Comparison of Remdesivir as Monotherapy or in Combination with Steroids in Treating COVID-19 Patients

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Introduction

On October 22, 2020, the antiviral drug Remdesivir was approved by the United States Food and Drugs Authority (US FDA) for use in adults and pediatric patients for the treatment of COVID-19 requiring hospitalization. Remdesivir with or without Steroids has been used in treating moderate to severe COVID-19 patients. The rationale for the use of these drugs is that Remdesivir is an antiviral that acts by lowering the viral load, whereas Steroids act upon the cytokine storm which occurs due to the host's immune response. But there is very little evidence to support which of the two is a more rational treatment for COVID-19.

Objective

This study observes the pattern of the duration of stay in patients treated only with Remdesivir compared to those treated in combination with Steroids.

Method

- This retrospective study included patients hospitalized due to COVID-19 between March 2020 to June 2021 with appropriate ICD-10 CM* diagnosis codes from Optum's de-identified claims database.
- The total identified patients were divided into two cohorts, one being the patients treated with Remdesivir (R) alone and another in combination with Steroids (R+S, Methylprednisolone or Dexamethasone).
- The patients in the two cohorts were further divided into sub-cohorts depending upon their need for the intensive care unit (ICU), ventilator, or both.
- The mean length of stay (LOS) and the facility cost for both the cohorts (R and R+S) and their sub-cohorts were analyzed.

Results

- A total of 41,604 patients were identified who were either treated with Remdesivir (30,819) alone or in combination with Steroids (10,785).
- The mean length of stay for those treated with Remdesivir alone was significantly greater than those treated in combination with steroids (11.6 vs 7.8; p <0.0001). The mean facility cost for Remdesivir alone was also significantly higher compared to the facility cost for those treated in combination with steroids ($44,251 vs $35,321; p <0.0001).
- There was a significant difference in the mean LOS in case of patients who required either ICU (13.0 vs 9.1; p <0.0001) or ventilatory support (11.2 vs 9.5; p<0.05), whereas no significant difference was observed in the mean LOS for patients requiring both ICU and ventilatory support (14.6 vs 14.3; p>0.05), on comparison between the two cohorts.
- There was also a significant difference in the facility cost for those requiring only ICU (51,228 vs 37373; p <0.0001) or ventilatory support along with ICU (58,493 vs 41,564; p <0.00010). But no significant difference was observed in facility cost for those requiring only ventilatory support (36,305 vs 37,172; p >0.05).

Figure 1: Total bed occupancy for sub-cohorts of Remdesivir (R) and Remdesivir + Steroids (R+S) cohorts

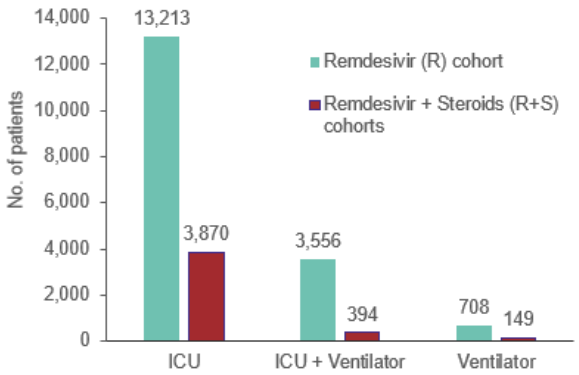
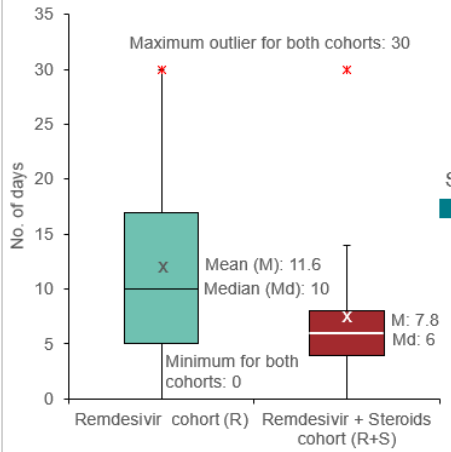
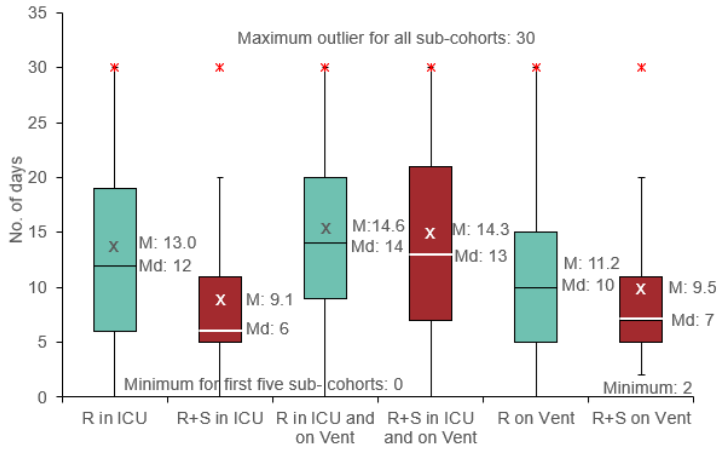


Figure 2: Median and mean length of stay for total patients in Remdesivir (R) and Remdesivir + Steroids (R+S) cohorts



Sub- cohorts

Figure 3: Median and mean length of stay for sub-cohorts of Remdesivir (R) and Remdesivir + Steroids (R+S) cohorts



Conclusions & limitations

- The study observed that patients treated with Remdesivir in combination with Steroids had a comparatively shorter mean LOS along with a reduced facility cost in comparison to those who were treated with Remdesivir alone.
- The ICU mean LOS and facility costs were significantly lower for the combination therapy compared to the monotherapy. The mean LOS for ventilator support was significantly lower for the combination treatment compared to the monotherapy, however, there wasn't a significant difference in the facility cost. The facility costs for both ICU and ventilator were significantly lower for the combination therapy compared with the monotherapy, however, there wasn't a significant difference in the mean LOS.
- A further detailed analysis is required to understand the impact demographic distribution and comorbidities can have on the two treatment approaches.
- The overall cost comparison, quality of life, and annual cost after discharge should also be researched to be able to better conclude the best treatment approach.
- Limitation: The study did not consider the pharmacy cost for the two cohorts or their sub cohorts.

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*ICD-10-CM codes used for identification of COVID-19 infection are Z1152, Z20822, Z8616, U00, U071, U09, U099, U49, U50, U85, J1281, J1282, B342, B949, B972, B9721, and B9729.