

## British Columbia Report

### Adverse Events Following Immunization with COVID-19 Vaccines

December 13, 2020 to June 12, 2021

This report summarizes the reports of COVID-19 vaccine adverse events following immunization (AEFI) reported to the BC Centre for Disease Control up to and including June 12, 2021. Please refer to the [BCCDC website](#) for reporting guidelines.<sup>1</sup> Events can be reported even when there is no certainty of a causal association. Please refer to the Data Notes section at the end of this report for additional information on the source data.

#### Summary

No safety signals have been identified in association with the mRNA reports received in BC to date. These results are in keeping with observed safety of the mRNA vaccines elsewhere in Canada and available reports from other jurisdictions, as well as the demonstrated safety of these vaccines in clinical trials prior to authorization for use.<sup>2-4</sup> BC is reporting higher rates of anaphylaxis than many other Canadian jurisdictions, but about half of these had lower level of diagnostic certainty and may reflect events such as anxiety or pre-syncopal (fainting) events, which are nevertheless managed as anaphylaxis out of an abundance of caution, and reported thereafter. Serious events have not been reported at rates higher than expected compared to background rates. BC is monitoring for reports of myocarditis following mRNA vaccines, which has been identified as an adverse event of interest based on reports from Israel and is being monitored in several countries.<sup>5,6</sup>

There have been three reports of thrombosis with thrombocytopenia syndrome reported in BC to date in association with over 300,000 doses of the ChAdOx1 (chimpanzee adenovirus vector vaccines AstraZeneca/COVISHIELD) administered. This syndrome was identified in March in Europe in association with the AstraZeneca vaccine, with a small number of cases accumulating in Canada associated with use of these vaccines at rates of about 1 in 50,000 to 1 in 100,000 recipients.<sup>7,8</sup>

#### Background

AEFIs are reportable by health care providers to the local medical health officer under the regulations of the Public Health Act. Detailed reporting guidelines are available in the [BC Immunization Manual](#).<sup>9</sup> When an AEFI report is received at a local public health unit, it is reviewed and reported in the public health information system aligned with the immunization registry which contains the information about the vaccine(s) administered on a specific date. Recommendations for further assessment and future doses are made by the medical health officer or designated public health professional. Expected side effects such as pain, redness, and swelling at the injection site which are commonly observed with many vaccines are not reportable as AEFI unless these meet specific severity thresholds.

AEFI reports are further investigated provincially with particular focus on serious AEFI and

detection of potential safety signals (e.g., clusters of events, event rates occurring at a higher than expected frequency compared to background rates, or rare events with previously unknown association with vaccination). Additionally, BC submits AEFI reports to the [Canadian Adverse Event Following Immunization Surveillance System](#) where additional review and analysis for potential safety signals is performed at the national level.<sup>10</sup> The Public Health Agency of Canada also produces a weekly [COVID-19 AEFI report](#).<sup>11</sup>

