



The Rate of Hospitalizations and Intensive Care Admissions in Boston Children Hospital

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Much remains unknown about the overall impact of COVID-19 on the pediatric population because of the relative low incidence of symptomatic pediatric cases compared to other age groups. Recent anecdotal reports of rare and unique illnesses related to COVID-19 in this population calls for a more robust analysis. A time series analysis from open source Center for Disease Control (CDC) data on Boston Children's Hospital over a three-week period from April 21, 2020 thru May 9, 2020 was completed. An overall downward trend of both COVID-19 hospitalizations and patients requiring Intensive Care Unit (ICU) care was found. Moreover, the ratio of patients hospitalized requiring ICU treatment decreased. These findings suggest that pediatric patients were seen earlier in the course of illness as reports emerged linking COVID-19 to symptomatic and life-threatening illness in children. This data is intended to raise this general issue to the broad readership of The Asian Journal of Pediatric Research.

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1. INTRODUCTION

The pediatric population has been relatively spared by the COVID-19 pandemic when compared to other age groups [1]. However, Cruz et.al identified that the full impact of COVID-19 on pediatrics remains undetermined due to data on the topic being both limited and difficult to access [2].

There have been a few studies that characterize the extent to which COVID-19 affects children aged 0-18 months. Dong et al. concludes a case series of 2,135 pediatric patients in China with the result that children of all ages are susceptible to symptomatic COVID-19 infection [3]. Li et al. provides case report evidence, offering clinical insight for treating pediatric COVID-19 patients [4]. The most robust characterization from North America to date was completed by Shekerdemain et al., which reviews 46 pediatric intensive care units (PICUs) and 48 general pediatric patients. Attempts to characterize the

extent to which COVID-19 affects pediatric patients have yet to yield any definitive conclusions [5]. The aim of our study is to add to the current available literature regarding the impact COVID-19 has had on the pediatric population.

2. METHODS

We analyzed open-source data reported by the CDC on children affected by COVID-19 from Boston Children’s Hospital from April 21, 2020 through May 9, 2020. Petacube’s Universal Data Loader (ULD) was used to extract hospital utilization reports [6], from Massachusetts CDC COVID-19 daily dashboard. Data mining was done and then converted into a time series useful for analysis [7]. Converted data was then ingested using ULD into Postgres database. Analysis and visualization were carried out using jupyter notebook [8] and python’s seaborn and pandas libraries [9]. Data was sourced on May 11, 2020.

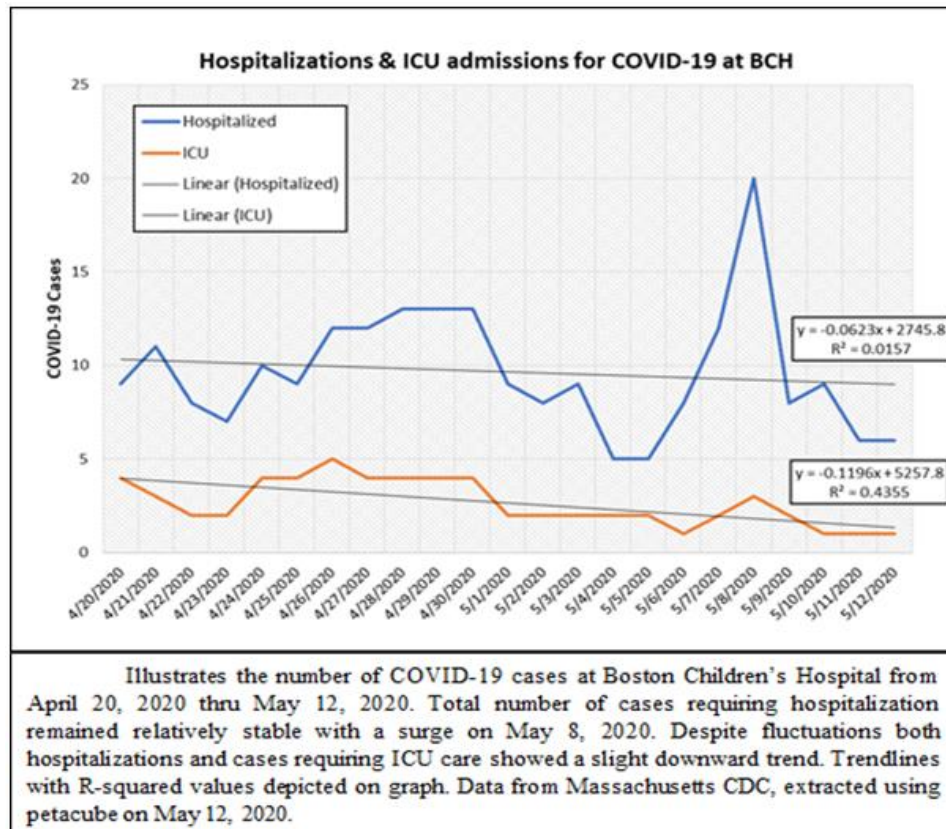


Fig. 1. Hospitalizations & ICU admissions for COVID-19 at BCH

3. RESULTS

The data reveals the daily count of patients at Boston Children's Hospital both hospitalized for COVID-19 and requiring intensive care (ICU) over a three-week period from April 21, 2020 through May 9, 2020. The mean daily number of hospitalizations was 9.65 with a standard deviation of 3.36, and the mean daily patients requiring ICU was 2.65 with a standard deviation of 1.22. There is a point of divergence on April 26, 2020, where the number of hospitalizations reached its maximum of 20 patients, while the number of ICU patients remained near its mean. Overall, the sample variance for hospitalizations was relatively large, 11.33, while remaining relatively small for patients requiring ICU treatment, 1.51.

Both COVID-19 hospitalizations and patients requiring ICU treatment trended downward over the three-week period, with patients requiring ICU treatment showing a more significant decline [Fig. 1]. Additionally, the percent of patients requiring ICU treatment vs total hospitalizations trended downward over the three-week period, from a high of 44% to a low of 11%.

4. DISCUSSION

One of the possible explanations for recent surges of admitted cases into BCH could be a recent increase in reporting on pediatric-specific cases, causing concerned parents to bring their children to the hospital more frequently. This also supports the general decline in cases requiring ICU treatment, as parents bring their children into the hospital sooner in the course of illness.

While the absolute number of confirmed COVID-19 cases requiring hospitalization was low, the fraction of cases requiring ICU care was relatively high at the beginning of the three-week period, reaching a maximum value of 44%. Moreover, the overall decline in the ratio of hospitalized patients requiring ICU treatment further suggests that patients were seen earlier in the course of illness.

Some limitations of the study could be that the data only covers one of the city's hospitals, making it difficult to form a broader pediatric assessment. Also, the few admitted number of cases may not give us a true picture of the entire pediatric population.

5. CONCLUSION

Our analysis shows importance of the open source data analysis to get the trend towards understanding of early presentation and severity of COVID-19 pediatric patients within the period of study. It is reassuring to see the much lesser number of pediatric patients during this pandemic.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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