

# Impact of KP.2 BNT162b2 COVID-19 Vaccine on Acute Symptoms Among U.S. Adults During the 2024-2025 Respiratory Season

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## INTRODUCTION

- Prior studies of earlier BNT162b2 formulations (original and BA.4/5), conducted among US outpatient adults, demonstrate reduced acute COVID-19 symptom burden, including fewer overall symptoms among vaccinated individuals following infection [1,2].
- However, evidence on the impact of the updated 2024-2025 BNT162b2 KP.2 vaccine [3] on acute patient-reported symptoms among outpatient adults remains limited.

## OBJECTIVE

- This study assessed the impact of the Pfizer-BioNTech BNT162b2 KP.2 COVID-19 vaccine on acute symptom burden during the first week of SARS-CoV-2 infection.

## METHODS

- US adults ≥ 18 years testing positive for SARS-CoV-2 within 4 days of symptom onset at a national pharmacy chain between 10/24/2024 and 08/29/2025 were enrolled (CT.gov: NCT05160636).
- Participants completed an online survey reporting demographics, clinical history, and vaccination status (defined as Vaccinated: BNT162b2 KP.2 recipients; Unvaccinated: no updated 2024-2025 vaccination).
- Fourteen CDC-defined acute COVID-19 symptoms were self-reported daily and retrospectively recalled for pre-infection and worst moment prior to enrollment [4]. Enrollment day refers to Survey 1. Surveys 2 and 3 were completed 1 and 2 days after enrollment. Worst moment refers to worst moment of current infection.
- Symptom severity was rated using an FDA-based 4-point scale (0-3) for most symptoms and a 3-point scale (0-2) for smell and taste.
- A composite symptom score (range: 0-40, lower scores indicate less symptom severity) representing overall symptom burden [5], was calculated for vaccinated and unvaccinated groups.
- Least-square estimates (LSE) of mean composite symptom scores and mean changes from pre-infection were calculated using mixed-models for repeated measures (MMRM) and compared between groups.
- A running average of daily survey means was calculated up to Survey 3, which corresponded to a median of 7 days after symptom onset.
- This estimated the mean LSE from the worst moment of current infection through each survey day and represented the average symptom burden from the worst moment of infection during the first week.

## RESULTS

- Among 608 participants, the mean age was 45.9 years, 76.5% were female, 53.9% used antiviral treatment, and 57.9% had ≥ 1 comorbidity.
- Median time from symptom onset to enrollment was 4 days.
- A total of 106 participants (17.4%) received the 2024-2025 KP.2 vaccine (Table 1).
  - Vaccinated participants had a median (Interquartile range [IQR]) time since vaccination of 161 (89-240) days.
- Pre-infection composite symptom score was similar between groups: 1.3 (SD: 1.7) (vaccinated) and 1.5 (SD: 1.9) (unvaccinated), P=0.305.
- The vaccinated group experienced lower symptom burden than the unvaccinated group through Survey 3 (Figure 1).
  - At Survey 3 (median of 7 days from symptom onset), the running average change in composite symptom score from pre-infection was 1.04 points lower in the vaccinated group compared with the unvaccinated group (SE: 0.40; P=0.010) (Table 2). This difference corresponds to an approximately 9% smaller relative increase in symptom burden following infection among vaccinated participants.

Table 1. Patient Characteristics

	Vaccinated with BNT162b2 KP.2	Unvaccinated
Total, n	106	502
Age, years, mean (SD)	51.3 (14.6)	44.7 (13.8)
Gender, n (%)		
Female	75 (70.8)	390 (77.7)
Male	31 (29.2)	111 (22.1)
Unknown	0 (0.0)	1 (0.2)
Race/Ethnicity, n (%)		
White or Caucasian	79 (74.5)	357 (71.1)
Black or African American	8 (7.5)	40 (8.0)
Hispanic	12 (11.3)	67 (13.3)
Asian	5 (4.7)	20 (4.0)
Other	2 (1.9)	18 (3.6)
US Geographic Region, n (%)		
Northeast	15 (14.2)	58 (11.6)
South	59 (55.7)	309 (61.6)
Midwest	27 (25.5)	106 (21.1)
West	5 (4.7)	28 (5.6)
Other/Unknown	0 (0.0)	1 (0.2)
Social Vulnerability Index <sup>a</sup> , mean (SD)	0.32 (0.18)	0.38 (0.21)
Antiviral use, n (%)	55 (51.9)	273 (54.4)
≥1 comorbid condition <sup>b</sup> , n (%)	67 (63.2)	285 (56.8)
Time since 2024-2025 KP.2 BNT162b2 COVID-19 vaccine, days, median (IQR)	161 (89-240)	-
Pre-infection composite symptom score, mean (SD)	1.3 (1.7)	1.5 (1.9)

<sup>a</sup> Social Vulnerability Index is a score that ranges from 0 to 1. Higher values correspond to higher vulnerability [6].  
<sup>b</sup> Comorbid conditions include cancers or malignancies (other than skin cancer), cerebrovascular disease, chronic kidney disease, chronic lung conditions, chronic liver disease, diabetes, heart conditions, mental health conditions, obesity (BMI >30), weakened immune system/immunocompromised, smoker, or active tuberculosis.

