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Letters

CDC-WONDER Database Analysis of COVID-19 and Cardiovascular Disease- Related Mortality



COVID-19 is associated with higher risk of acute coronary syndrome, venous thromboembolism, cerebrovascular accidents, and arrhythmias, especially after 30 days of incident infection.¹ Moreover, pre-existing cardiovascular disease (CVD) is associated with increased morbidity and mortality with acute COVID-19 illness. We sought to assess the COVID-19-related and CVD-related deaths and how they compare with deaths attributed to both COVID-19 and CVD.

We analyzed data from the Centers for Disease Control and Prevention WONDER (Wide-Ranging Online Data for Epidemiologic Research) database from January 1, 2020, to December 31, 2021. All deaths related to COVID-19 and CVD in adults aged ≥ 25 years were included. Data for deaths related to COVID-19 and CVD were obtained by querying “COVID-19” using International Classification of Diseases-10th Revision code U07.1 and “diseases of circulatory system” using International Classification of Diseases-10th Revision code I00-I99 as contributing or underlying causes of death. The 2 terms were then queried together to ascertain patients who had both COVID-19 and CVD, including pulmonary circulatory disorders and pulmonary embolism, as contributing or underlying causes of death. Sociodemographic data including age, sex, race/ethnicity, and region of residence across the United States were acquired for

all 3 patient subgroups. Age-adjusted mortality rates (AAMR) per 100,000 population were determined. AAMRs were calculated by standardizing the deaths to the year 2000 U.S. population.

Between 2020 and 2021, there were a total of 6,715,183 deaths. Of the total deaths, 3,732,440 were CVD related only, and 843,894 were COVID-19 related only. A total of 385,462 deaths were related to both COVID-19 and CVD. The AAMR was 709.2 (95% CI: 708.5-710.0) in CVD only, 161.0 (95% CI: 160.7-161.4.7) in COVID-19 only, and 73.2 (95% CI: 73.0-73.4) in both COVID-19 and CVD (Table 1). The elderly age group (age ≥ 65 years) had the highest AAMR for both COVID-19-related and CVD-related deaths of 284.8 (95% CI: 283.8-285.9), followed by middle-aged adults (45-64 years) (AAMR: 41.7; 95% CI: 41.4-42.0) and young adults (25-44 years) (AAMR: 7.0; 95% CI: 6.8-7.1). When stratified by race/ethnicity, the AAMR of both COVID-19-related and CVD-related deaths was highest in Hispanic patients (AAMR: 117.7; 95% CI: 116.7-118.6) followed by non-Hispanic (NH) Black patients (AAMR: 114.5; 95% CI: 113.6-115.5) compared with NH White patients (AAMR: 61.6; 95% CI: 61.4-61.9) and NH Asian patients (AAMR: 51.5; 95% CI: 50.7-52.4). The AAMR stratified by census region revealed a higher rate of both COVID-19 and CVD-related deaths in the South (AAMR: 77.4; 95% CI: 77.0-77.8) followed by the Northeast (AAMR: 72.7; 95% CI: 72.2-73.3), the Midwest (AAMR: 71.0; 95% CI: 70.5-71.5), and the West (AAMR: 67.9; 95% CI: 67.4-68.4). The highest AAMR in the Northeast (127.3 vs 117.2), Midwest (118.0 vs 106.0), and South (111.6 vs 108.8) was observed among NH Black patients followed by Hispanic patients. However, the highest AAMR in the West was observed in Hispanic followed by NH Black patients (129.4 vs 100.3). The highest proportion of deaths occurred in a medical facility (266,333; 70.6%).

The study reveals several key findings. Deaths attributed to both COVID-19 and CVD were estimated at ~ 70 per 100,000 persons in the United States, a figure higher than several common malignancies and many independent causes of CVD death. Hispanic and NH Black populations had higher AAMR related to both COVID-19 and CVD. Racial differences are determined to be a major determinant of outcomes with COVID-19, with minoritized populations

What is the clinical question being addressed?

