

**Vaccines and Related Biological Products  
Advisory Committee October 14-15, 2021  
Meeting Presentation**

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# **Surveillance Updates of Myocarditis/Pericarditis and mRNA COVID-19 Vaccination in the FDA BEST System**

Vaccines and Related Biological Products Advisory Committee  
October 14, 2021

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# Topics



- Background
  - Myocarditis/Pericarditis
  - FDA Biologics and Effectiveness Safety (BEST) System
- Myocarditis/Pericarditis following mRNA COVID-19 vaccination in FDA BEST System
- Summary

# Myocarditis/Pericarditis

## Fact Sheet for Moderna COVID-19 vaccines\*

### **Myocarditis and Pericarditis**

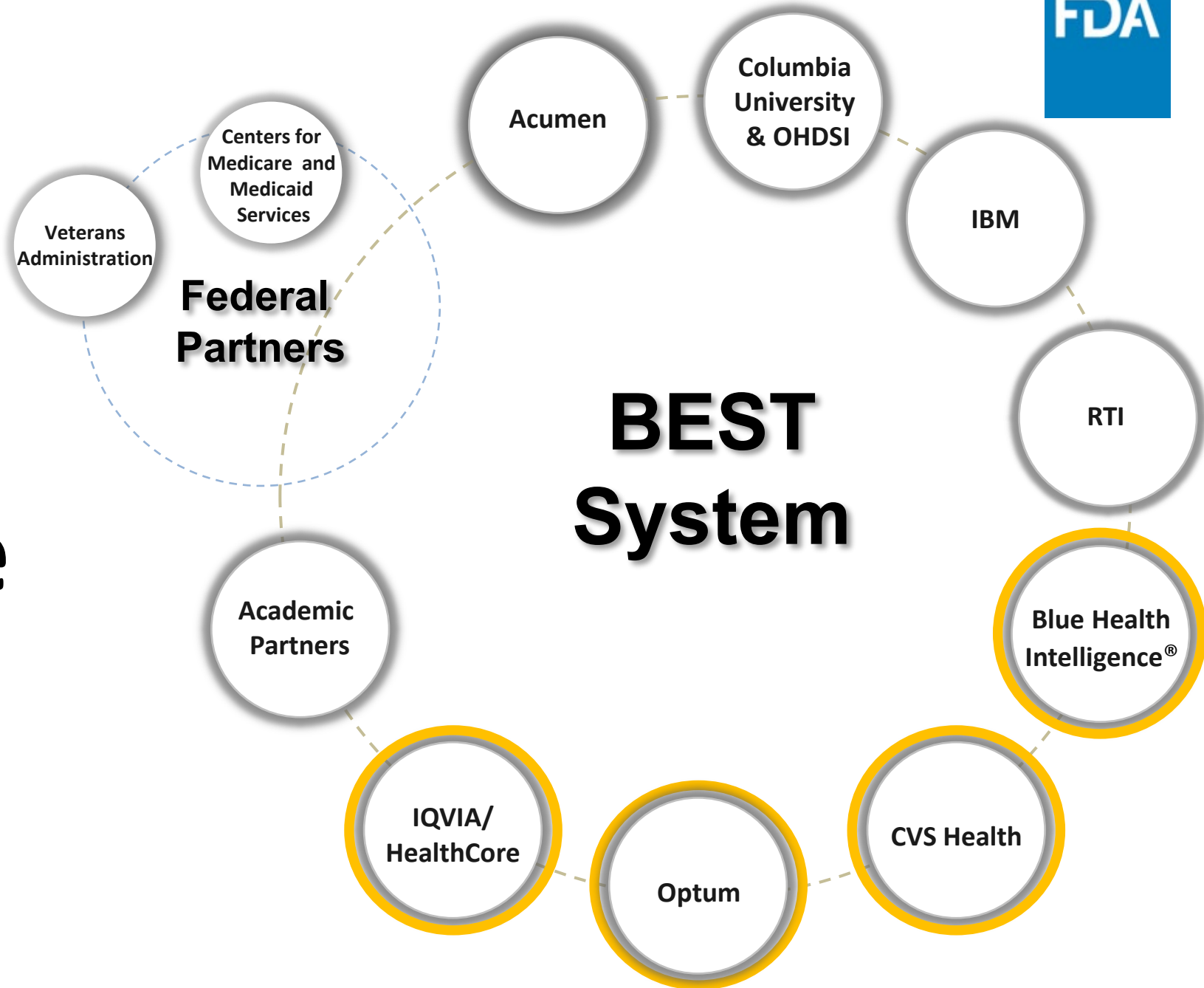
Postmarketing data demonstrate increased risks of myocarditis and pericarditis, particularly within 7 days following the second dose. The observed risk is higher among males under 40 years of age than among females and older males. The observed risk is highest in males 18 through 24 years of age. Although some cases required intensive care support, available data from short-term follow-up suggest that most individuals have had resolution of symptoms with conservative management. Information is not yet available about potential long-term sequelae. The CDC has published considerations related to myocarditis and pericarditis after vaccination, including for vaccination of individuals with a history of myocarditis or pericarditis (<https://www.cdc.gov/vaccines/covid-19/clinical-considerations/myocarditis.html>).



