COVID-19 and Cardiovascular Disease Nationwide Trends
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Abstract
A new severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), popularly known as COVID-19, was first detected in December 2019, in the city of Wuhan, China after a cluster of reported pneumonia cases. However, in March 2020, the World Health Organization declared the novel coronavirus a pandemic. At the time of writing, COVID-19 has claimed almost 3 million lives worldwide. The United States has recorded over 550,000 deaths and over 30 million total cases, making it the world’s worst hit nation in the world. COVID-19 is a respiratory illness and its impact on the heart is enormous and cannot be overlooked. Since the heart needs to work harder when there is a respiratory illness, people with pre-existing heart disease are at high risk of dying from COVID-19. This Independent Study project aims to compare COVID-19 death rates across the nation with cardiovascular disease (CVD) death rates to determine if there are trends observed in COVID-19 data for states known to have a history of high versus low cardiovascular disease rates.

Introduction
SARS-CoV-2, popularly known as COVID-19 is in the family of Coronaviruses and the 7th known human coronavirus (Clerkin et al., 2020). It is a single-stranded enveloped RNA virus. While some people infected with COVID-19 remain asymptomatic, others experience several arrays of symptoms from mild to severe forms of the disease and death. Though there are 3 ways by which respiratory viruses are transmitted (contact, droplet, and airborne modes of transmission), exposure to respiratory droplets from an infected person is the primary way by which people are infected with SARS-CoV-2. Currently, several variants of SARS-CoV-2 are circulating across the world. A new variant known as B.1.1.7 emerged from the United Kingdom, B.1.351 emerged from South Africa and P.1 also emerged from Brazil. Now, all these variants have been detected in the United States. People with pre-existing cardiovascular diseases face a higher risk of morbidity and mortality from SARS-CoV-2, which is primarily a respiratory illness (Frenan, Di Pasquale, & Rapezzi, 2020). From literature reviewed, there is a high prevalence of cardiovascular diseases among COVID-19 patients, and it is not known if there are other factors (e.g., Age) that mediates cardiovascular comorbidity, or it poses as an independent risk (Clerkin et al., 2020).

Method
Due to COVID-19 restrictions preventing in-laboratory experiences, data mining was performed with publicly available cardiovascular disease and COVID-19 values from the CDC website.

Data
- Deaths by Race/Ethnicity: Data from 425,901 deaths. Race/Ethnicity was available for 325,009 (76%) deaths.
- Deaths by Sex: Data from 425,901 deaths. Sex was available for 424,808 (99%) deaths.
- Total cases and deaths since January 21, 2020, and rates for cases (cases/100,000 people) and deaths (deaths/100,000).
- For COVID-19 Death rates, Rates per 100,000 are calculated as the total deaths per 100,000 people using the US Census Bureau Population Estimates Program.

Results

Table 1a: Comparing States with CVD and COVID Death Rates per 100,000

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<tr>
<th>States/Territories</th>
<th>CVD Death Rate per 100,000</th>
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<td>Hawaii</td>
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Figure 1a: COVID Death Rate per 100,000 by States/Territories
Figure 2a: Total Cardiovascular Disease Death Rate per 100,000 by all Races/Ethnicities, 2016-2018
Figure 3a: Total Cardiovascular Disease Death Rate per 100,000, for both genders, 2016-2018

Discussion
- There is no trend or overlap between States highest in COVID deaths and States with a history highest CVD deaths.
- We did not test COVID and CVD during same time, same place, and same patients, so we can’t say anything about complications of COVID and CVD together.
- Instead, we can only speak of trends we see in COVID and separately, trends we see in CVD.
- In Figure 2a, COVID death rates were highest in White (Non-Hispanic), followed by Black (Non-Hispanics) and Hispanics. In Figure 2b, it could be seen that Black (Non-Hispanic) has the highest cardiovascular disease death rate, followed by White (Non-Hispanic) and Hispanics.
- White (Non-Hispanic) have higher COVID death rate and separately, Black (Non-Hispanics) have higher death rate for CVD.
- Males have higher death rate for both ailments examined (CVD and COVID).
- We can’t conclude about people with CVD dying from COVID because the data is not on people who have CVD and COVID at same time. Instead, data is about COVID trends and separately, CVD trends in places highest but during a different time set.

Conclusion
- For trends in COVID-19 and separately, in CVD, White (Non-Hispanics) have higher COVID death rate and Black (Non-Hispanics) have higher death rate for CVD.
- From the data curated, Males have higher death rate for both ailments examined (CVD and COVID).
- Future research can be conducted within the CVD/COVID population to investigate if COVID-19 can be a contributory cause of a new or the worsening of an already existing heart and cardiovascular disease.

References

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