# Conflict of Interest Statement

This study is sponsored by Gilead Sciences, the manufacturer of remdesivir. The lead author of the abstract, Fang Sun, is an employee of the company. The co-authors, Sushanth Jeyakumar and Nate Smith, contributed to the study under a research contract with Gilead Sciences.

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# Economic Value and Health System Impact OF Remdesivir in Treating Hospitalized COVID-19 Patients in the United States

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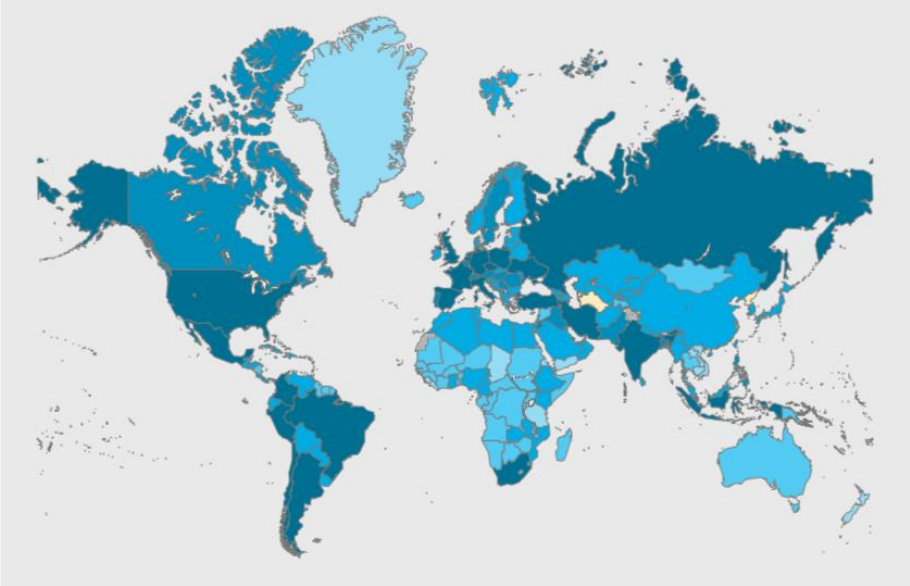
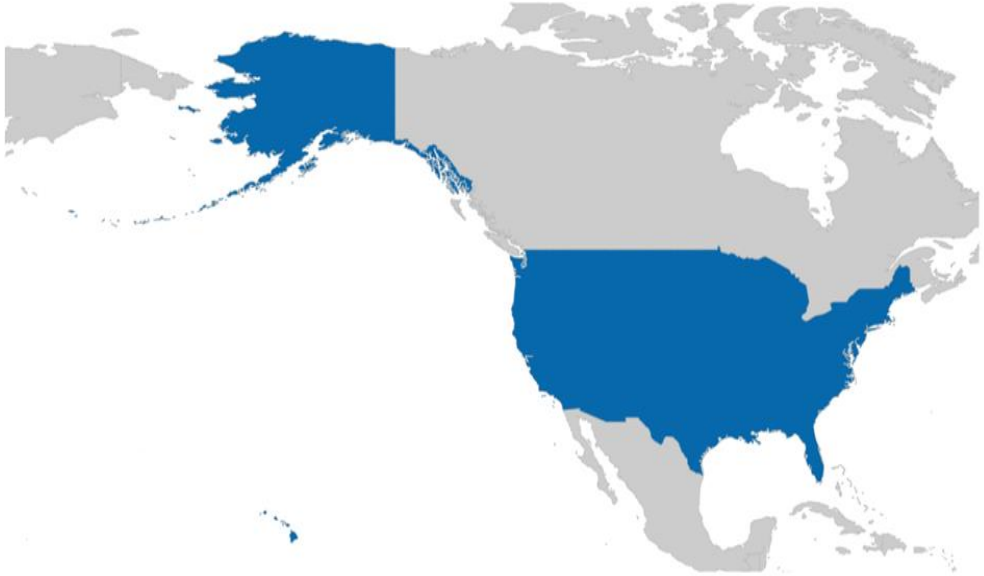
# COVID-19 is the most significant public healthcare crisis in our lifetime

Globally, as of 4:34pm CEST, April 4 2021, there had been **130,422,190** confirmed cases of COVID-19, including **2,842,135** deaths, reported to WHO.[1]



