

# **Safety of Monovalent BNT162b2 (Pfizer-BioNTech), mRNA-1273 (Moderna), and NVX-CoV2373 (Novavax) COVID-19 Vaccines in US Children Aged 6 months to 17 years**

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## **Key Points**

### ***Question***

Did active monitoring detect statistical signals for health outcomes following monovalent COVID-19 vaccination in the US children aged 6 months to 17 years?

### ***Findings***

In this study including 4,102,106 vaccinated enrollees from three commercial claims databases, myocarditis or pericarditis signaled after BNT162b2 (12-17 years) and a new signal was detected for seizures/convulsions after BNT162b2 (2-4 years) and mRNA1273 COVID-19 vaccinations (2-5 years).

### ***Meaning***

Near real-time monitoring of vaccines can rapidly identify potential safety concerns. While the myocarditis or pericarditis signal is consistent with existing evidence, the new seizures/convulsions signal should be interpreted cautiously given study limitations.

## **Abstract**

### ***Importance***

Active monitoring of health outcomes after COVID-19 vaccination provides early detection of rare outcomes that may not be identified in prelicensure trials.

### ***Objective***

To conduct near real-time monitoring of health outcomes following COVID-19 vaccination in the United States (US) pediatric population aged 6 months to 17 years.

### ***Design***

We evaluated 21 pre-specified health outcomes; 15 were sequentially tested through near real-time surveillance, and 6 were monitored descriptively within a cohort of vaccinated children. We tested for increased rate of each outcome following vaccination compared to a historical comparator cohort.

### ***Setting***

This population-based study was conducted under the US Food and Drug Administration public health surveillance mandate using three commercial claims databases.

### ***Participants***

Children aged 6 months to 17 years were included if they received a monovalent COVID-19 vaccine dose before early 2023 and had continuous enrollment in a medical health insurance plan from the start of an outcome-specific clean window to the COVID-19 vaccination dose.

### ***Exposure***

Exposure was defined as receipt of a monovalent BNT162b2, mRNA-1273, or NVX-CoV2373 COVID-19 vaccine dose. The primary analysis evaluated dose 1 and dose 2 combined, and secondary analyses

evaluated each dose separately. Follow-up time was censored at death, disenrollment, end of risk window, end of study period, or a subsequent dose administration.

### ***Main Outcomes***

Twenty-one prespecified health outcomes.

### ***Results***

The study included 4,102,016 enrollees aged 6 months to 17 years. Thirteen of 15 outcomes sequentially tested did not meet the threshold for a statistical signal. In the primary analysis, myocarditis or pericarditis signals were detected following BNT162b2 vaccine in children aged 12-17 years old and seizures/convulsions signals were detected following vaccination with BNT162b2 and mRNA-1273 in children aged 2-4/5 years. However, in a post-hoc sensitivity analysis, the seizures/convulsions signal was sensitive to background rates selection and was not observed when 2022 background rates were selected instead of 2020 rates.

### ***Conclusions and Relevance***

Of the two signaled outcomes, the myocarditis or pericarditis signals are consistent with previously published reports. The new signal detected for seizures/convulsions among younger children should be further investigated in a robust epidemiological study with better confounding adjustment.

## **Introduction**

Three vaccines against COVID-19 are currently available for use in children in the United States (US) including the Pfizer-BioNTech (BNT162b2) and Moderna (mRNA-1273) COVID-19 mRNA vaccines for those aged 6 months to 17 years and the protein-based Novavax COVID-19 vaccine (NVX-CoV2373) for those aged 12 to 17 years.<sup>1-3</sup> As of May 2023, the Centers for Disease Control and Prevention (CDC) reported 31.78 million children had received at least one COVID-19 vaccine dose and 26.2 million children had completed the primary series out of approximately 73 million children aged 6 months to 17 years in the US.<sup>4</sup> The US Food and Drug Administration (FDA), utilizing the Biologics Effectiveness and Safety (BEST) Initiative, has been monitoring the safety of COVID-19 vaccines in children since their authorization by applying a near real-time monitoring framework to evaluate the safety of COVID-19 vaccines. This process is a signal detection or screening method and the first step in safety monitoring of these vaccines. This framework is designed to be sensitive enough to rapidly detect less common safety signals. However, results of such study design do not establish a causal relationship between the vaccines and health outcomes and need to be interpreted with caution because of the limited adjustment for confounding and other forms of bias.

The BEST analysis of COVID-19 vaccines in children initially focused on the BNT162b2 COVID-19 monovalent vaccine authorized for use in children aged 5 to 17 years. Surveillance has since been expanded as additional pediatric age groups and vaccine brands received authorization through late 2022. Results of the initial, more limited, safety surveillance in children have been previously published.<sup>5</sup> In this report, we present results from the expanded monitoring of health outcomes in children after exposure to the ancestral monovalent COVID-19 vaccines in the US targeting the original COVID-19 strain.

## **Methods**

### ***Study Objective***

This study evaluated 21 pre-specified health outcomes after exposure to BNT162b2, mRNA-1273, or NVX-CoV2373 monovalent COVID-19 vaccines in children 6 months to 17 years old by applying a near real-time monitoring framework using health care data from three commercial claims databases in the US. Fifteen outcomes underwent sequential testing, and 6 outcomes were only monitored descriptively due to lack of historical rates.

### ***Data Sources***

The study used commercial administrative claims data from Optum, Carelon Research, and CVS Health containing longitudinal medical and pharmacy claims data supplemented with vaccination data from participating local and state Immunization Information Systems (IIS) (Supplemental Table 1).<sup>6</sup>

### ***Study Population and Period***

The study included pediatric enrollees aged 6 months to 17 years who received a monovalent COVID-19 vaccine from the earliest date of its Emergency Use Authorization by age group through April 2023 (Optum), March 2023 (Carelon Research), and February 2023 (CVS Health) (Supplemental Table 2). The surveillance concluded on these respective dates because of limited accrual of exposures and health outcomes. The sequential analyses for most outcomes did not reach the expected number of events that was pre-specified based on anticipated vaccination uptake in a 6-month period post-authorization of individual vaccine products. Another contributing factor to halting surveillance was the de-authorization of the original monovalent mRNA-1273 and BNT162b2 doses for persons of all ages on April 18, 2023.<sup>7</sup>

The inclusion criteria for the study included enrollment on the vaccination date and continuous enrollment in a participating medical health insurance plan from the start of an outcome-specific clean window to the COVID-19 vaccination date so that only new incident diagnosis of an outcome in the

post-vaccination risk window would contribute to the analysis (Supplemental Table 3).

### ***Exposures and Follow Up***

Exposure was defined as the receipt of a BNT162b2, mRNA-1273, or NVX-CoV2373 monovalent COVID-19 vaccine dose identified using brand and dose-specific Current Procedural Terminology/ Healthcare Common Procedure Coding System codes<sup>8</sup> and National Drug Codes (Supplemental Table 4). Dose number was assigned based on the chronological order in which vaccinations were observed since administration codes were not available in pharmacy claims. The primary analyses included all follow-up time accrued after dose 1 and dose 2 combined. Secondary analyses included stratification by dose number and follow-up time accrued after the individual dose (including monovalent third/booster doses) through censoring at subsequent vaccination, death, disenrollment, end of risk window, or end of study period.