# **FDA Biologics and Effectiveness Safety (BEST) System**



# FDA CBER Active Surveillance Program





# mRNA COVID-19 Vaccine Doses in FDA BEST

## Claims Data Sources

| FDA BEST<br>Claims Data Sources* | Number of<br>Enrollees per<br>Year (millions) | Vaccine Doses          |                |
|----------------------------------|---|------------------------|----------------|
|                                  |   | Pfizer-BioNTech<br>(N) | Moderna<br>(N) |
| Data Partner 1                   | 23-28   | 5,115,280              | 3,826,358      |
| Data Partner 2                   | 19-22   | 1,935,560              | 1,165,228      |
| Data Partner 3                   | 20-25   | 2,891,103              | 1,980,311      |
| Data Partner 4                   | 14.5  | 2,735,159              | 1,585,691      |
| TOTAL                            | 76.5-89.5                                     | 12,677,102             | 8,557,588      |

\* Data cutoff date: Data Partner 1 (6/30/2021), Data Partner 2 (7/31/2021), Data Partner 3 (7/10/2021), Data Partner 4 (8/21/2021)





# Myocarditis/pericarditis in first 1-7 days of receipt of mRNA COVID-19 vaccines in FDA BEST System

- Incidence rates for mRNA COVID-19 vaccines
- Incidence rate ratios for Moderna versus Pfizer-BioNTech