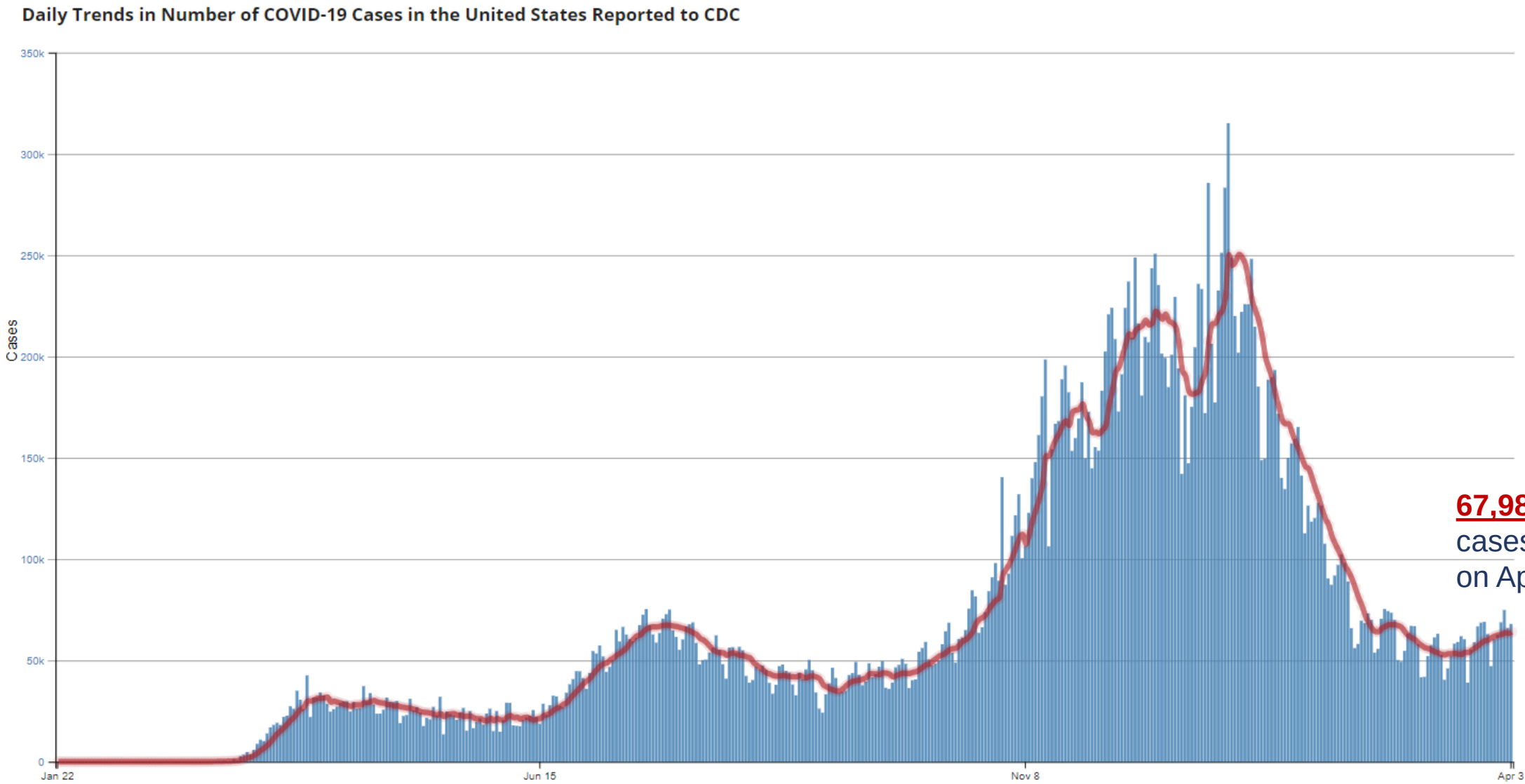


As of April 1, 2021, the cumulative COVID-19 cases and deaths in the US were **30,539,759** and **553,136**, respectively.[2]