### ***Health Outcomes***

Twenty-one pre-specified health outcomes were defined using claims-based algorithms<sup>9-10</sup>. Outcomes were selected through clinical consultation and literature review. Fifteen health outcomes were assessed using sequential testing comparing rates to historical outcome rates (additional information on historical rates below), and 6 were only monitored descriptively due to lack of historical rates.<sup>10</sup> The outcome myocarditis, pericarditis, or co-occurring myocarditis and pericarditis (hereafter referred to as myocarditis/pericarditis) was assessed using four different definitions with varying risk windows and care settings (included in Supplemental Table 3) based on evidence from prior surveillance efforts and clinical input.

### ***Descriptive Monitoring***

We estimated outcome rates in the vaccinated population stratified by age, sex, region, urban/rural status, data source, and vaccine brand on a monthly basis.

## *Sequential Testing*

Monthly sequential testing was conducted using the Poisson Maximized Sequential Probability Ratio Test (PMaxSPRT) to detect statistical signals by generating the incidence rate ratio (IRR) comparing outcome rates following vaccination to database-specific historical (expected) rates for 15 health outcomes.<sup>11</sup>

We estimated annual historical rates for 2019 and 2020 as well as during the COVID-19 pandemic between April and December 2020. Historical rates were adjusted for claims processing delay to account for observation delay and standardized by age and sex where case counts permitted.<sup>12</sup> Selection of the historical comparator rate was based on the overlap between the 95% confidence intervals (CI) for the periods prior to and during the COVID-19 pandemic. If rates in these two historical periods differed substantially, we selected either the minimum or more stable rate as a more conservative approach.

Tests were stratified by age based on age-group-specific authorizations by vaccine brand as well as availability of background rates using historical comparator data. For BNT162b2, this included ages 6 months-4 years, 6 months-1 year and 2-4 years (for seizure/convulsions only), 5-11 years, 12-15 years, and 16-17 years. For mRNA-1273, this included 6 months-5 years, 6 months-1 year and 2-5 years (for seizure or convulsions only), 6-11 years, 12-15 years, and 16-17 years. For NVX-CoV2373, the age groups were 12-15 years and 16-17 years.

Sequential testing for each outcome commenced when a minimum of three cases accrued in the risk window. One-tailed tests were used with the null hypothesis that the observed rate was no greater than the historical comparator rate beyond a pre-specified test margin for each outcome-dose-age group being sequentially tested, with an alpha level of 1%. A stringent alpha level was selected to increase the specificity of signals detected from testing multiple outcomes across different analyses. The log likelihood ratio was calculated comparing the likelihood of the observed IRR and the null hypothesis.



At each test, if the log likelihood ratio exceeded a pre-specified critical value, the null hypothesis was rejected, and a signal was declared. Surveillance continued until a signal was detected, the pre-specified maximum surveillance length was reached, or the end of study period was reached.<sup>10</sup>

### ***Signal Characterization***

Signal characterization was conducted after a signal was identified to provide data quality assessment.<sup>13</sup>

We conducted quality checks to rule out database errors or changes in the patterns of diagnosis codes used to identify events in the study period; estimated the relative risk of outcomes within demographic strata by age and sex; examined the timing of outcomes occurrence during the pre-specified risk window; and assessed whether the signal was sensitive to changes in background rates selection by conducting a post-hoc sensitivity analysis using the updated 2022 background rates as the historical comparator in sequential testing.

### ***Medical Record Review***

Medical record review was conducted for the myocarditis/pericarditis outcome following identification of a signal. Brighton Collaboration case definitions were used to adjudicate cases.<sup>14</sup> Records meeting the confirmed or probable Brighton classifications were considered true myocarditis/pericarditis cases for the validation analyses.

## **Results**

### ***Descriptive Monitoring***

A total of 8,444,355 monovalent COVID-19 vaccine doses were administered to 4,102,016 enrollees aged 6 months -17 years (Figure 1). This included 8,121,591 BNT162b2 (Dose 1: 3,843,778, Dose 2: 3,235,442, Dose 3/ Monovalent Booster: 1,033,036 and Unknown/Unclear: 9,335), and 322,628 mRNA-1273 doses (Dose 1: 173,857, Dose 2: 140,734, Dose 3/Monovalent Booster: 5,284 and

Unknown/Unclear: 2,753) administered to children aged 6 months-17 years, as well as 136 NVX-CoV2373 doses (Dose 1: 63, Dose 2: 43, Dose 3/Monovalent Booster and Unknown/Unclear: 30) administered to children aged 12-17 years (Table 1a). Demographic characteristics of the vaccinated population except age reported at first dose were largely similar across vaccine brands. While majority (93.4%) of BNT162b2-vaccinated individuals were 5 years old and older; majority (97.6%) of mRNA-1273-vaccinated individuals were younger than 5 years old. Across all vaccine brands, 2,058,142 (50.2%) were males and 3,901,370 (95.2%) lived in an urban area (Table 1b). We observed low case counts for outcomes that were monitored descriptively only (<80 cases of any given outcome in all three databases combined) (Supplemental Table 5).

### ***Sequential Testing***

Among 15 outcomes that were sequentially tested, two outcomes met the statistical threshold for a signal including myocarditis/pericarditis in ages 12-15 and 16-17 years, and seizures/convulsions in ages 2-4/5 years.

Myocarditis/pericarditis signaled for all definitions in the primary analysis following BNT162b2 COVID-19 vaccination among children aged 12-15 and 16-17 years in all three databases. Additionally, dose-specific signals for one or more definitions of the outcomes were detected in ages 12-17 years following dose 1, dose 2, and dose 3 of BNT162b2 vaccine in at least one of the three databases (Table 2).

In the primary analysis, seizures/convulsions met the statistical threshold for a signal in children aged 2-4 years following BNT162b2 vaccination in all three databases, and in children aged 2-5 years following mRNA-1273 vaccination in two of the three databases. Dose-specific signals for seizures/convulsions were detected in two of the three databases following dose 1 and dose 2 BNT162b2 vaccination in ages 2-4 years and following dose 2 mRNA-1273 vaccination in ages 2-5

years (Table 2).

Sequential testing did not initiate for any of the 15 outcomes for mRNA-1273 in ages 5-17 years and NVX-CoV2373 in ages 12-17 years, because no outcomes were observed in any databases.

### ***Signal Characterization***

Since myocarditis/pericarditis is a known adverse outcome following COVID-19 mRNA vaccinations, further signal characterization activities were not conducted. In the evaluation of the seizures/convulsions signal among children aged 2-4/5 years, none of the pre-specified data quality checks, including claims duplication, timing of events within pre-specified risk window, and IRR estimates, raised any data quality concerns.

There were 72 observed seizures/convulsions cases among children aged 2-4/5 years and >50% of these cases met the definition of febrile seizures. No differences in rates of seizures/convulsions by sex were identified. The timing of cases did not indicate substantial clustering with cases distributed across the 0-7-day risk window; 31.9% of the seizures/convulsions cases occurred within the 0-1 days following COVID-19 vaccination. The median time between vaccination and diagnosis of seizures/convulsions was 2 days. (Supplemental Figure 1).