Figure 1. LSE of mean change in composite acute symptom score from pre-infection by vaccination status

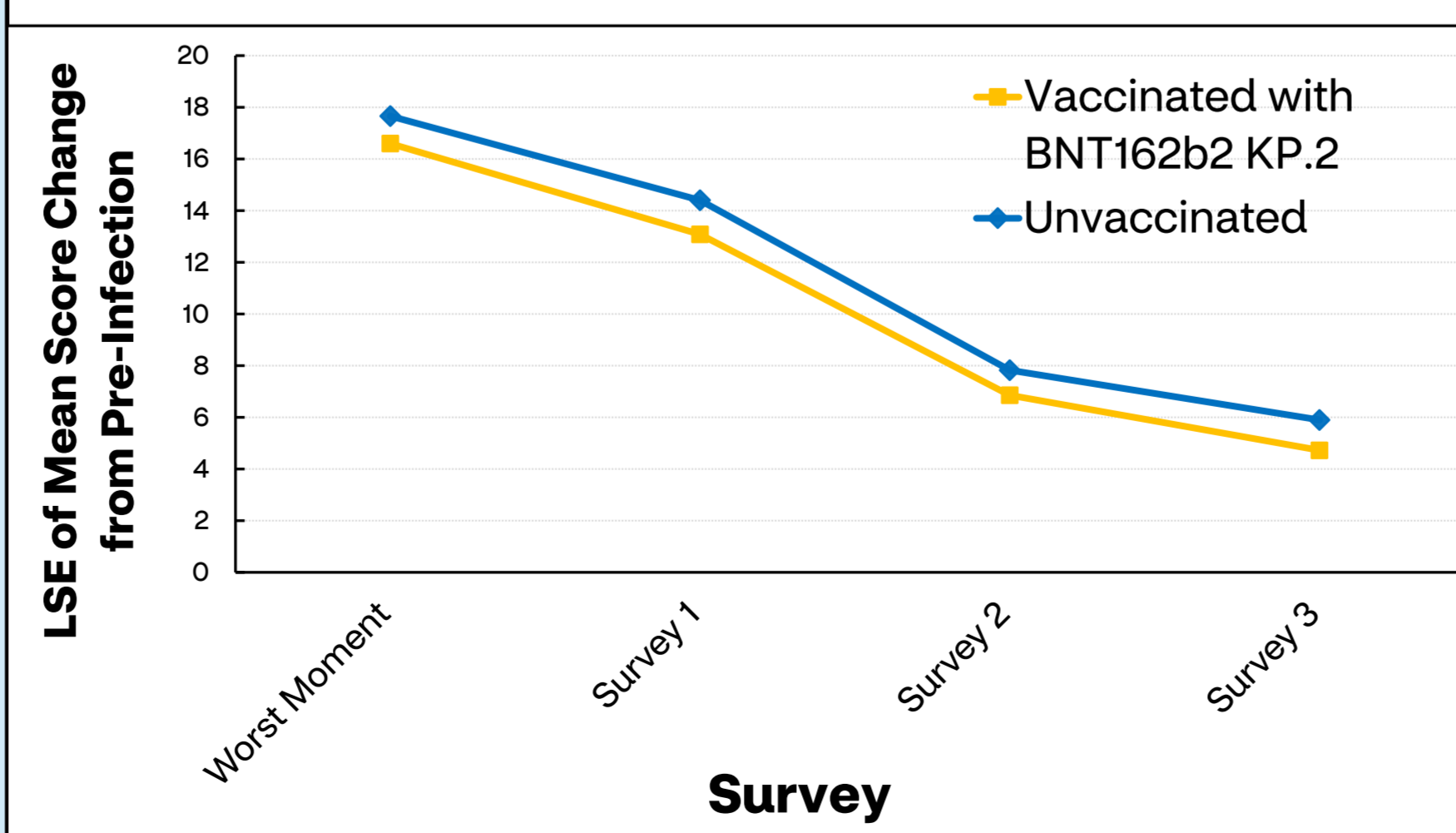


Table 2. Running average in LSE of change in composite acute symptom score from pre-infection by vaccination status

	Vaccinated with BNT162b2 KP.2 LSE (SE) <sup>a</sup>	Unvaccinated LSE (SE) <sup>a</sup>	Difference in LSE of score change between groups	
			LSE (SE) <sup>a</sup>	P value
Worst moment	16.8 (0.4)	17.7 (0.2)	-0.96 (0.49)	0.052
Survey 1	15.0 (0.4)	16.1 (0.2)	-1.09 (0.43)	<b>0.012</b>
Survey 2	12.3 (0.4)	13.3 (0.2)	-1.02 (0.41)	<b>0.013</b>
Survey 3	10.4 (0.4)	11.5 (0.2)	-1.04 (0.40)	<b>0.010</b>

<sup>a</sup> MMRM include covariates of time, high-risk status, sex, age group, race/ethnicity, US region, social vulnerability index category, antiviral use, receipt of Pfizer COVID-19 vaccine, baseline composite symptom score, insurance type, number of comorbidities by categories, and interaction terms between time and high-risk status, as well as time and receipt of the COVID-19 vaccine, with unstructured correlation matrix for repeated measures. Bolded values are significant at P<0.05.

## LIMITATIONS

- All data were self-reported and subject to missingness, errors, recall bias, and selection bias. There may be potential underrepresentation of early symptom dynamics, since the median time from symptom onset to enrollment was 4 days. Generalizability may be limited.

## CONCLUSIONS

- **BNT162b2 KP.2 vaccine was associated with lower COVID-19 symptom burden during the first week of infection compared to no receipt of KP.2 vaccine.**
- **These findings suggest that BNT162b2 KP.2 vaccine may be associated with reduced symptom severity following SARS-CoV-2 infection.**
- **These findings are consistent with research from earlier formulations across prior SARS-CoV-2 variants [2,3].**
- **These findings support staying up-to-date with recommended COVID-19 vaccinations as new sub-lineages continue to emerge.**

### References

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### Disclosures

A.Y., T.H., J.C.C., M.D.F., M.B.G., and S.M.C.L., are employees of Pfizer and may hold stock or stock options of Pfizer. L.L.L., R.B., and X.S. are employees of CVS Health® and may hold stock or stock options of CVS Health. This study was funded by Pfizer Inc.

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