[1] WHO. https://covid19.who.int/. Accessed on April 4, 2021

[2] CDC, https://covid.cdc.gov/covid-data-tracker/. Accessed on April 4, 2021

# Daily new case number remains at a high level in the United States

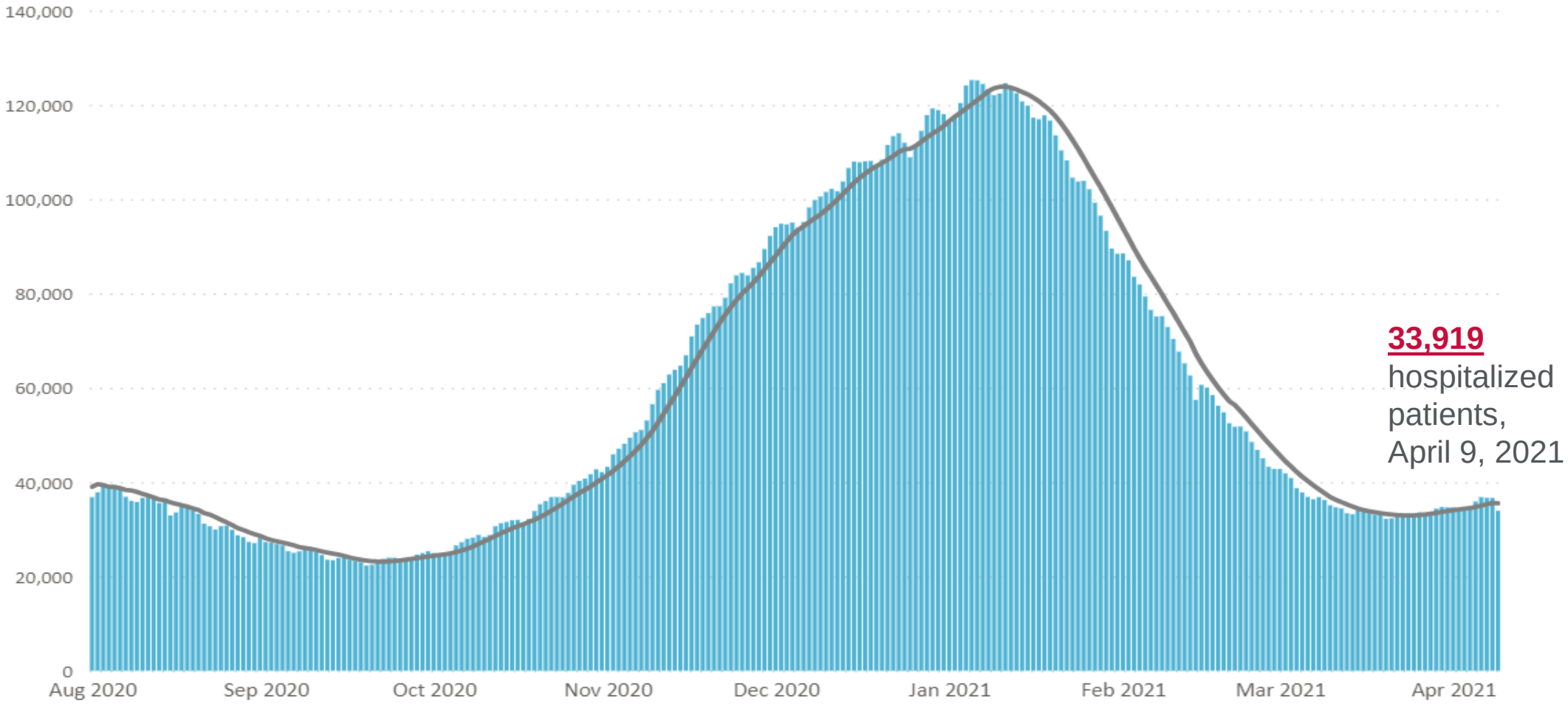



**67,989** new cases reported on April 3rd

CDC, https://covid.cdc.gov/covid-data-tracker/. Accessed on April 4, 2021

# COVID-19 pandemic has placed severe strain on health systems

**Prevalent Hospitalizations of Patients with Confirmed COVID-19, United States**




**33,919** hospitalized patients, April 9, 2021

CDC, https://covid.cdc.gov/covid-data-tracker/. Accessed on April 12, 2021

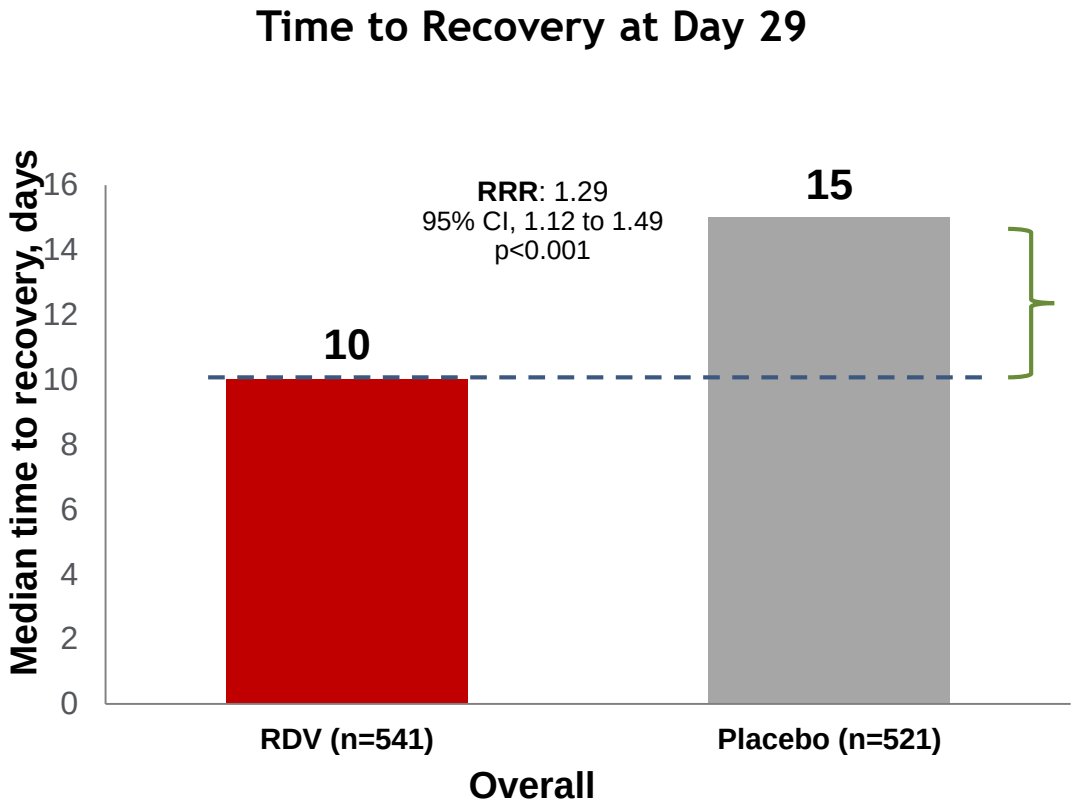
# Remdesivir is the first FDA-approved drug to treat COVID-19