# Myocarditis/pericarditis in first 1-7 days of receipt of mRNA COVID-19 vaccines in FDA BEST System

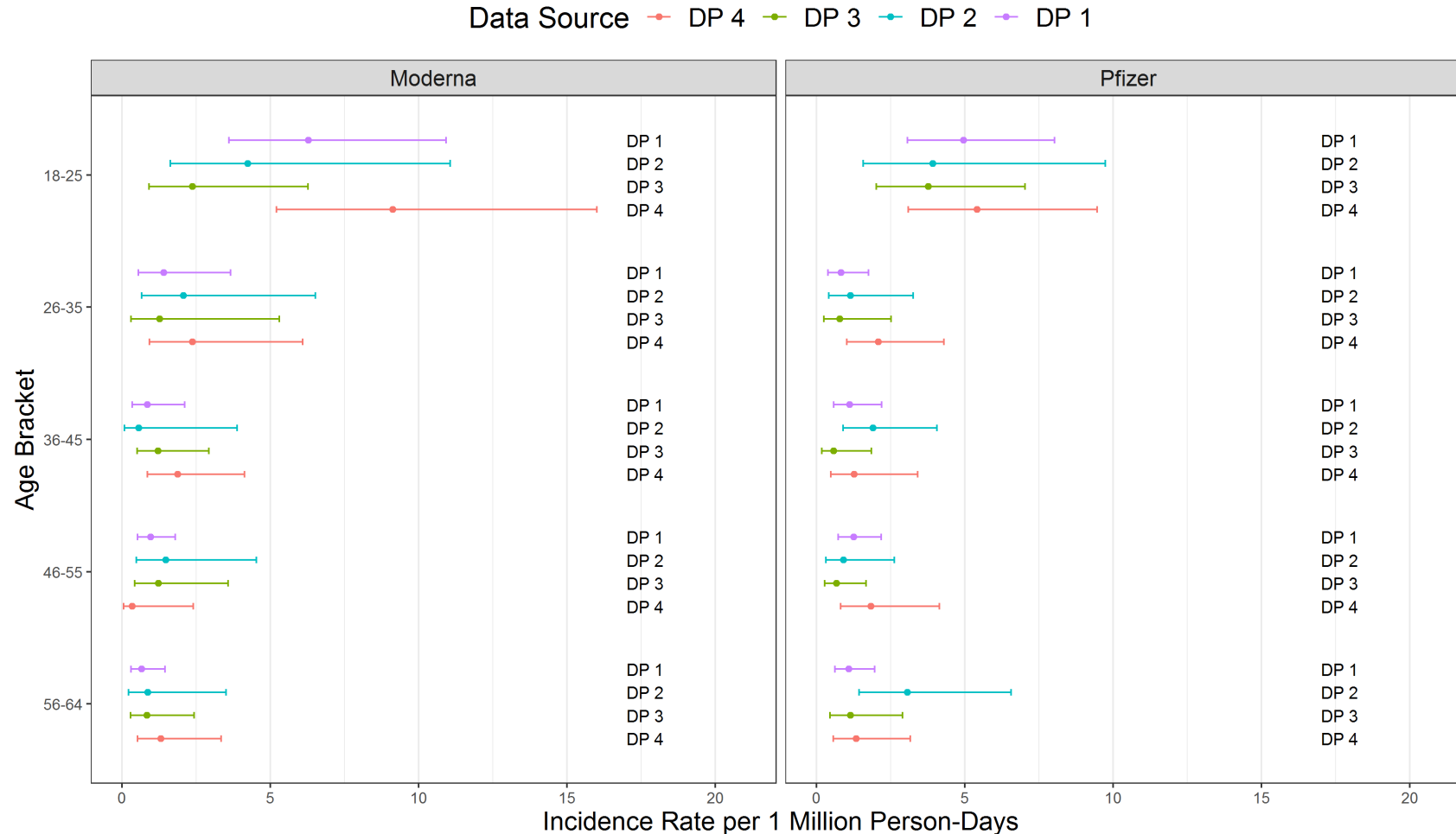
- Incidence rates for mRNA COVID-19 vaccines
  - by vaccine brand, age groups, sex, dose
  - adjusted for age, sex, and, where sample size permits, week of vaccination, history of prior COVID-19, urban/rural status
- Incidence rate ratios for Moderna versus Pfizer-BioNTech

# Number of myocarditis/pericarditis events in first 1-7 days of receipt of any dose mRNA COVID-19 vaccines in FDA BEST System



| Sex    | Age (years) | All BEST System Claims Data Partners |                  |                  |
|--------|-------------|--------------------------------------|------------------|------------------|
|        |             | Pfizer                               | Moderna          | Pfizer + Moderna |
|        |             | Number of Events                     | Number of Events | Number of Events |
| Male   | 18-25       | 41                                   | 27               | 68               |
|        | 26-35       | 18                                   | 16               | 34               |
|        | 36-45       | 14                                   | 12               | 26               |
|        | 46-55       | 15                                   | 10               | 25               |
|        | 56-64       | 20                                   | 10               | 30               |
| Female | 18-25       | 15                                   | 9                | 24               |
|        | 26-35       | 1                                    | 1                | 2                |
|        | 36-45       | 10                                   | 3                | 13               |
|        | 46-55       | 13                                   | 6                | 19               |
|        | 56-64       | 15                                   | 6                | 21               |

