

# An Interim Analysis of the Burden of Influenza Infection on Health-Related Quality of Life and Work Productivity Among Adults in the United States

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## INTRODUCTION

- Influenza infection is associated with substantial health care resource utilization and medical costs in the US [1].
- Influenza infection is also associated with worsening of quality of life and work productivity loss [2-5], which negatively affects daily activity and causes additional burden on the society.
- CDC classifies flu severity high for the 2024-2025 United States flu season based on influenza-like illness, flu-related hospitalizations, and flu-coded deaths [6].
- There are limited data characterizing the impact of seasonal influenza on quality of life and work productivity loss in the most recent respiratory season in the US.

## OBJECTIVE

- This study evaluated Health-Related Quality of Life (HRQoL) and Work Productivity and Impairment (WPAI) among outpatient symptomatic adults with test-confirmed influenza infections in the US in the 2024/25 flu season.

## METHODS

- Adults with positive results from rapid influenza diagnostic tests and rapid molecular assays for influenza infection at CVS Health sites and exhibiting  $\geq 1$  acute symptom were enrolled between 10/24/2024-4/15/2025 (CT.gov:NCT05160636).
- Upon enrollment at Day 1, questionnaires on socio-demographics, clinical characteristics, and vaccination status were administered to participants via an online survey platform.
- Self-reported HRQoL and WPAI outcomes were assessed using validated instruments (EQ-5D-5L, WPAI-GH) before infection via recall and at enrollment (Day 1):

## METHODS (cont.)

- For the pre-infection baseline, EQ-5D-5L was modified to ask participants to recall their HRQoL before the onset of symptoms. WPAI was modified to look back at the 7-day period prior to the onset of flu symptoms.
- On Day 1, WPAI was modified to ask participants questions since onset of flu symptoms, not including survey day.
- Outcomes (EQ-VAS, utility index; WPAI scores absenteeism, presenteeism, productivity loss, and activity impairment; and total hours lost due to health problem) were summarized using descriptive statistics for each time point and compared between Day 1 and pre-infection baseline using paired t-tests.

## RESULTS

- 720 influenza participants were included in the interim analysis. Mean (SD) age was 42.0 years (13.0), 73.7% were female, 47.0% at least one comorbidity, and 588 (81.7%) were employed at enrollment. (**Table 1**)
- Mean (SD) time from symptom onset to Day 1 was 3.7 (2.7) days.
- The mean (SD) of EQ-Visual Analogue Scale (EQ-VAS) scores and Utility Index (UI) were 89.7 (7.9) and 0.96 (0.07), respectively, for the pre-infection baseline. They dropped to 63.0 (17.7) and 0.75 (0.21), respectively at enrollment following infection. The changes were statistically significant with mean changes of -26.7 ( $P<0.001$ ) in EQ-VAS and -0.20 ( $P<0.001$ ) in UI scores. (**Table 2**)
- Relative to baseline,
  - The mean change in absenteeism was 56.4% ( $P<0.001$ ), the mean change in presenteeism was 57.9% ( $P<0.001$ ), the mean change in work productivity time loss at enrollment was 75.8% ( $P<0.001$ ), and the mean change in activity impairment was 63.9% ( $P<0.001$ ). (**Table 3**)
  - The mean change in total hours lost due to health problems was 15.4 ( $P<0.001$ ). (**Table 3**)

## RESULTS (cont.)

**Table 1. Patient Characteristics**

	Statistics
Total n	720
Age, years, mean (SD)	42.0 (13.0)
Gender, n (%)	
Male	187 (26.0%)
Female	531 (73.7%)
Unknown	2 (0.3%)
Race / Ethnicity, n (%)	
White or Caucasian	583 (81.0%)
Black or African American	34 (4.7%)
Hispanic	53 (7.4%)
Other	50 (7.0%)
US Geographic Region, n (%)	
Northeast	128 (17.8%)
South	336 (46.7%)
Midwest	220 (30.6%)
West	32 (4.4%)
Other/Unknown	4 (0.6%)
Social Vulnerability Index <sup>a</sup> , mean (SD)	0.32 (0.19)
$\geq 1$ comorbid condition <sup>b</sup> , n (%)	339 (47.0%)
Receiving 2024-2025 Influenza Vaccination, n(%)	351 (48.8%)
Days from symptom onset to Day 1, mean (SD)	3.7 (2.8)
Antiviral Use (baloxavir, oseltamivir and others), n (%)	608 (84.4%)
Employed, n (%)	588 (81.7%)

<sup>a</sup> Social Vulnerability Index ranges from 0 to 1. Higher values correspond to higher vulnerability. [7]

<sup>b</sup> Comorbid conditions include cancers or malignancies (other than skin cancer), cerebrovascular disease, chronic kidney disease, chronic lung conditions, chronic liver disease, endocrine disorders, heart conditions, mental health conditions, obesity (BMI  $>40$ ), weakened immune system/ immunocompromised, blood disorders, smoker, or active tuberculosis.