✓ Approved on Oct 22, 2020

For use in adults and pediatric patients 12 years of age and older and weighing at least 40 kg (about 88 pounds) requiring hospitalization for COVID-19

# NIAID-sponsored RCT demonstrated remdesivir's efficacy

The Adaptive Covid-19 Treatment Trial (ACTT-1) study found that, in hospitalized adults with laboratory confirmed COVID-19, remdesivir was superior to placebo in shortening time to recovery from COVID-19[1]




**Shortened time to recovery by 5 days – an increased recovery rate of 29%**

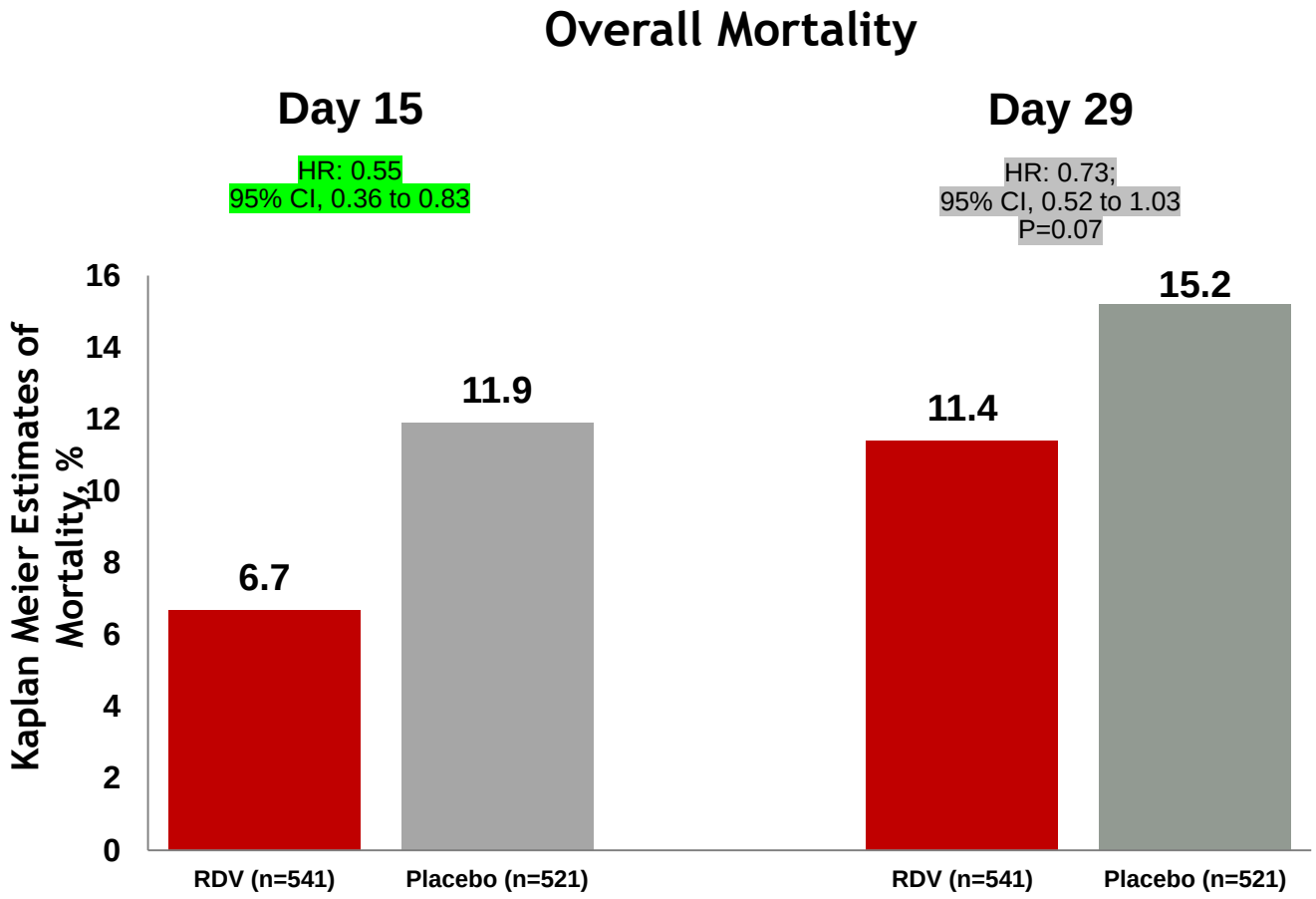
1. Beigel JH et al. NEJM. October 2020. DOI: 10.1056/NEJMoa2007764