# Incidence rates of myocarditis/pericarditis in first 1-7 days of receipt of any dose mRNA COVID-19 vaccines by age in FDA BEST System

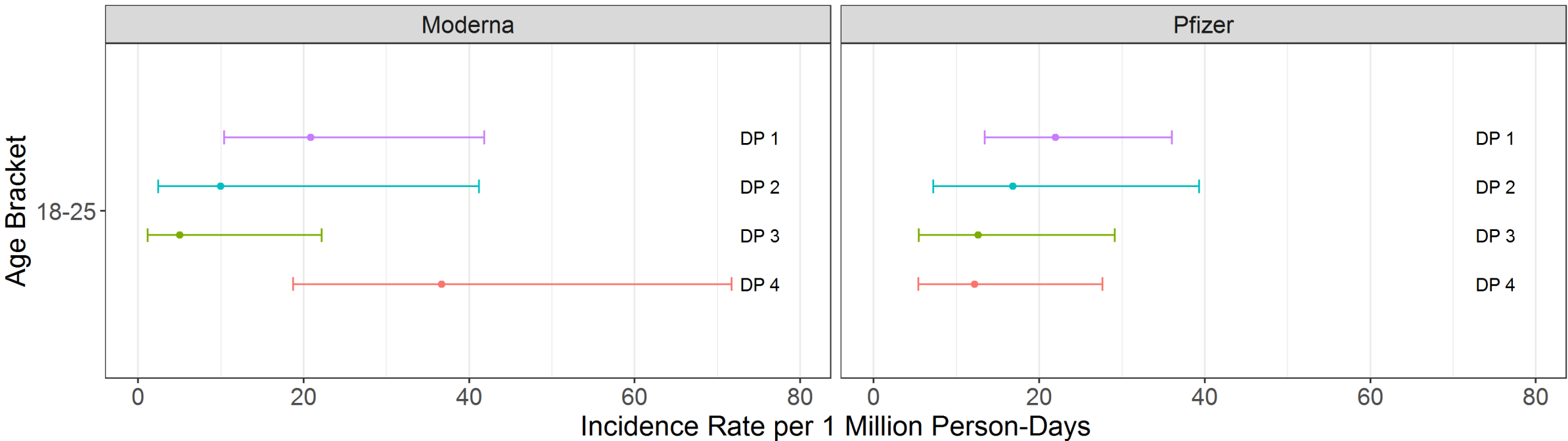


\*Adjusted for age category (including vaccine interactions), sex, urban/rural residency (DP2, DP3, DP4), COVID-19 prior to vaccination (DP1, DP2, DP3), and calendar week of vaccination (DP1-4).



# Incidence rates of myocarditis/pericarditis in first 1-7 days of receipt of 2 doses of mRNA COVID-19 vaccines in males 18-25 years in FDA BEST System

