

Tocilizumab: A Retrospective Multi-Center Cohort Study of Critically Ill Patients with COVID-19

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Background: Coronavirus disease 19 (COVID-19) can result in a dysregulated immune response requiring admission to the intensive care unit (ICU). Retrospective cohort studies of COVID-19 critically ill adults from the USA and Italy treated with tocilizumab, suggest a benefit on survival reduction of inflammation, and decreased mechanical ventilation.

Objectives: To determine the effect of tocilizumab treatment on mortality, ICU length of stay, and rates of secondary infections among critically ill patients with COVID-19.

Methods: This was a multi-center retrospective cohort study of 154 patients admitted to the ICU between March 15th- May 8th, 2020 to Ascension Hospitals (St John, Providence, Providence Park, and Macomb-Oakland at Warren and Madison Heights). We included adults (≥ 18 years) admitted for viral pneumonia-associated with COVID-19 diagnosed by a positive reverse-transcriptase-polymerase-chain-reaction (RT-PCR) assay of a nasopharyngeal swab. Data were obtained by electronic medical record (EMR) review. Data were analyzed using Student's t-test, the chi-squared test and multivariable Cox-regression models.

Results: Of 154 patients, 34 (21.4%) received tocilizumab. The mean age of the cohort was 61.5 \pm 14.4 years; the majority were male and predominantly black/African American. Compared to the non-treated group, the treated group was significantly younger, had fewer comorbidities, lower creatinine and procalcitonin levels, and higher alanine aminotransferase levels on admission. The overall case-fatality rate was 71.4%; it was significantly lower in the treated compared to the non-treated (52.9 % vs. 76.7%; $p=0.007$). In multivariable survival analysis, tocilizumab treatment was associated with a 2.1 times lower hazard of mortality when compared to the non-treated (hazard ratio: 0.47; 95% CI: 0.27, 0.83; $p=0.009$). The average ICU length of stay was significantly longer for the treated compared to the non-treated (21.7 \pm 13.2 vs. 7.4 \pm 5.8 days, $p<0.0001$). The prevalence of secondary infection tended to be higher in the treated group compared to the non-treated (41.2% vs. 28.3%; $p=0.17$).

Conclusion: Tocilizumab treatment for critically ill patients with COVID-19 resulted in a lower likelihood of mortality.