Time to recovery defined as the first day on which patient met criteria for not being hospitalized or ready to be discharged

NIAID= National Institute of Allergy and Infectious Diseases, RCT= Randomized Controlled Trial, RRR= recovery rate ratio, RDV= remdesivir

# Potential mortality benefits need to be confirmed

The ACTT-1 study found a trend toward lower mortality in the RDV group vs the placebo group at Day 29, although this finding was not statistically significant[1]




HR: hazard ratio; RDV: remdesivir

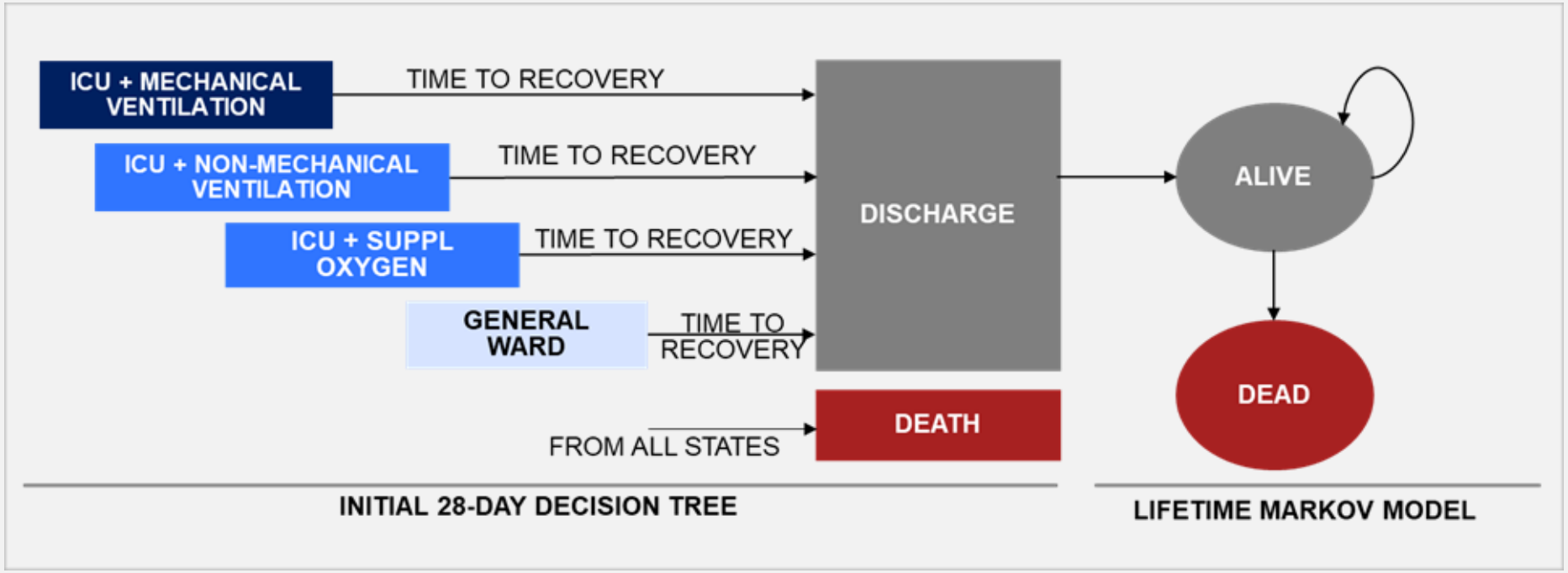
1. Beigel JH et al. NEJM. October 2020. DOI: 10.1056/NEJMoa2007764

# We conducted this study to evaluate the economic value and health system impact of remdesivir treatment in the United States

- Focused on remdesivir's long-term cost-effectiveness for hospitalized COVID-19 patients in the United States

- An analysis of remdesivir's impact on U.S. health system capacities on a national scale was performed

