Monoclonal Antibody Treatment for COVID-19 in Children: Experience of a Pediatric Tertiary Care Center

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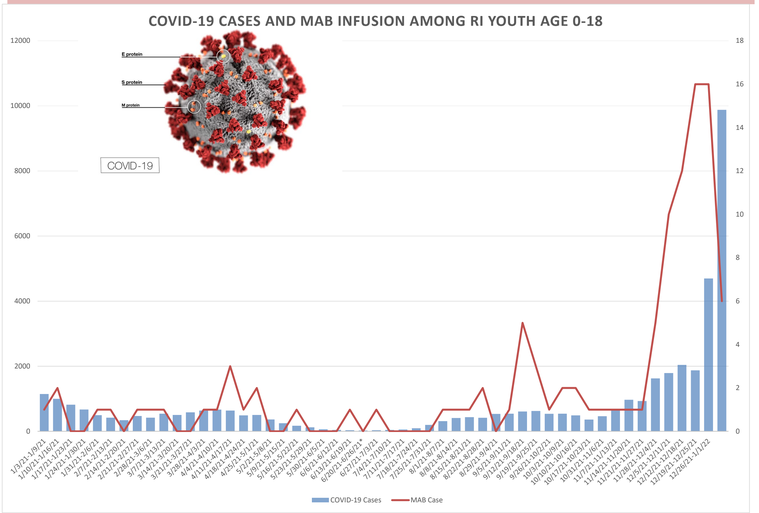
Introduction

The pediatric population is more likely than the adult population to experience mild COVID-19 infection yet may still suffer severe infection with lasting sequalae or death. Vaccines have been approved for children aged at least 5 years, but misinformation and parental hesitancy threaten population-wide vaccination. Certain conditions reduce vaccine efficacy, and breakthrough infections occur even in healthy children. Thus, practical treatment is necessary. One treatment modality is monoclonal antibodies (MABs), which prevent viral replication by binding the epithelial surface receptor for the SARS-CoV-2 spike protein. The FDA has issued emergency use approval (EUA) for two regimens: casirivimab/imdevimab and bamlanivimab/etesevimab. Stand-alone bamlanivimab has been revoked due to emerging resistance. Clinical trials have demonstrated decreasing viral loads as well as reductions in hospitalization and death in high-risk adult COVID-19 patients after Mab administration. However, there is insufficient literature examining the effectiveness and tolerability of Mabs in clinical practice among the pediatric population. This study seeks to fill this knowledge gap by reporting the experiences and outcomes with Mab administration of a single pediatric tertiary care center in Rhode Island, the US state with the highest rate of pediatric COVID-19 infection during the first year of the pandemic, prior to the arrival of the Omicron variant in the United States.

Methods

This was a retrospective case study of all pediatric patients in Rhode Island who received monoclonal antibody treatment for COVID-19 infection. Patients with mild-to-moderate COVID-19 infection who had risk factors for developing severe disease and received monoclonal antibody infusion in the Tomorrow Fund Clinic at Hasbro Children's Hospital in Providence, RI in the year 2021 were included in the study. All patients were above 12 years, weighed at least 40kg, had at least one underlying risk factor as per the FDA EUA and were followed by a pediatrician. These indicated risk factors include the following: BMI above the 85th percentile, immunosuppressive disease or treatment, cardiovascular disease or hypertension, chronic lung diseases, sickle cell disease or thalassemia, neurodevelopmental disorders, having a dependence on medical technology, diabetes mellitus, chronic kidney disease, or pregnancy. Communications with referring pediatricians were done via HIPAA compliant methods. Pediatric infectious diseases specialists determined Mab eligibility. Patients received either Casirivimab 600 mg and Imdevimab 600 infusion, Bamlanivimab 700 mg, or Bamlanivimab 700 mg and etesevimab 1400 mg over 30 minutes and were observed for 1 hour afterwards. Relevant demographic and clinical data such as sex, ethnicity, age, symptomatology, underlying disease, side effects, and outcome were abstracted from the EHR. Quality checks were applied to the data to remove duplications and errors, and Microsoft Excel was used for statistical analysis.

COVID-19 CASES AND MAB INFUSION AMONG RI YOUTH AGE 0-18



Results

- There were 108 cases of MAB infusion, 11 for PEP; 36 patients received Casirivimab/Imdevimab, 9 received Bamlanivimab, and 62 received Bamlanivimab/etesevimab, 1 received Sotrovimab .
- There were 7 cases of mild infusion-related reactions that included tingling of the lips, dyspnea, cough, pruritis, and fever to 101.5F. The infusion was discontinued in one patient per patient preference.
- Only one patient was admitted for complications related to COVID-19 after receiving MAB treatment. This patient simultaneously suffered an ischemic-occlusive crisis secondary to Sickle Cell Disease. Two patients presented to the ED with worsening symptoms and were discharged home
- One patient died 10 months after MAB treatment secondary to B-ALL relapse.

References

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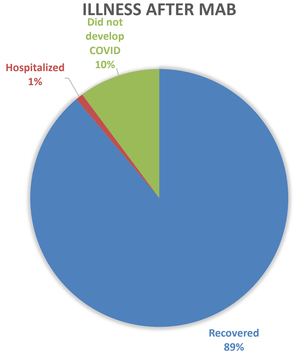
Discussion

- MAB treatment for COVID-19 among pediatric patients is safe and well-tolerated
- MAB treatment is effective in preventing progression of severity for COVID-19 illness among high-risk pediatric patients.
- MAB treatment is effective in preventing death from COVID-19 among high-risk pediatric patients.
- Most patients experienced no side effects from MAB treatment. No patients experienced severe side effects such as anaphylaxis or death. There was one instance of discontinued treatment due to side effects, but this was due to patient preference.
- Limitations include small sample size, inability to perform RCT, inability to confidently claim generalizability to greater pediatric population, inability to assess for extraneous factors like cost and availability of MABs

PROGRESSION OF SEVERITY OF ILLNESS AFTER MAB



Prevalence of Risk Factors