The seizures/convulsions signal was sensitive to changes in the selection of comparator rates.

Evaluation of the annual background rate of seizures/convulsions indicated that the rates used in the primary analyses (2020) were substantially lower than rates in 2022. Background rates in 2022 ranged from approximately 2.2-2.4 times the 2020 rates across three databases (Supplemental Table 6). A post-hoc sensitivity analysis using 2022 background rates as the comparator in sequential testing did not identify any seizures/convulsions signals.

### ***Medical Record Review***

Of the 153 cases of myocarditis/pericarditis after COVID-19 vaccination among children aged 12-17 years, medical record review was conducted for a sample of 40 cases whose records could be obtained. Twenty-nine of these cases (72.5%) were confirmed as true cases of myocarditis/pericarditis, of which 27 patients were male, and 19 were hospitalized with a median length of hospital stay of 2 days (interquartile range: 1, 3). The median time from vaccination to presentation of myocarditis/pericarditis event was 3 days (interquartile range: 2, 5). Medical record review and further validation efforts for seizures/convulsions are currently underway.

## **Discussion**

Our near real-time monitoring of 21 pre-specified health outcomes following monovalent COVID-19 vaccines detected signals for myocarditis/pericarditis in the age group 12-17 years and seizures/convulsions in the age group 2-4/5 years. We did not detect signals for other outcomes that were sequentially tested.

The myocarditis/pericarditis signal is consistent with peer-reviewed publication reports demonstrating an elevated risk of this outcome following mRNA vaccines among younger males aged 12 to 29 years.<sup>15-17</sup> Myocarditis/pericarditis is a rare event with a reported average incidence of 39.3 cases per one million vaccine doses administered in children aged 5-17 years within 7 days after BNT162b2 vaccination.<sup>18-19</sup> We did not detect a signal for myocarditis/pericarditis in children younger than 12 years old which is consistent with reports from other surveillance systems.<sup>20-21</sup>

The seizures/convulsions signal in children aged 2-4/5 years has not been previously reported for this age group in active surveillance studies of mRNA COVID-19 vaccines. However, there are reports from the Vaccine Adverse Events Reporting System (VAERS) database which is a passive reporting system and has limitations. In an analysis of VAERS data, only 8 seizures were identified following approximately one million mRNA vaccinations through August 2022 in the age group 6 months to 5

years. Six of the 8 seizures were afebrile on medical evaluation.<sup>22</sup> Pre-licensure vaccine safety data indicate that among young children, seizures/convulsions following mRNA COVID-19 vaccines are rare; clinical trial of 3,013 BNT162b2 vaccine recipients in children aged 6 months to 4 years reported only 5 febrile convulsions cases and only one of those (in a 6-month-old participant) was considered possibly related to the vaccine or may also have been caused by a concurrent viral infection.<sup>23</sup> Among studies conducted in children with childhood epilepsy (<18 years), no increased risk of medically attended seizures was identified following immunization with COVID-19 vaccines. Seizure risk after COVID-19 vaccination was lower in children who were seizure free for more than six months before vaccination. However, the incidence of general adverse events after vaccination was low with no severe adverse events recorded.<sup>24-25</sup> Generally, there is limited evidence linking the mRNA COVID-19 vaccines to a seizure onset among vaccinated children aged 2-4/5 years.

The new seizures/convulsions signal observed in our study should be interpreted with caution and further investigated in a more robust epidemiological study. Our study utilized a broad seizures/convulsions outcome definition with a 0-7-day risk window because of its applicability to older children. However, in children younger than 5 years, vaccine-related seizures typically manifest as a febrile seizure.<sup>26</sup> Although the majority of seizures/convulsions cases met the febrile seizure definition, there was no statistically significant clustering observed at days 0-1. Since febrile seizures can be common in young children for a variety of reasons; the analysis may have identified febrile seizures unrelated to the vaccination later in the risk window.

The post-hoc sensitivity analyses using the 2022 background rates as comparators in sequential testing did not yield any seizures/convulsions signals which suggest that our results are sensitive to comparator rate selection. The decision to use 2020 seizures/convulsions rates as comparators was to maximize sensitivity in the primary analysis. However, seizures/convulsions rates in this age group in 2022 were twice as high as 2020 rates. There could be a couple of potential reasons for elevated outcome rates in

2022 compared to 2020. First, there was an increased incidence of respiratory infections (influenza and respiratory syncytial virus) which are shown to be associated with febrile seizure in younger children, during the study period (mid-2022 to mid-2023) compared to 2020.<sup>27-30</sup> Second, in 2020, there were likely fewer emergency department visits for seizure-related events compared to 2022 because of COVID-19 pandemic healthcare resource limitations.<sup>31</sup>

Our study has a number of strengths. First, the study included a large, geographically diverse population from three US commercial health insurance databases. Due to availability of more complete information from claims supplemented with IIS data and a short data lag from health encounters, we monitored monovalent COVID-19 vaccines safety in a near real-time manner. Additionally, a subset of the identified myocarditis/pericarditis cases were confirmed through medical record review.

The study also has some limitations. We used a near–real-time surveillance method which may be sensitive to comparator rate selection and does not include controlling for bias and confounding. Therefore, results from this study do not establish a causal relationship between the vaccines and health outcomes, and signals should be further evaluated. Secondly, this study only includes data from a commercially insured pediatric population and may not be nationally representative. Furthermore, the study may have limited power to detect small increases in risk of outcomes in certain subgroups or in the cases of more recently authorized vaccines, such as NVX-CoV2373 in children aged 12-17 years as well as mRNA-1273 in those aged 5-17 years.

## **Conclusion**

Our study detected a signal for myocarditis/pericarditis in older children which is consistent with existing literature, and a new signal for seizures/convulsions in young children that is being further evaluated in a more robust study. FDA concludes that the known and potential benefits of COVID-19 vaccination outweigh the known and potential risks of COVID-19 infection. This study was conducted

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**Table 1a. Vaccine Dose Counts for Monovalent BNT162b2, mRNA-1273, NVX-CoV2373 COVID-19 Vaccines Administered to the Pediatric Population, All Data Sources<sup>a</sup>**

Vaccine Dose	BNT162b2		mRNA-1273		NVX-CoV2373	
	N	%	N	%	N	%
<b>Total</b>	8,121,591	100	322,628	100	136	100
<b>Dose 1</b>	3,843,778	47.33	173,857	53.89	63	46.32
<b>Dose 2</b>	3,235,442	39.84	140,734	43.62	43	31.62
<b>Dose 3/Monovalent Booster</b>	1,033,036	12.72	5,284	1.64	§	§
<b>Unknown/Unclear</b>	9,335	0.11	2,753	0.85	§	§

<sup>a</sup> Combines Optum data through 4/2023, Carelon Research data through 3/2023, CVS Health data through 2/2023

§ Cell sizes 1-10 and cells that can be used to back-calculate small cell sizes were masked for confidentiality

**Table 1b. Characteristics of Pediatric Population Receiving Monovalent BNT162b2, mRNA-1273, and NVX-CoV2373 COVID-19 Vaccines, All Data Sources**