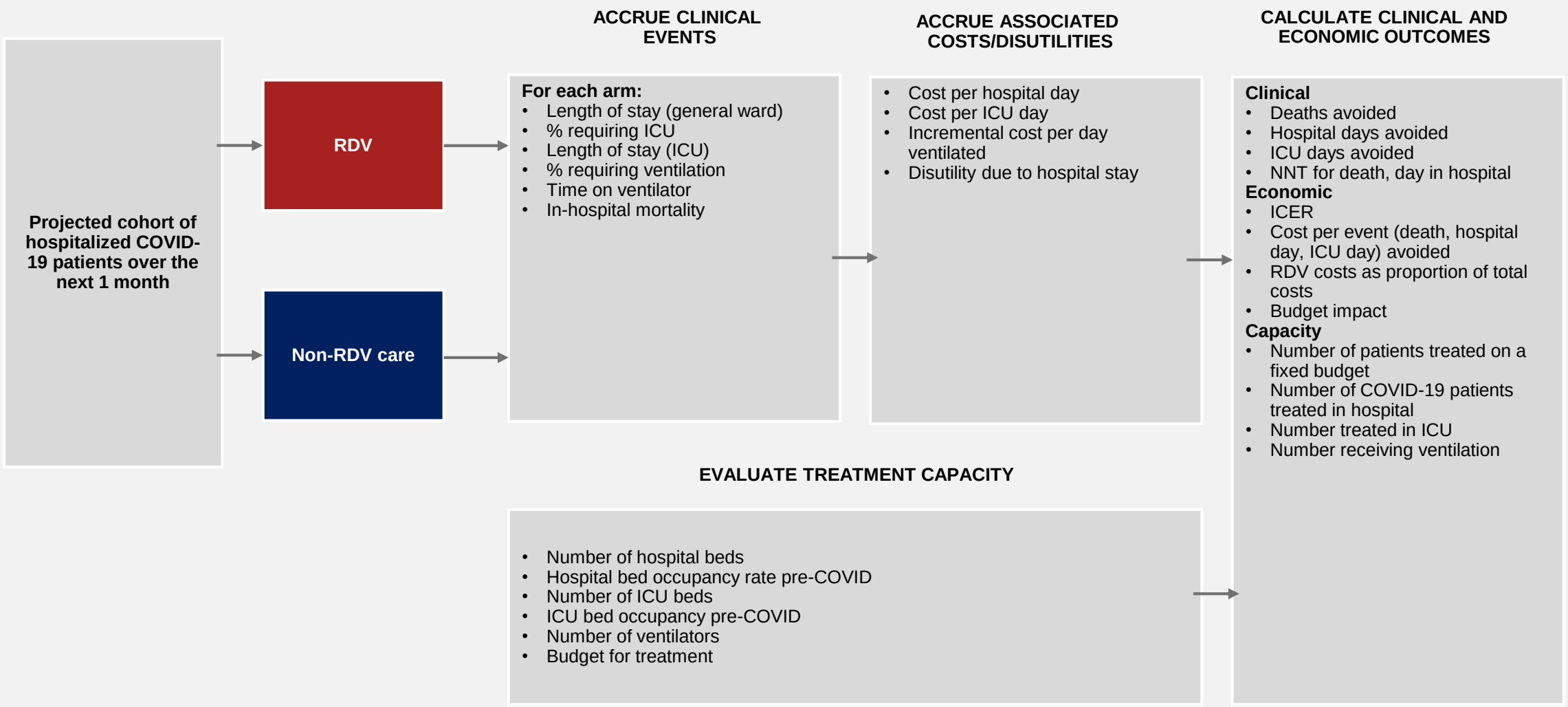
# We developed a hybrid decision-tree and Markov model from a US health system perspective




MIV = mechanical ventilation; ICU = intensive care unit

This study was conformed to the ISPOR Modelling Good Practice Guidelines

# Remdesivir Health Economic Model Approach




RDV = remdesivir; ICU = intensive care unit; NNT = number needed to treat; ICER = incremental cost-effectiveness ratio

# Key Input and Assumptions for CEA Base Case

- Clinical inputs were based on the ACTT-1 trial[1]
- Cost inputs were sourced from an internal analysis and the literature
- In the absence of granular data by age group or by disease severity, overall estimates of an input were assumed to apply identically
- The ACTT-1 trial categorizes patients on an ordinal scale.[1] We assume that
  - A score of 5 or higher indicates hospitalized in the ICU; a score of 4 indicates hospitalization on a general ward; a score of 3 is a proxy for discharge
- We assume remdesivir acquisition cost was $390/vial, and patients received 6.25 vials per treatment course

1. Beigel JH et al. NEJM. October 2020. DOI: 10.1056/NEJMoa2007764

**Scenario analyses, one-way and probabilistic sensitivity analyses were performed to evaluate the robustness of the CEA results.**

**For the treatment capacity analysis, we assumed a population of 328,200,000 and one monthly incident cohort of 201,000 patients eligible for treatment.**

The estimate was based on the COVID-19 related hospitalization rates in the 2 months before our abstract submission