What is the scope of COVID-19 and cardiovascular disease-related death in the United States?

What is the main finding?

Concomitant COVID-19 and cardiovascular disease is associated with high mortality and persistent racial disparities.

TABLE 1 Cardiovascular-Related and COVID-19-Related Mortality, 2020-2021

Age-Adjusted Death Rate per 100,000 and Frequency for Both Cardiovascular Disease and COVID-19				
	Deaths, n	Population, n	Overall Age-Adjusted Death Rate per 100,000 (95% CI)	
Entire cohort	385,462	454,873,425	73.2 (73.0-73.4)	
Sex				
Men	216,391 (56.1%)	221,125,676	93.6 (93.2-94.0)	
Women	169,071	233,747,749	56.7 (56.5-57.0)	
Race				
Asian	13,506	27,756,974	51.5 (50.7-52.4)	
Black or African American	59,364	54,752,155	114.5 (113.6-115.5)	
White	241,198	289,387,384	61.6 (61.4-61.9)	
Hispanic	64,064	72,446,135	117.7 (116.7-118.6)	
Census region of United States				
Northeast	71,893	79,758,107	72.7 (72.2-73.3)	
Midwest	79,748	93,753,771	71.0 (70.5-71.5)	
South	153,412	173,573,832	77.4 (77.0-77.8)	
West	80,409	107,823,715	67.9 (67.4-68.4)	
Age groups				
Young adults (25-44 y)	11,598	177,104,797	7.0 (6.8-7.1)	
Middle age (45-64 y)	76,263	166,261,310	41.7 (41.4-42.0)	
Elderly (65+ y)	297,601	111,507,318	284.8 (283.8-285.9)	
Age-Adjusted Death Rate per 100,000 According to Race by Region (95% CI)				
	Northeast	Midwest	South	West
Asian	66.4 (64.1-68.7)	58.1 (55.0-61.3)	38.9 (37.2-40.7)	50.0 (48.8-51.2)
Black or African American	127.3 (124.9-129.7)	118.0 (115.7-120.3)	111.6 (110.4-112.8)	100.3 (97.3-103.2)
White	60.6 (60.0-61.1)	65.0 (64.5-65.5)	66.2 (65.8-66.7)	49.7 (49.1-50.2)
Hispanic	117.2 (114.8-119.6)	106.0 (102.6-109.4)	108.8 (107.4-110.3)	129.4 (127.8-131.0)
Age-Adjusted Death Rate per 100,000 According to Race for Cardiovascular Disease Only and COVID-19 Only (95% CI)				
	Cardiovascular Disease Only		COVID-19 Only	
Asian	965.7 (963.0-968.5)		235.9 (234.6-237.3)	
Black or African American	411.7 (409.2-414.2)		103.2 (102.0-104.4)	
White	704.7 (703.8-705.5)		138.2 (137.8-138.6)	
Hispanic	612.2 (610.0-614.4)		251.7 (250.4-253.1)	

experiencing higher risk of hospitalizations and mortality in several large-scale retrospective studies.^{2,3} Previous data revealed a much higher proportion of NH Black adults affected by COVID-19 compared with the proportion of NH Black adults in the total population.⁴ Data regarding vaccination were not available, which would have provided further insight if socioeconomic and racial inequities are confounded by vaccination rates in these populations.

Limitations of this analysis include a lack of individual-level data on baseline comorbidities, lack of statistical assessment for confounding variables, and the inability to ascertain the temporal association of CVD with COVID-19 infection, that is, if CVD occurred as a consequence of COVID-19 vs exacerbation of existing CVD related to COVID-19. Moreover, cause of death from out-of-hospital reported deaths is

known to be less reliable. Therefore, it is important to emphasize that we cannot draw causal conclusions from these results.

In conclusion, mortality rates of concomitant COVID-19 and CVD in the United States are high, with persistent racial disparities. Efforts are needed to further delineate the reasons responsible for these differences that have an impact on clinical outcomes and mortality in the socially vulnerable strata of society.

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