Patient Characteristics <sup>#</sup>	BNT162b2		mRNA-1273		NVX-CoV2373		Multiple Brands	
	N	%	N	%	N	%	N	%
<b>Total No. Persons Vaccinated</b>	3,920,563	100	176,427	100	53	100	4,973	100
<b>Age at First Dose (y)</b>								
6 months-4/5*	256,958	6.55	172,161	97.58	0	0.00	2,299	46.23
5/6-11*	1,558,895	39.76	1,687	0.96	0	0.00	1,471	29.58
12-15	1,389,351	35.44	1,420	0.80	27	50.94	945	19.00
16-17	715,359	18.25	1,159	0.66	26	49.06	258	5.19
<b>Sex</b>								
Female	1,954,260	49.85	86,588	49.08	24	45.28	2,521	50.69
Male	1,965,853	50.14	89,808	50.90	29	54.72	2,452	49.31
Missing/Unknown	450	0.01	31	0.02	0	0.00	0	0.00
<b>Urban/Rural</b>								
Rural	191,550	4.89	4,465	2.53	§	§	§	§
Urban	3,724,798	95.01	171,771	97.36	50	94.34	4,751	95.54
Missing/Unknown	4,215	0.11	191	0.11	§	§	§	§
<b>United States Department of Health and Human Services (HHS) Region</b>								
1: CT, ME, NH, RI, VT	252,282	6.43	15,436	8.75	§	§	287	5.77
2: NJ, NY, PR, VI	481,296	12.28	25,927	14.70	§	§	1,844	37.08
3: DE, DC, MD, PA, VA, WV	421,390	10.75	21,765	12.34	§	§	455	9.15
4: AL, FL, GA, KY, MS, NC, SC, TN	610,942	15.58	16,869	9.56	§	§	523	10.52
5: IL, IN, MI, MN, OH, WI	644,718	16.4	24,061	13.64	§	§	465	9.35
6: AR, LA, NM, OK, TX	330,374	8.43	11,142	6.32	§	§	263	5.29
7: IA, KS, MO, NE	159,328	4.06	6,401	3.63	§	§	§	§
8: CO, MT, ND, SD, UT, WY	168,549	4.30	6,998	3.97	§	§	203	4.08
9: AZ, CA, HI, NV, AS, MP, FM, GU, MH, PW	720,576	18.38	37,394	21.20	§	§	621	12.49
10: AK, ID, OR, WA	127,558	3.25	10,260	5.82	§	§	203	4.08
Missing/Unknown	3,550	0.09	174	0.10	0	0.00	§	§
<b>Facility/Provider Type</b>								
Hospital	194,886	4.97	11,492	6.51	§	§	§	§
Office	1,115,926	28.46	125,781	71.29	§	§	3,559	71.57
Pharmacy	1,610,036	41.07	9,940	5.63	32	60.38	337	6.78
Skilled Nursing Facility	§	§	0	0.00	0	0.00	0	0.00
Home Health Agency	§	§	73	0.04	0	0.00	§	§
Mass Immunization Center	110,794	2.83	2,448	1.39	§	§	121	2.43
Other	135,842	3.46	3,851	2.18	§	§	151	3.04
Missing/Unknown	751,900	19.18	22,842	12.95	§	§	710	14.28

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Combines Optum data through 4/2023, Caredon Research data through 3/2023, CVS Health data through 2/2023

# Patient characteristics were assessed at the time of first vaccine dose which was either Dose 1 or Dose 2 depending on the dose that met EUA-specific dose eligibility criteria; persons who received a different brand of vaccine from their Dose 1 are categorized in the "Multiple Brands" category

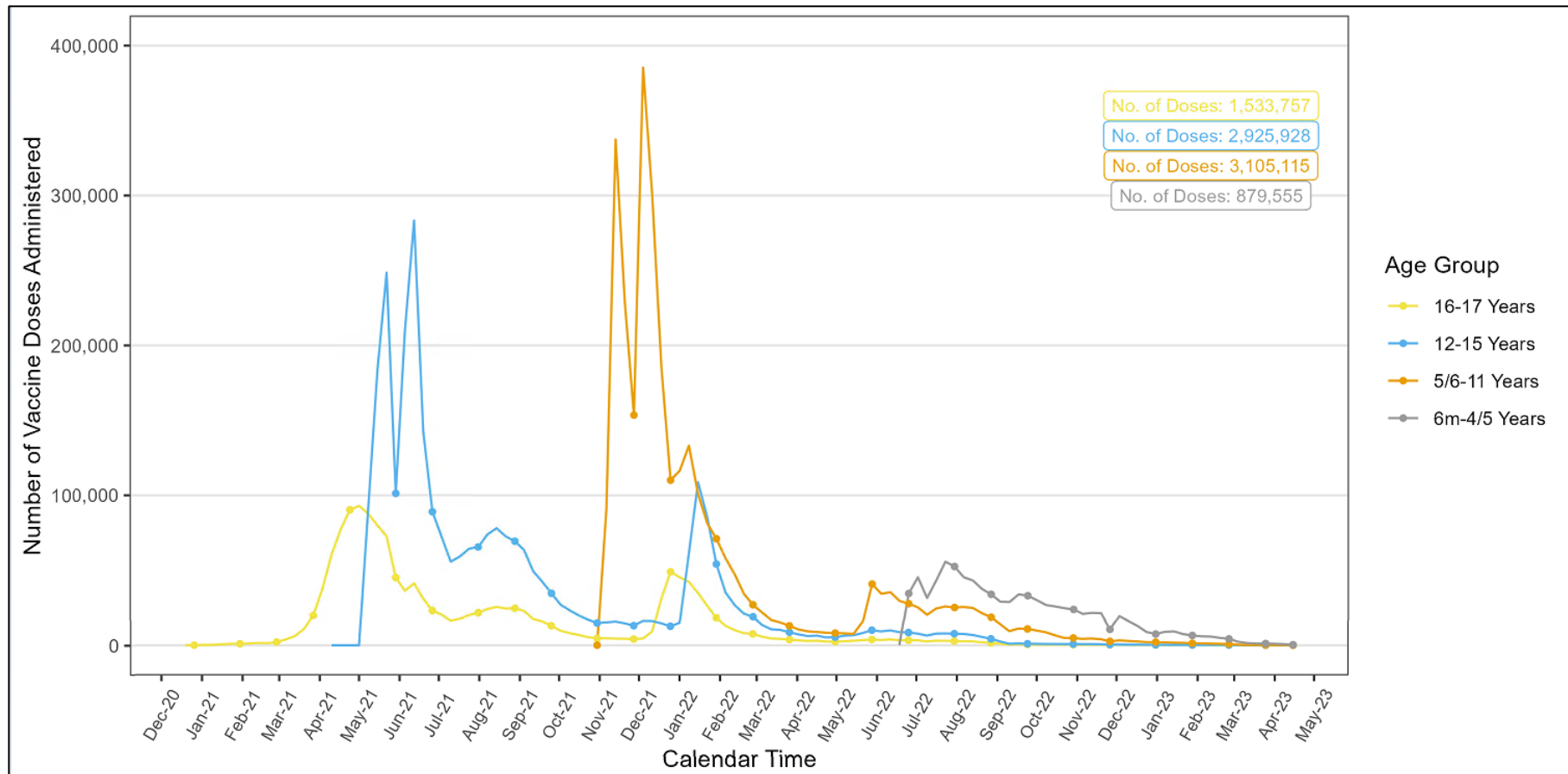
§ Cell sizes 1-10 and cells that can be used to back-calculate small cell sizes were masked for confidentiality

Percentages may not sum up to 100% due to rounding.