# CEA results: Remdesivir was dominant versus non-remdesivir care

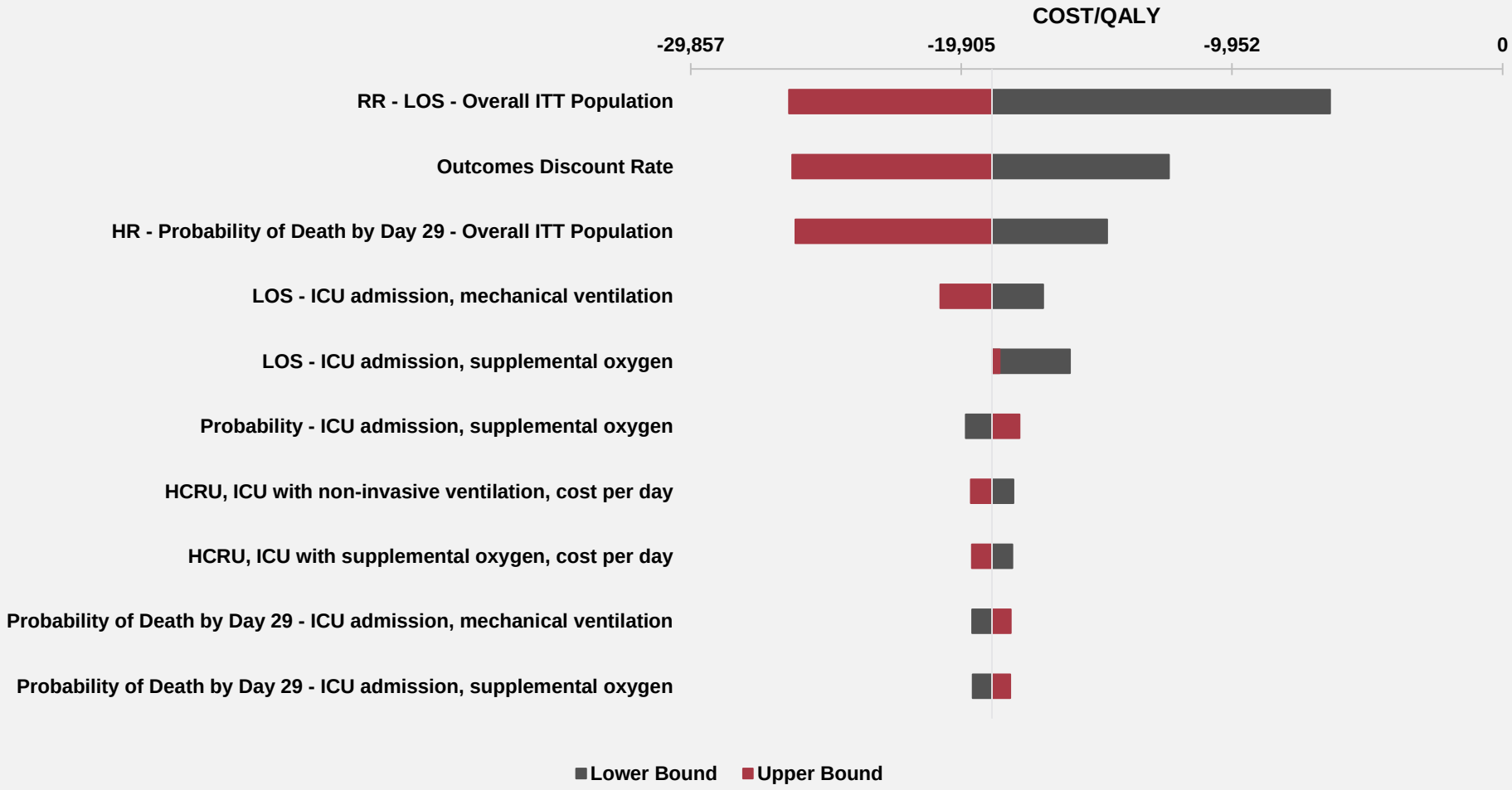
**Base case: Remdesivir was associated with a decrease in total costs (savings of $8,844.49 per patient), increased life years (+0.62) and quality-adjusted life years (+0.47)**

| | RDV COST | HCRU COST | TOTAL COST | LYs | QALYs |
|---|---|---|---|---|---|
| **RDV** | $2,291.29 | $65,582.56 | $67,873.85 | 13.62 | 10.04 |
| **Non-RDV** | $0.00 | $76,718.34 | $76,718.34 | 13.01 | 9.57 |
| **Difference** | $2,291.29 | -$11,135.78 | -$8,844.49 | 0.62 | 0.47 |

RDV = remdesivir; HCRU = health care resources utilization; LY = life year; QALY = quality-adjusted life year