## Definitions

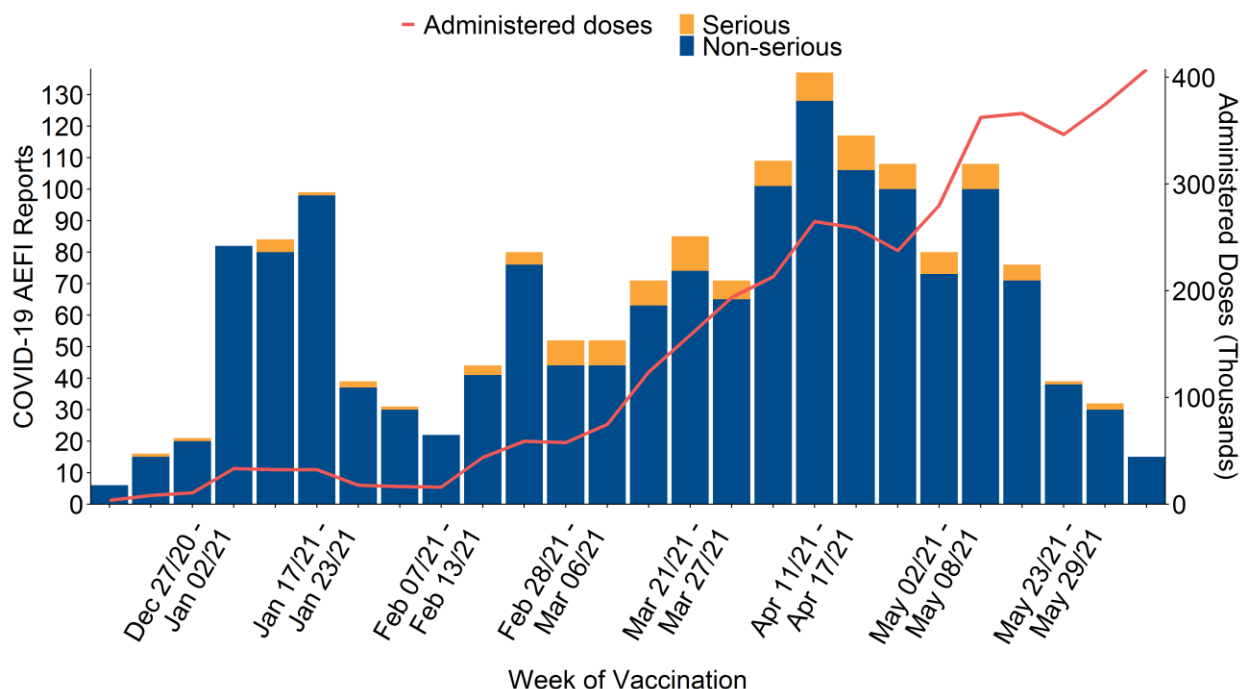
1. **Adverse event following immunization (AEFI)** - Any untoward medical event following immunization that is temporally (i.e., occurs within a biologically plausible timeframe after receipt of vaccine) but not necessarily causally associated.<sup>12</sup>
2. **Serious AEFI** - For the purpose of this report, a serious AEFI is one that resulted in hospitalization or a prolongation of hospitalization, permanent disability/incapacity, or death.

## Key Findings

- As of June 12, 2021, there have been 3,993,717 COVID-19 vaccine doses administered in BC and 1,676 COVID-19 AEFI reports (42.0 reports per 100,000 doses administered)
- 117 reports (7%) met the serious definition, for a rate of 2.9 per 100,000 doses administered
- The most frequently reported events were other allergic event, event managed as anaphylaxis, and anaesthesia/paraesthesia

## Summary of AEFI Reports

**Figure 1:** Adverse event reports following receipt of a COVID-19 vaccine by week of vaccination, BC, Dec. 13, 2020 - Jun. 12, 2021 (N=1,676)



COVID-19 vaccinations of British Columbians began the week of December 13, 2020, and up to and including June 12, 2021, a total of 3,993,717 doses have been administered. During this period, there have been 1,676 AEFI reports following a COVID-19 vaccine, for a reporting rate of 42.0 reports per 100,000 doses administered (Table 1). Reports are delayed beyond the week of vaccination because of time to onset that varies by event and associated time to receive, investigate and process a report for submission. Weekly report counts, especially for recent weeks, are expected to increase over time as these are submitted.

**Table 1:** Description of adverse event reports following receipt of a COVID-19 vaccine, BC, Dec. 13, 2020 - Jun. 12, 2021 (N=1,676)

	COVID-19 Vaccine*				
	All COVID-19 Vaccines	AstraZeneca	COVISHIELD	Moderna	Pfizer
<b>Total reports</b>	<b>1,676</b>	<b>159</b>	<b>50</b>	<b>498</b>	<b>968</b>
Non-serious reports	1,559	147	46	470	895
Serious reports	117	12	4	28	73
Proportion serious	7%	7.5%	8%	5.6%	7.5%
Dose 1 reports	1,546	159	50	458	878

	COVID-19 Vaccine*				
	All COVID-19 Vaccines	AstraZeneca	COVISHIELD	Moderna	Pfizer
Dose 2 reports	130	0	0	40	90
<b>Total doses administered</b>	<b>3,993,717</b>	<b>255,169</b>	<b>63,758</b>	<b>717,628</b>	<b>2,957,132</b>
Dose 1 administered	3,415,209	215,279	59,497	606,985	2,533,418
Dose 2 administered	578,508	39,890	4,261	110,643	423,714
<b>Total reporting rate</b>	<b>42.0</b>	<b>62.3</b>	<b>78.4</b>	<b>69.4</b>	<b>32.7</b>
Serious rate	2.9	4.7	6.3	3.9	2.5
Dose 1 rate	45.3	73.9	84.0	75.5	34.7
Dose 2 rate	22.5	0.0	0.0	36.2	21.2