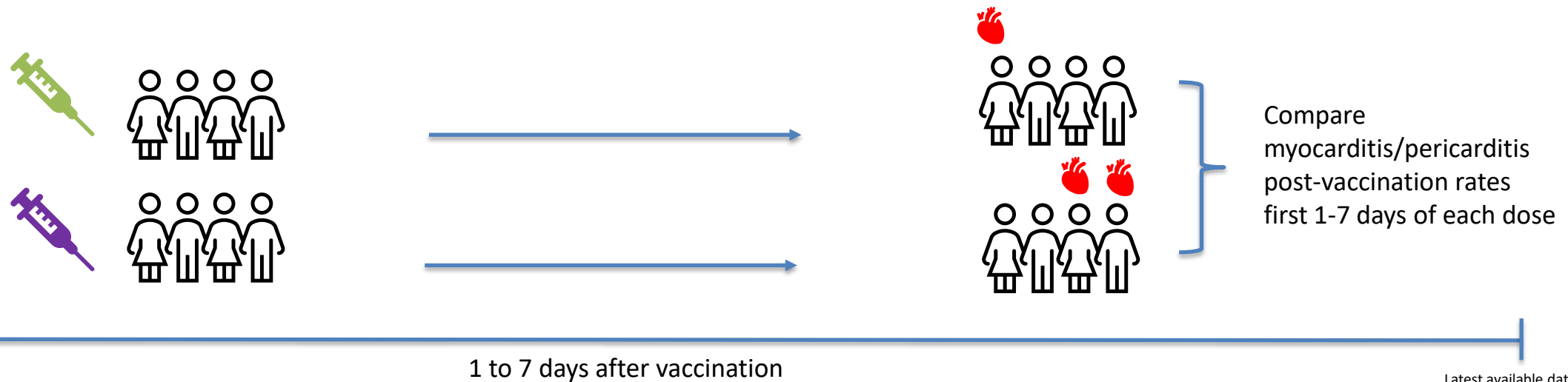
Data Source ● DP 4 ● DP 3 ● DP 2 ● DP 1



\*Dose 2 model adjusted for age category (including vaccine interaction), urban/rural residency (DP3, DP4), COVID-19 prior to vaccination (DP1, DP2), and calendar week of vaccination (DP1-4).

# Myocarditis/pericarditis in first 1-7 days of receipt of mRNA COVID-19 vaccines in FDA BEST System

- Incidence rates for mRNA COVID-19 vaccines
- Incidence rate ratios for Moderna versus Pfizer-BioNTech
  - Retrospective comparative cohort design





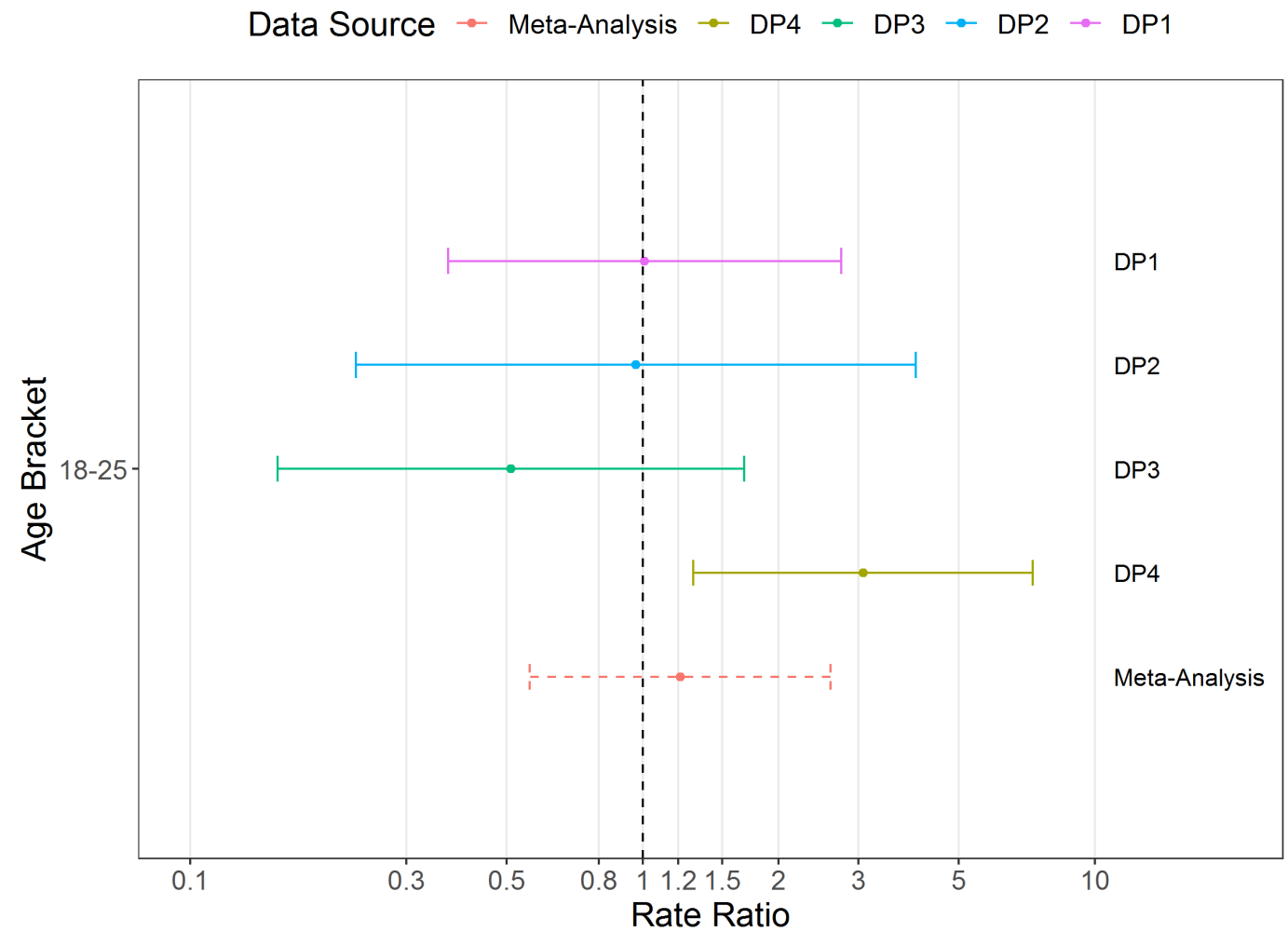
# Total number of Myocarditis/Pericarditis (Moderna vs. Pfizer-BioNTech (ref)) in Males 18-25 years in first 1-7 days post-vaccination in FDA BEST System

