388.04	1	288.43	0	0.00
45+	11	180.62	2	150.11	0	0.00	0	0.00
By age (in years), within 365 days after first vaccine dose								
<20	79	158.51	73	138.26	24	155.71	0	0.00
20-24	460	185.20	339	193.95	23	181.87	0	0.00
25-29	275	143.67	199	180.38	5	156.50	0	0.00
30-34	191	138.75	103	153.27	1	86.91	0	0.00
35-39	166	152.28	73	164.58	1	199.33	0	0.00
40-44	77	132.41	28	147.20	1	600.54	1	6,150.23
45+	48	132.15	13	151.30	0	0.00	0	0.00

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