Note: Rates calculated per 100,000 doses administered

\* Some reports had an unspecified COVID-19 vaccine (n=1). Therefore, the total reports for all COVID-19 vaccines do not equal the sum of reports for each specific vaccine

## Serious Reports

One hundred seventeen reports (7%) were considered serious (refer to serious AEFI definition above). Of these, 107 individuals were admitted to hospital. These included 12 individuals hospitalized after anaphylaxis, 25 for a neurological diagnosis (including three for transverse myelitis, four for seizure, 14 for stroke, two intracerebral hemorrhage with one associated encephalopathy, one meningitis, and one Guillain-Barre Syndrome), 20 for cardiac events (including 11 for myocardial infarction, seven for myopericarditis, and two for an arrhythmia), 12 pulmonary embolism, one respiratory distress, one for exacerbation of idiopathic pulmonary fibrosis, one for a pregnancy related complication, seven for thrombocytopenia alone or associated with a concurrent condition, and three for thrombosis with thrombocytopenia syndrome (described further below). The remaining reports were for individuals who were hospitalized for monitoring of allergic, neurological, or cardiac symptoms but without a medically diagnosed event.

Death is reportable as an adverse event when it occurs within 30 days of vaccination and no other clear cause of death has been established.<sup>9</sup> Death may also be recorded as the outcome of a specific reportable event. Thirteen serious AEFI reports were received for individuals who died within 30 days of receiving a COVID-19 vaccine. For two of the deaths, vaccination was not considered to be a contributing factor by health care providers who attended and investigated the death based on the individuals' medical history. Two deaths occurred in elderly individuals with underlying medical conditions; the coroner deemed these deaths not unexpected and further investigation into the cause of death was not conducted. Another death occurred in a long term care resident following deterioration with reduction in oral intake, without a clear underlying cause of death identified. Two additional deaths occurred in long term care residents and were still being reviewed at the time of this report.

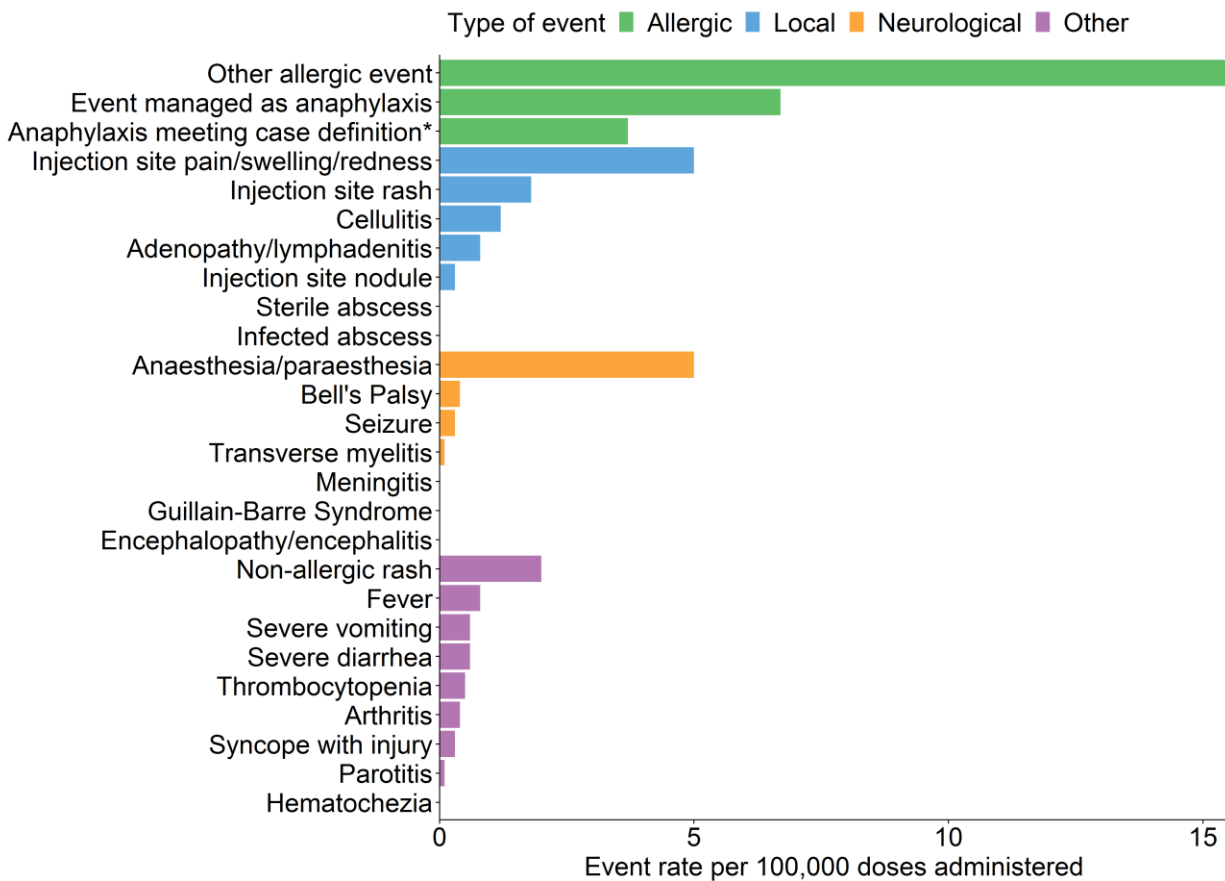
For four individuals, death was the outcome of cardiac arrest. Three of these were elderly