**Table 2. Summary of HRQoL: Mean (SD)**

	Pre-infection	Day 1	Change <sup>a</sup>
EQ-VAS	89.7 (7.9)	63.0 (17.7)	-26.7 (17.4)
Utility index	0.96 (0.07)	0.75 (0.21)	-0.20 (0.21)

<sup>a</sup> All P values of paired t-test less than 0.001.

**Table 3. Summary of WPAI Scores: Mean (SD)**

	Pre-infection <sup>a</sup>	Day 1 <sup>b</sup>	Change <sup>c</sup>
WPAI: GH			
Absenteeism	2.3 (11.9)	58.9 (35.7)	+56.4 (36.6)
Presenteeism	5.0 (12.4)	62.5 (27.5)	+57.9 (29.9)
Work productivity loss	7.0 (16.5)	82.7 (23.2)	+75.8 (28.2)
Activity impairment	7.2 (17.5)	71.1 (25.8)	+63.9 (30.6)
Total hours lost due to health problems	2.4 (5.6)	17.9 (13.2)	+15.4 (11.8)

<sup>a</sup> Recall period was 7-day prior to flu symptom onset.

<sup>b</sup> Recall period was time since onset of flu symptoms, not including survey day

<sup>c</sup> All P values of paired t-test less than 0.001.

## CONCLUSIONS & DISCUSSIONS

- Influenza infections are associated with a negative impact on HRQoL and work productivity among US adults in the 2024/2025 respiratory disease season.
- Estimated work productivity loss associated with influenza are similar with previous literature [8,9], with our study generating more recent data and filling in the gap on the impact of seasonal influenza on HRQoL.
- Key limitations: all data collected were self-reported, subject to missingness, errors, recall bias, and selection bias associated with survey drop-off. Findings may not be generalizable to a different season or a different care setting.

## References

- Centers for Disease Control and Prevention. About estimated flu burden. Available online: <https://www.cdc.gov/flu-burden/php/about/index.html> (accessed on April 3, 2025).
- Van Hoek, A.J.; Underwood, A.; Jit, M.; Miller, E.; Edmunds, W.J. The impact of pandemic influenza H1N1 on health-related quality of life: a prospective population-based study. *PLoS one* **2011**, *6*, e17030.
- Hollmann, M.; Garin, O.; Galante, M.; Ferrer, M.; Dominguez, A.; Alonso, J. Impact of influenza on health-related quality of life among confirmed (H1N1) 2009 patients. *PLoS one* **2013**, *8*, e60477.
- Blanchet Zumofen, M.-H.; Frimpter, J.; Hansen, S.A. Impact of influenza and influenza-like illness on work productivity outcomes: a systematic literature review. *PharmacoEconomics* **2023**, *41*, 253-273.
- Fisman, D.; Postma, M.; Levin, M.J.; Mould-Quevedo, J. Absenteeism and Productivity Loss Due to Influenza or Influenza-like Illness in Adults in Europe and North America. *Diseases* **2024**, *12*, 331.
- Centers for Disease Control and Prevention. 2024-2025 United States Flu Season: Preliminary In-Season Severity Assessment. Available online: <https://www.cdc.gov/flu/php/surveillance/in-season-severity.html> (accessed on March 20, 2025).
- CDC/ATSDR Social Vulnerability Index. Available online: <https://www.atsdr.cdc.gov/place-health/php/svi/> (accessed on March 20, 2025).
- Palmer, L.A.; Rousculp, M.D.; Johnston, S.S.; Mahadevia, P.J.; Nichol, K.L. Effect of influenza-like illness and other wintertime respiratory illnesses on worker productivity: The child and household influenza-illness and employee function (CHIEF) study. *Vaccine* **2010**, *28*, 5049-5056.
- Petrie, J.G.; Cheng, C.; Malosh, R.E.; VanWormer, J.J.; Flannery, B.; Zimmerman, R.K.; Gaglani, M.; Jackson, M.L.; King, J.P.; Nowak, M.P. Illness severity and work productivity loss among working adults with medically attended acute respiratory illnesses: US Influenza Vaccine Effectiveness Network 2012-2013. *Clinical Infectious Diseases* **2016**, *62*, 448-455.

## Disclosures

T.H., A.Y., J.C.C., M.G., and M.D.F. are employees of Pfizer and may hold stock or stock options of Pfizer. X.S. is an employee of CVS Health and holds stock of CVS Health.

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