P0340

Cost-effectiveness of Oral Nirmatrelvir/ritonavir in Patients at High Risk for Progression to Severe COVID-19 in the United States

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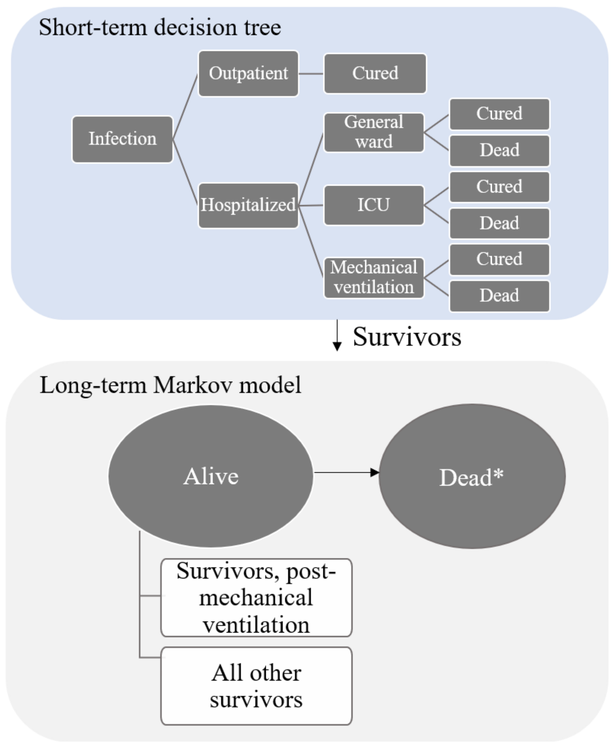
INTRODUCTION

- The coronavirus disease 2019 (COVID-19) pandemic imposed a significant strain on healthcare systems with broad medical, economic, and social impacts globally
- Antiviral therapies have played a critical role in improving clinical outcomes for patients with COVID-19. Several antiviral treatments are available in the United States (US) for outpatient use
- Nirmatrelvir/ritonavir (NMV/r) is indicated for the treatment of mild-to-moderate COVID-19 in adults who are at high risk for progression to severe COVID-19[1]
- The objective of this study was to estimate the cost-effectiveness of NMV/r vs best supportive care (BSC [no antiviral treatment]) from a US health sector perspective

METHODS

- A cost-utility model was developed using a short-term decision-tree followed by a lifetime two-state Markov model (**Figure 1**)
- The short-term decision-tree captured costs and outcomes associated with the primary infection and healthcare utilization; survivors of the short-term decision-tree were followed until death assuming US quality-adjusted life years (QALYs), adjusted in the short-term for survivors of mechanical ventilation (MV)

Figure 1: Model Structure



*Death due to general population mortality

- Costs and QALYs were discounted at 3.0% annually; the willingness to pay threshold was set to $150,000
- Clinical, cost and utility inputs were derived from published literature, focusing on the recent COVID-19 era of vaccinated patients and predominance of the Omicron variant (**Table 1**)[2; 4-11]
  - The BSC hospitalization rate for patients with COVID-19 (3.43%) and effectiveness of NMV/r in reducing hospitalizations (79.60%) were taken from Lewnard et al. 2023[2]
- In the short-term decision tree, we assumed no outpatient mortality due to COVID-19 infection
- Deterministic (DSA) and probabilistic sensitivity analyses (PSA) were conducted for all model inputs to test the robustness of the model results

METHODS (continued)

- In the DSA, parameters were varied by +/- 10% of the base case value or within 95% confidence intervals, where available; PSA input distribution selections were based on Briggs et al. 2012[3]
- Outpatient healthcare resource use and the impact of NMV/r on post-COVID conditions were excluded in the base case to achieve more conservative estimates

Table 1. Base Case Model Inputs

Patient Characteristics and Clinical Inputs	Value
Age (years)[2]	45
Hospitalization rate, BSC[2]	3.43%
NMV/r reduction in hospitalization (calculated as: *[1 - adjusted hazard ratio (vs untreated)] x 100%*)[2]	79.60%
Proportion hospitalized in general ward[4]	84.33%
Proportion hospitalized in intensive care unit (ICU)[4]	15.67%
Proportion in ICU receiving mechanical ventilation (MV)[4]	39.80%
Length of stay, general ward (days)[5]	6
Length of stay, ICU (days)[5]	21
Length of stay, ICU/MV (days)[5]	22
Mortality rate, general ward[6]	2.40%
Mortality rate, ICU[6]	20.90%
Mortality rate, ICU/MV[6]	34.76%
Duration of outpatient symptoms (days)[7]	8.06
NMV/r reduction in infection duration[8]	20%
Utility Inputs	**Value**
Baseline utility[9]	0.86
Disutility, outpatient symptom day[5]	-0.29
Disutility, general ward hospitalization[5]	-0.64
Disutility, ICU hospitalization[5]	-0.57
Disutility ICU/MV hospitalization[5]	-0.80
Disutility, 1st year post-MV discharge[10]	-0.13
Disutility, 2-5 years post-MV discharge[10]	-0.04
Cost Inputs	**Value**
NMV/r treatment[11]	$1,390
General ward cost per day[5]	$5,665
ICU cost per day[5]	$2,729
ICU/MV cost per day[5]	$4,814
1st year additional cost, post-MV discharge[12]	$8,412