\* Children aged 6 months – 4 years that were vaccinated with BNT162b2 COVID-19 vaccine are included in 6 months – 4/5 years age group; children aged 6-months – 5 years that were vaccinated with mRNA1273 COVID-19 vaccine are included in the 6 months – 4/5 years age group. Children aged 5 – 11 years that were vaccinated with BNT162b2 COVID-19 vaccine are included in the 5/6 – 11 years age group; children aged 6 – 11 years that were vaccinated with mRNA1273 COVID-19 vaccine are included in the 5/6 -11 years age group.



**Figure 1. Distribution of Monovalent Doses of BNT162b2, mRNA-1273, and NVX-CoV2373 COVID-19 Vaccines Administered Over Time by Age Group, All Data Sources**



Combines Optum data through 4/2023, Carelon Research data through 3/2023, CVS Health data through 2/2023

**Table 2. Sequential Testing Results for the Pediatric Population Receiving BNT162b2 or mRNA-1273 Monovalent COVID-19 Vaccines Stratified by Vaccine dose and Outcome**

Outcome	Dose	Age Group (years)	BNT162b2				mRNA-1273			
			No. Vaccine Doses	No. Outcomes	Person-Time (Days)	Signal Status*	No. Doses	No. Outcomes	Person-Time (Days)	Signal Status*
Anaphylaxis	Dose 1 + Dose 2	6months(m)-4/5	454,003	§	903,139	NT	304,501	§	606,089	NT
		5/6-11	2,715,842	§	5,428,277	NS	1,687	0	3,346	NT
		12-15	2,444,395	§	4,887,562	NS	1,558	0	3,093	NT
		16-17	1,245,735	§	2,490,728	NT	1,315	0	2,604	NT
	Dose 1	6m-4/5	248,106	§	493,859	NT	166,491	0	331,645	NT
		5/6-11	1,467,128	§	2,932,681	NT	1,068	0	2,120	NT
		12-15	1,309,249	§	2,617,844	NS	957	0	1,896	NT
		16-17	676,147	§	1,351,857	NT	834	0	1,646	NT
	Dose 2	6m-4/5	205,897	§	409,280	NT	138,010	§	274,444	NT
		5/6-11	1,248,714	§	2,495,596	NT	619	0	1,226	NT
		12-15	1,135,146	§	2,269,718	NT	601	0	1,197	NT
		16-17	569,588	0	1,138,871	NT	481	0	958	NT
	Dose 3	6m-4/5	102,335	0	204,292	NT	3,391	0	6,671	NT
		5/6-11	269,600	0	538,724	NT	725	0	1,448	NT
		12-15	383,763	§	767,272	NT	589	0	1,178	NT
		16-17	237,024	§	473,794	NT	320	0	640	NT
Appendicitis	Dose 1 + Dose 2	6m-4/5	351,986	§	11,874,618	NT	241,915	§	8,789,224	NT
		5/6-11	2,213,650	206	72,789,318	NS	1,212	0	43,060	NT
		12-15	2,035,023	302	66,600,250	NS	1,187	0	42,059	NT
		16-17	1,043,311	166	34,406,004	NS	1,013	0	34,656	NT
	Dose 1	6m-4/5	190,648	§	5,463,829	NT	131,372	§	4,385,416	NT
		5/6-11	1,182,865	92	30,910,940	NS	755	0	26,302	NT
		12-15	1,078,396	130	27,055,551	NS	703	0	23,821	NT
		16-17	559,908	74	14,413,948	NS	632	0	20,186	NT
	Dose 2	6m-4/5	161,338	§	6,410,789	NT	110,543	§	4,403,808	NT
		5/6-11	1,030,785	114	41,878,378	NS	457	0	16,758	NT
		12-15	956,627	172	39,544,699	NS	484	0	18,238	NT
		16-17	483,403	92	19,992,056	NS	381	0	14,470	NT
	Dose 3	6m-4/5	83,010	§	3,397,223	NT	2,845	0	92,282	NT
		5/6-11	239,487	27	9,790,542	NS	645	0	23,859	NT
		12-15	352,339	54	14,545,967	NS	532	0	20,146	NT
		16-17	214,951	41	8,754,099	NS	285	0	10,536	NT
Bell's Palsy		6m-4/5	410,400	§	14,065,149	NS	277,737	§	10,222,194	NS

	Dose 1 + Dose 2	5/6-11	2,485,011	35	81,704,667	NS	1,467	0	53,845	NT
		12-15	2,223,492	56	72,869,846	NS	1,410	0	51,392	NT
		16-17	1,129,439	24	37,292,252	NS	1,216	0	43,061	NT
	Dose 1	6m-4/5	221,585	§	6,444,275	NT	150,082	§	5,063,381	NT
		5/6-11	1,334,662	14	35,013,473	NS	916	0	32,855	NT
		12-15	1,179,765	18	29,755,101	NS	849	0	29,484	NT
		16-17	607,786	§	15,737,104	NS	760	0	25,173	NT
	Dose 2	6m-4/5	188,815	§	7,620,874	NT	127,655	§	5,158,813	NT
		5/6-11	1,150,349	22	46,691,194	NS	551	0	20,990	NT
		12-15	1,043,727	38	43,114,745	NS	561	0	21,908	NT
		16-17	521,653	§	21,555,148	NS	456	0	17,888	NT
	Dose 3	6m-4/5	96,939	§	3,984,353	NT	3,233	0	110,964	NT
		5/6-11	259,078	§	10,618,052	NS	699	0	27,077	NT
		12-15	370,606	16	15,297,175	NS	562	0	22,080	NT
		16-17	229,588	§	9,335,942	NS	310	0	12,020	NT
Common Site Thrombosis with Thrombocytop enia <sup>†</sup>	Dose 1 + Dose 2	6m-4/5 <sup>#</sup>	244,267	0	6,241,793	NT	81,661	0	2,219,079	NT
		5-6/11 <sup>#</sup>	2,215,973	§	55,992,946	NT	621	0	16,404	NT
		12-15	2,038,360	§	51,169,805	NT	1,188	0	31,617	NT
		16-17	1,045,098	§	26,329,445	NT	1,016	0	26,702	NT
	Dose 1	6m-4/5 <sup>#</sup>	131,743	0	3,201,944	NT	43,906	0	1,196,821	NT
		5-6/11 <sup>#</sup>	1,184,106	§	27,642,091	NT	398	0	10,492	NT
		12-15	1,080,146	0	24,623,090	NT	704	0	18,802	NT
		16-17	560,874	§	12,913,395	NT	634	0	16,526	NT
	Dose 2	6m-4/5 <sup>#</sup>	112,524	0	3,039,849	NT	37,755	0	1,022,258	NT
		5-6/11 <sup>#</sup>	1,031,867	0	28,350,855	NT	223	0	5,912	NT
		12-15	958,214	§	26,546,715	NT	484	0	12,815	NT
		16-17	484,224	§	13,416,050	NT	382	0	10,176	NT
	Dose 3	6m-4/5 <sup>#</sup>	59,404	0	1,638,795	NT	778	0	19,250	NT
		5-6/11 <sup>#</sup>	239,716	§	6,602,510	NT	352	0	9,147	NT
		12-15	352,878	0	9,765,325	NT	533	0	14,234	NT
		16-17	215,309	0	5,886,780	NT	285	0	7,596	NT
Deep Vein Thrombosis	Dose 1 + Dose 2	6m-4/5	351,932	§	9,020,709	NT	241,877	0	6,579,967	NT
		5/6-11	2,215,893	§	55,988,930	NT	1,212	0	32,099	NT
		12-15	2,038,235	§	51,163,432	NS	1,188	0	31,617	NT
		16-17	1,044,870	§	26,321,797	NS	1,016	0	26,702	NT
	Dose 1	6m-4/5	190,617	0	4,651,184	NT	131,352	0	3,581,264	NT
		5/6-11	1,184,060	§	27,640,017	NT	755	0	20,038	NT
		12-15	1,080,081	§	24,620,103	NS	704	0	18,802	NT
		16-17	560,752	§	12,909,608	NS	634	0	16,526	NT
	Dose 2	6m-4/5	161,315	§	4,369,525	NT	110,525	0	2,998,703	NT
		5/6-11	1,031,833	0	28,348,913	NT	457	0	12,061	NT