| Data Source                    | Dose Number | Number of Events |         | Total |
|--------------------------------|-------------|------------------|---------|-------|
|                                |             | Pfizer (ref)     | Moderna |       |
| Four BEST Claims Data Partners | Any         | 41               | 27      | 68    |
|                                | Dose 1      | 5                | 6       | 11    |
|                                | Dose 2      | 36               | 21      | 57    |



# Incident Rate Ratios of Myocarditis/Pericarditis (Moderna vs. Pfizer-BioNTech (ref), males 18-25 years, any dose)

Risk window 1-7 days



\*Male 18-25y IRR adjusted for urban/rural residency (DP3, DP4), COVID-19 prior to vaccination (DP1, DP2, DP3), and calendar week of vaccination (DP1-4).



# Summary

- Incidence rates estimates of myocarditis/pericarditis after mRNA COVID-19 vaccination
  - Highest in males ages 18 to 25 years
  - More events were observed post-Dose 2 than in post-Dose 1
  - Wide range of incidence rates among four BEST databases with wide confidence intervals
- Incidence rate ratio estimates comparing Moderna and Pfizer-BioNTech vaccines
  - Preliminary results do not support a significant difference for males 18-25 years
  - Estimates had large uncertainty
    - Small numbers of observed events
    - Partial adjustment for some potential confounders

# Limitations

- Events were not chart-confirmed
- Partial adjustment for potential confounders
  - Cannot rule out biased estimates
- Large uncertainty of incidence rates and incidence rate ratios
  - Small number of events, wide confidence intervals
- Relies on the assumption that the claims delay for Pfizer is similar to Moderna.
  - Claims delay: the time between the day of service and the day of observation in the database
- Heterogeneity results across databases are under review

# Acknowledgements



## FDA BEST Partners

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Optum

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IBM

RTI

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## CBER Surveillance Program

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