individuals with multiple underlying medical conditions, while the other had cardiac risk factors and was hospitalized for a myocardial infarction. A death occurred in an elderly individual following a stroke and hospital admission. This individual had previous history of stroke along with other medical conditions. Finally, one death occurred in an individual with metastatic cancer who had been hospitalized for complications of thrombocytopenia and hemolytic anemia.

### Summary of Reported Events

A single AEFI report may contain one or more adverse events. Reported events are temporally associated with vaccination (i.e., occur after vaccination within a biologically plausible timeframe) but not necessarily causally associated. The 1,676 AEFI reports received up to June 12, 2021 contained a total of 2,175 adverse events for a ratio of 1.3 events per COVID-19 AEFI report. The most frequently reported events were other allergic events (e.g., allergic rash, hives, pruritus, and gastrointestinal symptoms), events managed as anaphylaxis, and anaesthesia/paraesthesia (Figure 2). Of the events managed as anaphylaxis, roughly half met the Brighton Collaboration anaphylaxis case definition with level 1, 2, or 3 diagnostic certainty.<sup>13</sup>

**Figure 2:** Adverse events following receipt of a COVID-19 vaccine, British Columbia, Dec. 13, 2020 - Jun. 12, 2021 (N=2,175)



\*Represent a subset of events managed as anaphylaxis that meet the Brighton Collaboration anaphylaxis case definition with level 1, 2, or 3 diagnostic certainty.

## Event Descriptions

Two hundred sixty-seven reports were received for events managed as anaphylaxis (i.e., the client received epinephrine for a suspected anaphylactic reaction). Of these, 147 (55%) met the Brighton Collaboration definition for anaphylaxis with diagnostic certainty levels of 1, 2, or 3.<sup>13</sup> Upon further review of these reports, many may reflect events such as anxiety or pre-syncope (fainting) events.

Forty-six reports of cellulitis were received. Although most of these reports specified that antibiotics were provided, many appeared to represent a delayed onset local inflammatory reaction rather than cellulitis, a reaction described by others.<sup>14</sup> None of these reports were confirmed by microbial testing.

Thirty-six reports contained a diagnosed neurological event. Seventeen individuals experienced Bell's Palsy within 30 days following COVID-19 vaccination. Three individuals were admitted to hospital and diagnosed with transverse myelitis, including one with a history of multiple sclerosis. Twelve individuals reported seizures, including eight with a history of a seizure disorder. Two individuals were admitted to hospital for an intracerebral hemorrhage, and one had a subsequent encephalopathy. One individual was hospitalized for aseptic meningitis. Finally, there was one report for an individual hospitalized with Guillain-Barre Syndrome (GBS) who has since been discharged and is recovering with rehabilitation therapy. A possible infectious cause of GBS was not identified. GBS cases following COVID-19 vaccines have been identified in Canada and internationally, but rarely.<sup>11,15,16</sup>

There were fifteen reports of thrombocytopenia without concurrent thrombosis. Two occurred in individuals with a single low platelet result followed subsequently by normal results; in both the low platelet counts were assessed as due to lab error. The majority of reports were in individuals who had a previous history of thrombocytopenia or who had a concurrent condition (e.g., known infection, sepsis, cancer) or medication associated with thrombocytopenia. There were five reports of idiopathic thrombocytopenia (i.e., thrombocytopenia without a known cause). Three of these were following the AstraZeneca vaccine, and in one case, the individual tested positive for the anti-platelet factor 4 antibody often observed with TTS. This individual did not meet the TTS definition as they had no signs or symptoms of thrombosis, and all imaging studies for a thrombus/thromboembolism were negative.