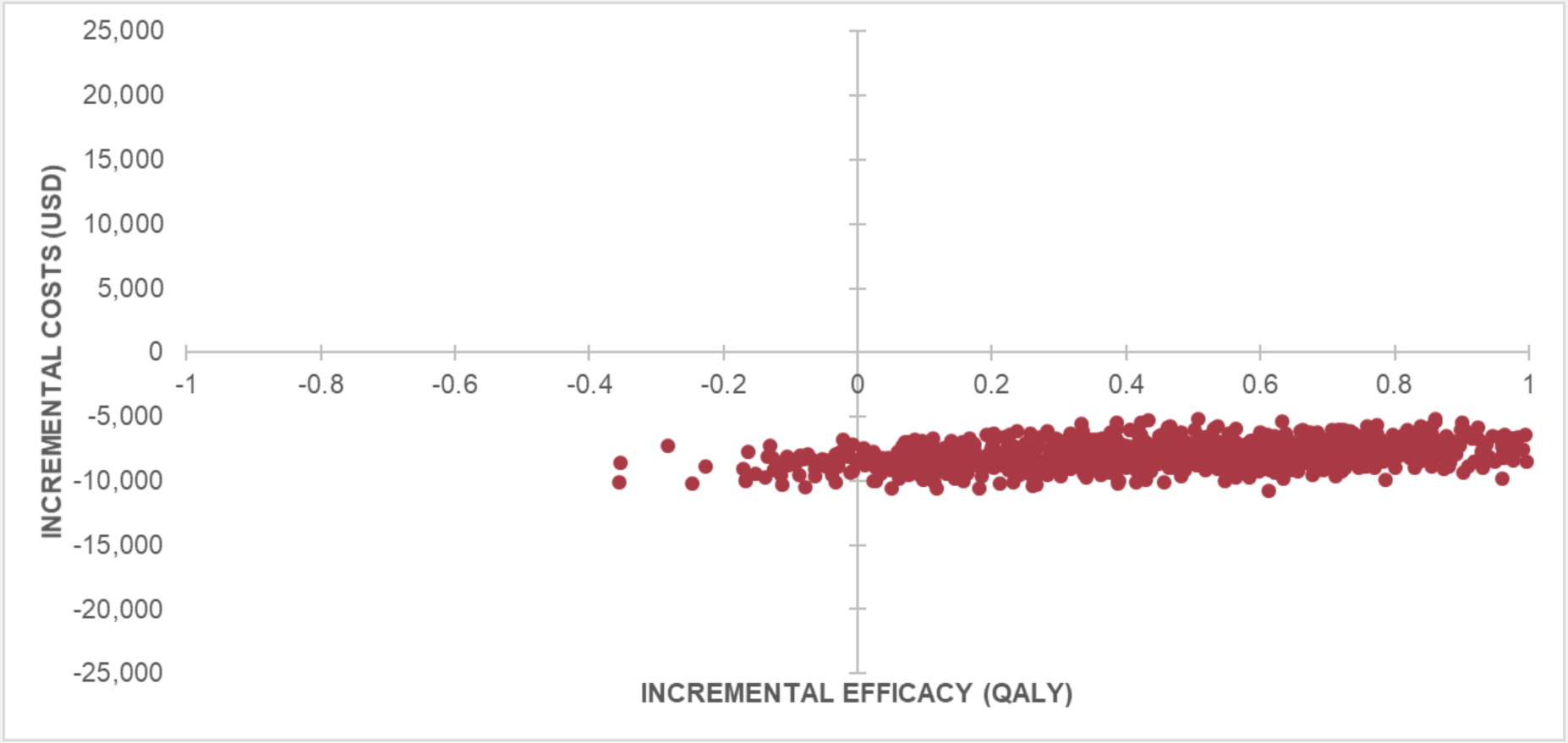
**Scenario analyses: Remdesivir was dominant with or without mortality benefits, assuming a drug price of $390 or $520 per vial, using inputs from overall population or subpopulations**

# One-way sensitivity analysis: Remdesivir remained dominant across parameter variations




ICU = intensive care unit; MIV = mechanical invasive ventilation; RDV = remdesivir; HCRU = healthcare resource utilization; LOS = length of stay; ITT = intent to treat; HR = hazard ratio; RR = rate ratio

# Probabilistic sensitivity analysis: Remdesivir was dominant or cost-effective across >90% of simulations



# Treatment Capacity Analysis: Remdesivir increased the availability of hospital beds, ICU beds, and total ventilator capacity.

| | Number of general ward bed-days per month as % of available hospital capacity | Number of ICU bed-days per month as % of available ICU capacity | Number of ventilator bed-days per month as % of total ventilator capacity |
|---|---|---|---|
| **Assuming one monthly incident cohort of 201,000 patients eligible for treatment** | | | |
| **RDV** | 9.78% | 120.79% | 6.95% |
| **Non-RDV** | 11.22% | 152.91% | 9.27% |
| **Difference** | -1.44% | -32.11% | -2.32% |
| **Assuming one monthly incident cohort of 100,000 patients eligible for treatment** | | | |
| **RDV** | 4.87% | 60.10% | 3.46% |
| **Non-RDV** | 5.58% | 76.07% | 4.61% |
| **Difference** | -0.71% | -15.98% | -1.15% |

The estimate was based on the average of CDC's weekly COVID-19 related hospitalization rates[1]

1. CDC, https://gis.cdc.gov/grasp/COVIDNet/COVID19_3.html

# Conclusions

**Remdesivir is a cost-effective option for the treatment of patients hospitalized with mild, moderate, and severe COVID-19 versus non-remdesivir care.**

Due to its ability to shorten time to recovery, remdesivir is projected to increase treatment capacity by increasing the percentage of available hospital beds, ICU beds, and total ventilator capacity.

# Key Limitations

- Our study took a U.S. health system perspective. Broader societal values of remdesivir, which are potentially enormous, were not evaluated.
- The clinical inputs for the model were primarily from the ACTT-1 study. Some other studies did not replicate the results of the ACTT-1 study. While our sensitivity analyses demonstrated the robustness of the current model, future studies may help reduce the uncertainty in the clinical inputs thus further improve the robustness of the model.
- COVID-19 disease pattern, treatment options and costs have been changing constantly. The findings of the current study may need to be refined as future scenarios unfold.

# Thank you!

For any questions about this abstract or presentation, please reach out to *Fang Sun* via fang.sun2@gilead.com