RESULTS

- Through a reduction in hospitalizations (-0.027) and hospitalization costs (-$1,110), treatment with NMV/r resulted in an ICER of $8,931 vs BSC, well below the willingness to pay threshold (**Table 2**)

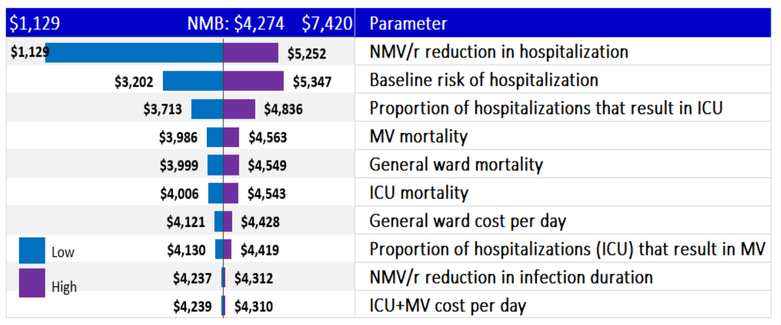
Table 2. Base Case Results

Outcome	NMV/r	BSC	Incremental
Hospitalizations	0.007	0.034	-0.027
Treatment cost	$1,390	$0	$1,390
Hospitalization cost	$285	$1,395	-$1,110
Post-MV discharge cost	$2	$11	-$9
Total discounted costs	$1,677	$1,406	$271
Total discounted QALYs	17.39	17.36	0.03
ICER			**$8,931**
Net monetary benefit (NMB)			**$4,274**

RESULTS (continued)

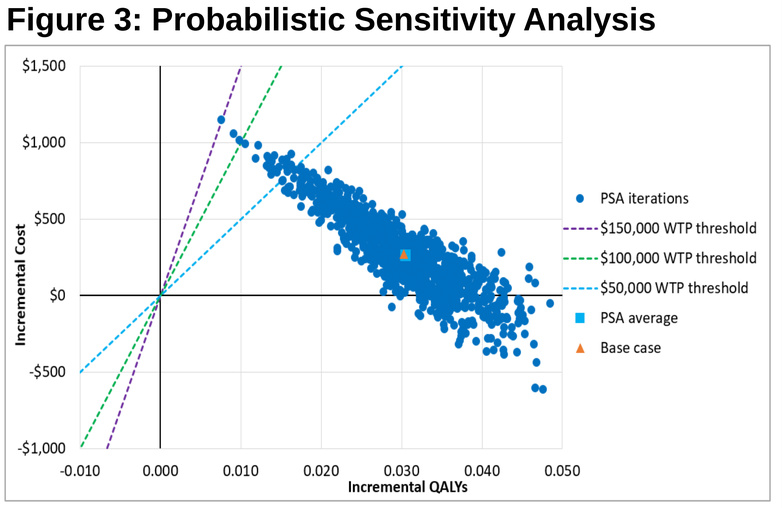
- DSA results were most sensitive to changes in the and NMV/r reduction in hospitalization and BSC hospitalization rate (**Figure 2**)

Figure 2: Deterministic Sensitivity Analysis



- The PSA indicated that NMV/r has a >99% probability of being cost-effective at a $100,000 willingness to pay threshold (**Figure 3**)

Figure 3: Probabilistic Sensitivity Analysis



- A threshold analysis indicated that the baseline hospitalization rate would need to be as low as 0.76% for NMV/r to exceed an ICER of $150,000 vs BSC
- Conversely, NMV/r becomes cost-saving, and therefore a dominant treatment strategy, at baseline hospitalization rates above 4.26%

CONCLUSIONS

- **NMV/r was found to be cost-effective vs BSC from a US health sector perspective**
- **The results were robust to various sensitivity analyses, including using lower baseline hospitalization rates and NMV/r effectiveness estimates, which were key drivers of the model**
- **These findings support timely US adoption of NMV/r for the treatment of high-risk COVID-19 to maximize health outcomes**

References

1.Paxlovid prescribing information. **2.** Lewnard JA, et al. Lancet Infect Dis. 2023;S1473-3099(23)00118-4. **3.** Briggs AH, et al. Value in Health. 2012;15(6):835-842. **4.** Laboratory-Confirmed COVID-19-Associated Hospitalizations. Accessed March 2023. **5.** Goswami H, et al Pharmacoeconomics. 2022;40(7):699-714. **6**. Adjei S HK, et al. MMWR Morb Mortal Wkly Rep 2022;71:1182–1189. **7.** Menni C, et al. Lancet. 2022; 399(10335):1618-1624**. 8**. Pfizer, data on file. **9**. Janssen MF, et al. . Eur J Health Econ. Mar 2019;20(2):205-216. **10.** Sheinson D, et al. Adv Ther. Apr 2021;38(4):1811-1831. **11.** Red Book. Merative US LP. Accessed: January 2024. **12.** Pike J, et al. Prev Chronic Dis 2023;20:220292.

Disclosures

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