Some events may be reported as an "other serious" event when not its own discrete event on the provincial AEFI report form. Amongst these events, 66 were for various thrombotic/thromboembolic conditions. These included 14 strokes and one cerebral venous sinus thrombosis without thrombocytopenia (i.e., not a TTS case), 11 myocardial infarctions, 16 pulmonary embolisms, 21 deep vein thromboses, and three superficial vein thromboses. None of these events met the TTS criteria as none were associated with new onset thrombocytopenia.<sup>7,8</sup>

There have been three non-fatal confirmed cases of TTS reported in BC to date, all in adults in their 30s or 40s. The first had onset four days after receipt of the AstraZeneca vaccine with a

low platelet count found upon presentation for care, and a diagnosis of pulmonary embolism. The second case had abdominal symptoms that progressed the week after receiving the AstraZeneca vaccine, with a diagnosis of abdominal venous thrombus and thrombocytopenia. The third case also had symptoms develop in the week after AstraZeneca vaccine. Upon presentation to care, thrombocytopenia was detected. The individual was assessed for possible TTS, and identification of an abdominal venous thrombus was made in hospital.

There have been 13 reports of pericarditis/myocarditis. Seven individuals had a diagnosis of pericarditis alone, two had myocarditis, and four had myopericarditis. Ages ranged from 17 to 95, and eight were male. Five had received Moderna vaccine, seven had Pfizer vaccine, and one had AstraZeneca; two of the events occurred after a second dose (one Pfizer and one Moderna). Some had alternate explanations including rheumatic diseases or genetic syndrome associated with cardiac disorders. One met the diagnostic criteria to be considered a definite case according to the draft Brighton Collaboration myocarditis case definition.<sup>17</sup> This individual also presented with signs of sepsis but no infective agent was identified. Myocarditis is being investigated as a possible safety signal after mRNA vaccines in Canada and internationally, but at this time event rates reported in Canada have been within the expected background rates for these conditions.<sup>5,6,11</sup>

### **Data Notes**

Data on COVID-19 AEFI reports and doses administered were extracted from Panorama, the provincial public health information system, on June 16, 2021. Only AEFIs reported and doses administered up to June 12, 2021 were included in this report. Any AEFI report with a status of “Does not meet reporting criteria” or “Disregard - Entered in error” was excluded.

Delays exist between the time an AEFI occurs, is reported to public health, and is entered into Panorama. As AEFI investigations progress from draft version to being submitted for review and finally completed, there may be changes to the data, or reports may be removed from analysis if reflective of events that are not reportable (e.g., expected local reaction). This may lead to fluctuations in AEFI counts and rates, and subsequent weekly reports cannot be directly compared to previous reports of AEFI reported in BC.