		12-15	958,154	§	26,543,329	NT	484	0	12,815	NT
		16-17	484,118	§	13,412,189	NT	382	0	10,176	NT
	Dose 3	6m-4/5	83,015	0	2,291,244	NT	2,845	0	68,640	NT
		5/6-11	239,708	0	6,601,838	NT	648	0	17,106	NT
		12-15	352,852	§	9,763,925	NT	533	0	14,234	NT
		16-17	215,265	§	5,885,237	NT	285	0	7,596	NT
Disseminated Intravascular Coagulation	Dose 1 + Dose 2	6m-4/5	352,017	§	8,897,561	NT	241,928	0	6,501,186	NT
		5/6-11	2,215,973	§	55,933,013	NT	1,212	0	30,713	NT
		12-15	2,038,363	0	51,163,245	NT	1,188	0	30,749	NT
		16-17	1,045,113	0	26,325,916	NT	1,018	0	25,832	NT
	Dose 1	6m-4/5	190,665	§	4,597,312	NT	131,380	0	3,546,479	NT
		5/6-11	1,184,106	§	27,614,907	NT	755	0	19,448	NT
		12-15	1,080,148	0	24,619,938	NT	704	0	18,402	NT
		16-17	560,883	0	12,911,429	NT	635	0	15,982	NT
	Dose 2	6m-4/5	161,352	0	4,300,249	NT	110,548	0	2,954,707	NT
		5/6-11	1,031,867	§	28,318,106	NT	457	0	11,265	NT
		12-15	958,215	0	26,543,307	NT	484	0	12,347	NT
		16-17	484,230	0	13,414,487	NT	383	0	9,850	NT
	Dose 3	6m-4/5	83,022	0	2,278,221	NT	2,845	0	64,854	NT
		5/6-11	239,717	0	6,579,046	NT	648	0	16,295	NT
		12-15	352,881	§	9,759,909	NT	533	0	13,650	NT
		16-17	215,316	0	5,884,863	NT	285	0	7,132	NT
Encephalitis or Encephalomyelitis	Dose 1 + Dose 2	6m-4/5	410,448	0	13,758,825	NT	277,773	§	10,024,797	NT
		5/6-11	2,485,324	§	81,547,753	NT	1,469	0	49,843	NT
		12-15	2,223,796	§	72,859,944	NS	1,410	0	48,910	NT
		16-17	1,129,627	§	37,287,987	NT	1,216	0	40,559	NT
	Dose 1	6m-4/5	221,610	0	6,325,107	NT	150,101	§	4,984,704	NT
		5/6-11	1,334,839	§	34,943,578	NT	916	0	30,912	NT
		12-15	1,179,935	§	29,750,039	NT	849	0	28,438	NT
		16-17	607,886	§	15,734,035	NT	760	0	23,715	NT
	Dose 2	6m-4/5	188,838	0	7,433,718	NT	127,672	§	5,040,093	NT
		5/6-11	1,150,485	§	46,604,175	NT	553	0	18,931	NT
		12-15	1,043,861	§	43,109,905	NS	561	0	20,472	NT
		16-17	521,741	§	21,553,952	NT	456	0	16,844	NT
	Dose 3	6m-4/5	96,950	0	3,945,744	NT	3,233	0	101,347	NT
		5/6-11	259,110	§	10,548,412	NT	699	0	24,341	NT
		12-15	370,652	0	15,282,789	NT	563	0	20,192	NT
		16-17	229,634	0	9,331,463	NT	310	0	10,873	NT
Guillain-Barré Syndrome	Dose 1 + Dose 2	6m-4/5	352,025	0	11,830,401	NT	241,936	0	8,761,303	NT
	Dose 1	6m-4/5	190,670	0	5,446,456	NT	131,384	0	4,374,485	NT

