

Night Time Heart Rate- A Useful Marker of a Prognosis of COVID

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Background

- Coronavirus disease-2019 (COVID-19) was first reported in December 2019, in Wuhan China, and continues to threaten the global health care system by causing life-threatening infection, resulting in severe acute respiratory syndrome-coronavirus-2 (SARS-Cov-2), myocarditis, and other serious illnesses
- Most immunocompetent patients with COVID-19 present with mild symptoms such as fever, cough, shortness of breath, dyspnea, muscle aches, diarrhea, loss of smell and taste, and fatigue. On the other hand, patients with comorbidities including cardiovascular disease (CVD) are at an increased risk of facing higher fatality rate with critical serious complications such as acute respiratory distress syndrome (ARDS), CVD, disseminated intravascular coagulation (DIC), and multi-organ failure
- There are already numerous studies on COVID-19 that it can induce acute cardiac injury and cardiac arrhythmias. The exact mechanism of cardiovascular complications of COVID-19 is unknown but it is believed to be secondary to systemic inflammation, hypoxia, cytokine storm, interferon-mediated immune response, and plaque destabilization
- Heart rate (HR) can be used to predict an all-cause and cardiovascular (CV) morbidity and mortality
- Several studies have shown that an increase in HR directly correlates to increased adverse events in patients with CVD

Research Question/hypothesis

- The primary question of this research is to establish the relationship between the changes in average heart rate (AHR)/night time average heart rate (NAHR) and the severity of respiratory failure secondary to COVID-19
- We hypothesize that > 40% increase in AHR and NAHR during COVID-19 is linearly correlated to increased mortality and longer length of stay (LOS) and concomitant cardiovascular sequelae
- We hypothesize that return of average NHR pre-discharge to within +/- 10% of average baseline NHR is associated with a lower risk of 30-day all cause readmission after acute infection with COVID-19

Discussion

- Studies demonstrated that resting, night-time, and 24-hour heart rate were associated with increased CV mortality and risk. According to Johansen et al.'s study, night-time HR showed the most significant prognostic importance
- To date, there are limited studies on the relationship between HR and the severity of the respiratory failure in patients with COVID-19. The present study is intended to study the effects of HR and the prognosis of respiratory failure in patients with SARS-Cov-2
- The goal of this study is to find a correlation between nocturnal heart rate and its predicatory value in COVID-19 outcomes including mortality
- If a correlation can be found, we can expect the prognosis of COVID patients on based on their average heart rate during hospital stay
- Also, we can predict the mortality and chance of readmission when we discharge the patient based on average heart rate prior to discharge

Methods

- Project status:
 - IRB approved. Finished data collection and it is being analyzed by a statistician
- Study design:
 - Retrospective chart review of a total of 259 patients who presented at Arnot Ogden Medical Center between 12/1/2019- 12/1/2020 with a diagnosis of COVID-19
- Inclusion Criteria:
 - Presented to Arnot Ogden Medical Center (AOMC) with a diagnosis of COVID-19
 - Age >= 18 and <= 99
 - Included patients with a permanent pacemaker
- Exclusion Criteria
 - Age <19 and >99
 - No documented follow up
 - No documented records of variables
- Outcome measures
 - Primary: The number of patients who expired
 - Secondary:
 - The number of patients who was transferred to the ICU or admitted to the ICU for respiratory failure
 - The number of patients who required intubation secondary to SARS-Cov-2.
 - The number of patients who expired
 - Length of stay
 - The number of 30-day readmission
- Intervention:
 - A retrospective chart review will be conducted from AOMC to identify patients with a permanent pacemaker who had a diagnosis of COVID-19
 - The study will be retrospectively looking at the patients' hospital course focused on their respiratory status
 - The study will review the patients' pacemaker to assess changes in day-time and night-time heart rate. The patients with a pacemaker placed who are presenting with COVID-19 will be automatically enrolled in the study that they meet the inclusion criteria.
 - A determination will be made to see if there is any correlation between increased heart rate and respiratory failure/mortality

References

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