## References

1. BC Centre for Disease Control. Adverse events following immunization [Internet]; 2021 [cited 2021 Mar 23]. Available from: <http://www.bccdc.ca/health-professionals/clinical-resources/adverse-events-following-immunization>
2. Wollersheim S. Vaccines and Related Biological Products Advisory Committee December 10, 2020 Presentation - FDA Review of Efficacy and Safety of Pfizer-BioNTech COVID-19 Vaccine Emergency Use Authorization Request; 2020 Dec 10. Available from: <https://www.fda.gov/advisory-committees/advisory-committee-calendar/vaccines-and-related-biological-products-advisory-committee-december-10-2020-meeting-announcement>
3. Zhang R. Vaccines and Related Biological Products Advisory Committee December 17, 2020 Meeting Presentation - FDA Review of Efficacy and Safety of Moderna COVID-19 Vaccine EUA; 2020 Dec 17. Available from: <https://www.fda.gov/advisory-committees/advisory-committee-calendar/vaccines-and-related-biological-products-advisory-committee-december-17-2020-meeting-announcement>
4. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Weekly summary: adverse events following immunization (AEFIs) for COVID-19 in Ontario [Internet]. Toronto, ON: Queen's Printer for Ontario; 2021 [cited 2021 Apr 7]. Available from: <https://www.publichealthontario.ca/-/media/documents/ncov/epi/covid-19-aefi-report.pdf?la=en>
5. World Health Organization. COVID-19 subcommittee of the WHO Global Advisory Committee on Vaccine Safety (GACVS) reviews cases of mild myocarditis reported with COVID-19 mRNA vaccines [Internet]. 2021 [cited 2021 Jun 2]. Available from: <https://www.who.int/news/item/26-05-2021-gacvs-myocarditis-reported-with-covid-19-mrna-vaccines>
6. Centers for Disease Control and Prevention. Myocarditis and Pericarditis Following mRNA COVID-19 Vaccination [Internet]. 2021 [cited 2021 Jun 2]. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/safety/myocarditis.html>
7. Greinacher A, Thiele T, Warkentin TE, Weisser K, Kyrle PA, Eichinger S. Thrombotic thrombocytopenia after ChAdOx1 nCov-19 vaccination. *N Engl J Med*. 2021. Available from: <https://www.nejm.org/doi/full/10.1056/NEJMoa2104840>
8. Brighton Collaboration. Case finding definition of thrombosis with thrombocytopenia syndrome (TTS) v9.0 [Internet]. 2021 [cited 2021 Apr 21]. Available from: <https://brightoncollaboration.us/thrombosis-with-thrombocytopenia-syndrome-case-finding-definition/>
9. BC Centre for Disease Control. Communicable disease control manual. Chapter 2: Immunization. Part 5 - Adverse events following immunization [Internet]; 2019 [cited 2021 Mar 23]. Available from: [http://www.bccdc.ca/resource-gallery/Documents/Guidelines%20and%20Forms/Guidelines%20and%20Manuals/Epid/CD%20Manual/Chapter%202%20-%20Imms/Part\\_5\\_AEFI.pdf](http://www.bccdc.ca/resource-gallery/Documents/Guidelines%20and%20Forms/Guidelines%20and%20Manuals/Epid/CD%20Manual/Chapter%202%20-%20Imms/Part_5_AEFI.pdf)
10. Government of Canada. Canadian adverse events following immunization surveillance system (CAEFISS) [Internet]; 2019 [cited 2021 Mar 23]. Available from:



<https://www.canada.ca/en/public-health/services/immunization/canadian-adverse-events-following-immunization-surveillance-system-caefiss.html>

11. Government of Canada. Reported side effects following COVID-19 vaccination in Canada [Internet]; 2021 [cited 2021 Mar 23]. Available from: <https://health-infobase.canada.ca/covid-19/vaccine-safety/>
12. Council for International Organizations of Medical Sciences (CIOMS). Definition and application of terms for vaccine pharmacovigilance [Internet]. Geneva, Switzerland: WHO Press; 2012 [cited 2021 Mar 23]. Available from: [https://vaccine-safety-training.org/tl\\_files/vs/pdf/report-of-cioms-who-working-group.pdf](https://vaccine-safety-training.org/tl_files/vs/pdf/report-of-cioms-who-working-group.pdf)
13. Ruggeberg JU, Gold MS, Bayas J-M, Blum MD, Bonhoeffer J, Friedlander S, et al. Anaphylaxis: case definition and guidelines for data collection, analysis, and presentation of immunization safety data. *Vaccine*. 2007;25(31):5675-84. Available from: <https://doi.org/10.1016/j.vaccine.2007.02.064>
14. Blumenthal KG, Freeman EE, Staff RR, Robinson LB, Wolfson AR, Foreman RK, et al. Delayed large local reactions to mRNA-1273 vaccine against SARS-CoV-2. *N Eng J Med*. 2021;384(13). Available from: <https://www.nejm.org/doi/full/10.1056/NEJMc2102131>
15. Patel SU, Khurram R, Lakhani A, Quirk B. Guillain-Barre syndrome following the first dose of the chimpanzee adenovirus-vectored COVID-19 vaccine, ChAdOx1. *BMJ Case Rep* 2021;14:e242956. Available from: <https://casereports.bmj.com/content/bmjcr/14/4/e242956.full.pdf>
16. Waheed S, Bayas A, Hindi F, Rizvi Z, Espinosa PS. Neurological complications of COVID-19: Guillain-Barre Syndrome following Pfizer COVID-19 vaccine. *Cureus*. 2021;13(2):e13426. Available from: <https://www.cureus.com/articles/52295-neurological-complications-of-covid-19-guillain-barre-syndrome-following-pfizer-covid-19-vaccine>
17. Brighton Collaboration. Draft myocarditis case definition (version\_1.4.2\_30.May.2021) [Internet]. 2021 [cited 2021 Jun 2]. Available from: <https://brightoncollaboration.us/myocarditis-case-definition-update/>