	Dose 2	6m-4/5	161,355	0	6,383,945	NT	110,552	0	4,386,818	NT
	Dose 3	6m-4/5	83,022	0	3,391,294	NT	2,845	0	90,746	NT
Hemorrhagic Stroke	Dose 1 + Dose 2	6m-4/5	351,997	§	8,970,006	NT	241,927	0	6,548,151	NT
	Dose 1	6m-4/5	190,654	§	4,629,520	NT	131,379	0	3,567,371	NT
	Dose 2	6m-4/5	161,343	0	4,340,486	NT	110,548	0	2,980,780	NT
	Dose 3	6m-4/5	83,017	0	2,285,757	NT	2,845	0	66,970	NT
Immune Thrombocytop enia	Dose 1 + Dose 2	6m-4/5	351,972	§	12,028,216	NT	241,891	§	8,887,610	NS
		5/6-11	2,215,661	23	72,925,239	NS	1,212	0	44,796	NT
		12-15	2,038,029	25	66,706,657	NS	1,188	0	43,176	NT
		16-17	1,044,876	15	34,462,183	NS	1,018	0	35,938	NT
	Dose 1	6m-4/5	190,643	0	5,522,961	NT	131,361	§	4,424,088	NT
		5/6-11	1,183,941	§	30,969,110	NS	755	0	27,077	NT
		12-15	1,079,968	§	27,098,483	NS	704	0	24,320	NT
		16-17	560,757	§	14,438,389	NS	635	0	20,921	NT
	Dose 2	6m-4/5	161,329	§	6,505,255	NT	110,530	§	4,463,522	NT
		5/6-11	1,031,720	§	41,956,129	NS	457	0	17,719	NT
		12-15	958,061	§	39,608,174	NS	484	0	18,856	NT
		16-17	484,119	§	20,023,794	NS	383	0	15,017	NT
	Dose 3	6m-4/5	83,012	0	3,415,558	NT	2,845	0	97,403	NT
		5/6-11	239,675	0	9,830,404	NT	647	0	24,998	NT
		12-15	352,826	0	14,573,683	NT	533	0	21,004	NT
		16-17	215,255	§	8,769,474	NT	285	0	11,128	NT
Myocarditis/pe ricarditis (All settings) (1-7 day)	Dose 1 + Dose 2	6m-4/5	351,988	0	2,443,114	NT	241,924	0	1,679,814	NT
		5/6-11	2,215,815	§	15,455,303	NS	1,212	0	8,392	NT
		12-15	2,038,160	72	14,241,393	S	1,188	0	8,197	NT
		16-17	1,044,928	56	7,299,458	S	1,018	0	7,014	NT
	Dose 1	6m-4/5	190,650	0	1,323,939	NT	131,378	0	912,801	NT
		5/6-11	1,184,019	§	8,261,973	NT	755	0	5,244	NT
		12-15	1,080,046	§	7,547,573	NS	704	0	4,859	NT
		16-17	560,782	§	3,917,140	NS	635	0	4,355	NT
	Dose 2	6m-4/5	161,338	0	1,119,175	NT	110,546	0	767,013	NT
		5/6-11	1,031,796	§	7,193,330	NS	457	0	3,148	NT
		12-15	958,114	§	6,693,820	S	484	0	3,338	NT
		16-17	484,146	§	3,382,318	S	383	0	2,659	NT
	Dose 3	6m-4/5	83,014	0	579,161	NT	2,845	0	19,413	NT
		5/6-11	239,708	0	1,672,699	NT	648	0	4,517	NT
		12-15	352,832	§	2,465,354	S	533	0	3,719	NT
		16-17	215,272	13	1,497,801	S	285	0	1,990	NT
Myocarditis/pe ricarditis (All		6m-4/5	351,988	§	7,252,205	NT	241,924	0	4,987,361	NT
		5/6-11	2,215,815	12	45,978,229	NS	1,212	0	24,750	NT

Settings) (1-21 day)	Dose 1 + Dose 2	12-15	2,038,160	103	42,443,102	S	1,188	0	24,182	NT
		16-17	1,044,928	71	21,746,581	S	1,018	0	20,541	NT
	Dose 1	6m-4/5	190,650	0	3,932,631	NT	131,378	0	2,711,909	NT
		5/6-11	1,184,019	§	24,573,073	NT	755	0	15,431	NT
		12-15	1,080,046	19	22,468,619	S	704	0	14,352	NT
		16-17	560,782	16	11,655,098	S	635	0	12,742	NT
	Dose 2	6m-4/5	161,338	§	3,319,574	NT	110,546	0	2,275,452	NT
		5/6-11	1,031,796	§	21,405,156	NS	457	0	9,319	NT
		12-15	958,114	84	19,974,483	S	484	0	9,830	NT
		16-17	484,146	56	10,091,483	S	383	0	7,799	NT
	Dose 3	6m-4/5	83,014	0	1,728,090	NT	2,845	0	54,542	NT
		5/6-11	239,708	0	4,980,481	NT	648	0	13,186	NT
		12-15	352,832	§	7,349,009	S	533	0	10,924	NT
		16-17	215,272	14	4,436,604	S	285	0	5,871	NT
Myocarditis/pe ricarditis (IP/OP-ED) (1-7 day)	Dose 1 + Dose 2	6m-4/5 <sup>#</sup>	352,019	0	2,427,241	NT	152,637	0	1,053,032	NT
		5-6/11 <sup>#</sup>	2,215,967	§	15,450,396	NT	621	0	4,208	NT
		12-15	2,038,335	55	14,242,747	S	1,188	0	8,114	NT
		16-17	1,045,077	40	7,300,604	S	1,018	0	6,924	NT
	Dose 1	6m-4/5 <sup>#</sup>	190,667	0	1,316,715	NT	82,934	0	573,125	NT
		5-6/11 <sup>#</sup>	1,184,102	§	8,259,674	NT	398	0	2,691	NT
		12-15	1,080,136	§	7,548,270	NT	704	0	4,819	NT
		16-17	560,863	§	3,917,764	NS	635	0	4,297	NT
	Dose 2	6m-4/5 <sup>#</sup>	161,352	0	1,110,526	NT	69,703	0	479,907	NT
		5-6/11 <sup>#</sup>	1,031,865	§	7,190,722	NT	223	0	1,517	NT
		12-15	958,199	§	6,694,477	S	484	0	3,295	NT
		16-17	484,214	§	3,382,840	S	383	0	2,627	NT
	Dose 3	6m-4/5 <sup>#</sup>	83,021	0	578,025	NT	1,185	0	7,882	NT
		5-6/11 <sup>#</sup>	239,718	0	1,671,051	NT	352	0	2,405	NT
		12-15	352,870	§	2,465,157	S	533	0	3,707	NT
		16-17	215,311	§	1,498,007	S	285	0	1,966	NT
Myocarditis/pe ricarditis (IP/OP-ED) (1-21 day)	Dose 1 + Dose 2	6m-4/5 <sup>#</sup>	352,019	0	7,198,601	NT	152,637	0	3,125,323	NT
		5-6/11 <sup>#</sup>	2,215,967	§	45,959,404	NT	621	0	12,298	NT
		12-15	2,038,335	61	42,446,709	S	1,188	0	23,893	NT
		16-17	1,045,077	46	21,749,769	S	1,018	0	20,217	NT
	Dose 1	6m-4/5 <sup>#</sup>	190,667	0	3,908,994	NT	82,934	0	1,702,556	NT
		5-6/11 <sup>#</sup>	1,184,102	§	24,564,532	NT	398	0	7,883	NT
		12-15	1,080,136	§	22,470,533	NS	704	0	14,199	NT
		16-17	560,863	12	11,656,804	S	635	0	12,513	NT
	Dose 2	6m-4/5 <sup>#</sup>	161,352	0	3,289,607	NT	69,703	0	1,422,767	NT
		5-6/11 <sup>#</sup>	1,031,865	§	21,394,872	NT	223	0	4,415	NT
		12-15	958,199	§	19,976,176	S	484	0	9,694	NT

	Dose 3	16-17	484,214	35	10,092,965	S	383	0	7,704	NT
		6m-4/5 <sup>#</sup>	83,021	0	1,723,572	NT	1,185	0	22,367	NT
		5-6/11 <sup>#</sup>	239,718	0	4,973,111	NT	352	0	6,892	NT
		12-15	352,870	§	7,348,086	S	533	0	10,753	NT
		16-17	215,311	§	4,437,033	S	285	0	5,721	NT
Narcolepsy	Dose 1 + Dose 2	5/6-11	2,215,928	§	72,934,272	NS	1,212	0	44,796	NT
		12-15	2,038,107	16	66,709,380	NS	1,188	0	43,176	NT
		16-17	1,044,699	24	34,456,767	NS	1,017	0	35,896	NT
	Dose 1	5/6-11	1,184,080	§	30,972,795	NT	755	0	27,077	NT
		12-15	1,080,018	§	27,099,946	NS	704	0	24,320	NT
		16-17	560,647	§	14,435,556	NT	635	0	20,921	NT
	Dose 2	5/6-11	1,031,848	§	41,961,477	NS	457	0	17,719	NT
		12-15	958,089	§	39,609,434	NS	484	0	18,856	NT
		16-17	484,052	§	20,021,211	NS	382	0	14,975	NT
	Dose 3	5/6-11	239,715	0	9,832,012	NT	648	0	25,021	NT
		12-15	352,841	§	14,574,277	NS	533	0	21,004	NT
		16-17	215,221	12	8,768,192	NS	285	0	11,128	NT
Non-Hemorrhagic Stroke	Dose 1 + Dose 2	6m-4/5	352,009	0	8,942,566	NT	241,930	§	6,530,082	NT
		5/6-11	2,215,960	§	55,955,653	NT	1,212	0	31,259	NT
		12-15	2,038,354	0	51,165,669	NT	1,188	0	31,151	NT
		16-17	1,045,115	§	26,327,584	NT	1,018	0	26,192	NT
	Dose 1	6m-4/5	190,661	0	4,617,655	NT	131,381	§	3,559,300	NT
		5/6-11	1,184,098	§	27,625,211	NT	755	0	19,695	NT
		12-15	1,080,143	0	24,621,154	NT	704	0	18,574	NT
		16-17	560,884	§	12,912,371	NT	635	0	16,176	NT
	Dose 2	6m-4/5	161,348	0	4,324,911	NT	110,549	0	2,970,782	NT
		5/6-11	1,031,862	0	28,330,442	NT	457	0	11,564	NT
		12-15	958,211	0	26,544,515	NT	484	0	12,577	NT
		16-17	484,231	§	13,415,213	NT	383	0	10,016	NT
	Dose 3	6m-4/5	83,019	§	2,282,885	NT	2,845	0	66,156	NT
		5/6-11	239,722	0	6,587,840	NT	648	0	16,549	NT
		12-15	352,881	0	9,761,993	NT	533	0	13,822	NT
		16-17	215,317	§	5,885,718	NT	285	0	7,299	NT
Pulmonary Embolism	Dose 1 + Dose 2	6m-4/5 <sup>#</sup>	239,532	0	6,178,317	NT	160,273	0	4,377,689	NT
		5/6-11	2,215,976	0	56,012,340	NT	1,212	0	32,579	NT
		12-15	2,038,334	§	51,168,510	NT	1,188	0	31,876	NT
		16-17	1,044,978	§	26,326,099	NS	1,018	0	27,082	NT
	Dose 1	6m-4/5 <sup>#</sup>	130,125	0	3,196,420	NT	87,477	0	2,391,693	NT
		5/6-11	1,184,108	0	27,650,979	NT	755	0	20,295	NT
		12-15	1,080,133	0	24,622,518	NT	704	0	18,935	NT
		16-17	560,809	§	12,911,833	NS	635	0	16,775	NT

	Dose 2	6m-4/5 <sup>#</sup>	109,407	0	2,981,897	NT	72,796	0	1,985,996	NT
		5/6-11	1,031,868	0	28,361,361	NT	457	0	12,284	NT
		12-15	958,201	§	26,545,992	NT	484	0	12,941	NT
		16-17	484,169	§	13,414,266	NT	383	0	10,307	NT
	Dose 3	6m-4/5 <sup>#</sup>	55,239	0	1,527,770	NT	2,067	0	50,277	NT
		5/6-11	239,722	§	6,610,019	NT	648	0	17,308	NT
		12-15	352,879	0	9,766,897	NT	533	0	14,393	NT
		16-17	215,293	§	5,886,669	NT	285	0	7,721	NT
Seizures/Convulsions <sup>‡</sup>	Dose 1 + Dose 2	6m-1	450,140	25	1,191,471	NS	302,275	15	872,958	NS
		2-4/5	450,140	36	2,373,696	S	302,275	29	1,522,577	S
		5/6-11	2,692,535	71	21,462,208	NS	1,667	0	13,078	NT
		12-15	2,430,285	52	19,407,961	NS	1,545	0	12,180	NT
		16-17	1,238,940	38	9,890,880	NS	1,300	0	10,220	NT
	Dose 1	6m-1	245,400	14	660,359	NS	164,942	§	486,994	NS
		2-4/5	245,400	21	1,284,771	S	164,942	§	821,447	NS
		5/6-11	1,454,544	41	11,598,717	NS	1,051	0	8,240	NT
		12-15	1,301,389	27	10,393,770	NS	947	0	7,458	NT
		16-17	671,951	24	5,363,845	NS	821	0	6,431	NT
	Dose 2	6m-1	204,740	11	531,112	NS	137,333	§	385,964	NS
		2-4/5	204,740	15	1,088,925	S	137,333	§	701,130	S
		5/6-11	1,237,991	30	9,863,491	NS	616	0	4,838	NT
		12-15	1,128,896	25	9,014,191	NS	598	0	4,722	NT
		16-17	566,989	16	4,527,035	NS	479	0	3,789	NT
	Dose 3	6m-1	102,099	§	231,518	NT	3,376	§	8,115	NT
		2-4/5	102,099	§	581,953	NS	3,376	0	18,177	NT
		5/6-11	268,990	§	2,145,055	NS	725	0	5,768	NT
		12-15	382,249	§	3,052,406	NS	587	0	4,684	NT
		16-17	236,352	§	1,879,834	NS	318	0	2,532	NT

**\* Signal Status Definitions:**

- NS: Test was initiated (cases > 3) but no signal was observed.

- S: Test met the statistical threshold for a signal.

- NT: Test did not initiate due to low outcome counts (cases <3).

§ Cell sizes 1-10 and cells that can be used to back-calculate small cell sizes were masked for confidentiality

† Common site thrombosis with thrombocytopenia is combined with unusual site thrombosis (broad) with thrombocytopenia consisting of a thrombotic event (made up of other events such as acute myocardial infarction, deep vein thrombosis etc.) and a thrombocytopenia event (defined in the IP, OP/PB setting). The overall setting definition for the outcome depends on individual setting definitions for each of these components.

# For these outcome-age combinations, testing occurred in fewer than three data sources because one or more data source did not have available background rates; for these outcome-age combinations, no. of doses are reported for the data sources where sequential testing data was available.

‡ For the outcome seizures/convulsions, the number of doses reported in both ages 6 months-1 year and 2-4/5 years corresponds to the total number of doses monitored descriptively in ages 6 months-4/5 years; all other statistics from sequential testing (number of outcomes, person-time, and signal status) are reported for the corresponding age stratifications listed in the table above due to availability of background rates for those age strata.

Sequential testing ended earlier in ages 5/6-17 years due to limited accrual of new exposures; therefore, the data cuts used are different from ages 6 months-4/5 years.



- Ages 5/6-17 years: Optum data through 4/2023, Carelon Research data through 1/2023, CVS Health data through 12/2022.
- Ages 6 months-4/5 years: Optum data through 1/2023, Carelon Research data through 3/2023, CVS Health data through 2/2023