

Factors associated with increased COVID-19 deaths among COVID-19 prostate cancer patients varied by race

Pratibha Shrestha¹, Mei-Chin Hsieh¹, Yong Yi¹, Xiao-Cheng Wu¹

¹Louisiana Tumor Registry, Louisiana State University Health Sciences Center School of Public Health



Background

A systematic review of studies found that African Americans/Blacks experience disproportionately higher rates of COVID-19 related mortality (1), and patients with cancer tested COVID-19 positive have a high probability of death (2). However, few studies explain the underlying factors playing a significant role in worsening the outcome among cancer patients with positive COVID-19 infection, especially for **prostate cancer** (most common cancer, 2nd leading cause of cancer death in American men).

To optimize health resources, research is warranted to identify the vulnerable groups among COVID prostate cancer patients. This study aims to assess the factors associated with the increased risk of dying from COVID-19 among prostate cancer patients.

Objective

Assess racial difference in the risk of COVID-specific death among prostate cancer patients and the roles of age, poverty, comorbidities, and COVID19-related hospitalization in the risk

Methods

We linked Louisiana Tumor Registry data on patients aged ≥ 50 years diagnosed with invasive prostate cancer in 2015-19 with the 2020 Louisiana statewide COVID-19 data and hospital in-patient discharge data (HIDD) to identify COVID-19 infection and COVID related hospitalization in 2020. The cutoff date for COVID-specific death was March 9, 2021. We validated COVID-related deaths with the Louisiana vital records. Because the race variable did not meet proportional hazard (PH) assumptions, the analysis was stratified by race. The log-rank test and cause-specific Cox proportional hazard regression were employed. Multicollinearity of covariates in the multivariable model was examined.

Results

Of 1,060 COVID-19 prostate cancer patients, 38% were Blacks, and 62% were Whites. COVID19-deaths and other causes of death counted for 7.3% and 2.0% of the cases, respectively. More than half of the patients were 65-79 years old (56.3%). Compared with White patients, Black patients were significantly more likely to be younger, reside in higher poverty areas, are current/former smokers, have higher comorbidities, and have higher COVID-related hospitalization.(Table 1). The one-year COVID-specific death was higher (p=0.0384) for Blacks (10.2%) than Whites (6.9%). Among Whites, the significant predictors of elevated risk of COVID-specific death were older age, former smokers, unknown poverty, late-stage prostate cancer, and COVID-related hospitalization (Table 2). While among Blacks, the significant predictors were older age and COVID-related hospitalization. The multicollinearity in the multivariable model was not statistically significant.

Table 1: COVID prostate cancer patient’s characteristics by race

Variable	Whites (n=660, 62.3%) n (%)	Blacks (n=400, 37.7%) n (%)	p-value	Variable	Whites (n=660, 62.3%) n (%)	Blacks (n=400, 37.7%) n (%)	p-value
Age group (in years)				Smoking status at diagnosis			
50-64	186 (28.2)	162 (40.5)	<.0001	Non-Smoker	288 (43.6)	145 (36.2)	0.0505
				Current Smoker	62 (9.4)	54 (13.5)	
65-79	381 (57.7)	216 (54.0)		Former Smoker	200 (30.3)	132 (33.0)	
				Unknown	110 (16.7)	69 (17.2)	
80+	93 (14.1)	22 (5.5)		Charlson score comorbidities			
Body mass index (BMI) in kg/m2				0	357 (54.1)	180 (45.0)	0.0041
Underweight	13 (1.9)	7 (1.7)	1	133 (20.1)	81 (20.2)		
Normal weight	69 (10.4)	49 (12.2)	2+	170 (25.8)	139 (34.7)		
Overweight	179 (27.1)	102 (25.5)	0.7935	AJCC Stage			
Obese	399 (60.4)	242 (60.5)		I	138 (20.9)	72 (18.0)	0.5505
Poverty (% of persons with an income below the federal poverty level)				II	289 (43.8)	184 (46.0)	
0% - <10%	176 (26.7)	34 (8.5)	III	101 (15.3)	65 (16.2)		
10% - <20%	234 (35.4)	97 (24.2)	IV	36 (5.4)	28 (7.0)		
≥20%	165 (25.0)	211 (52.7)	Unknown	96 (14.5)	51 (12.7)		
Unknown	85 (12.9)	58 (14.5)	<.0001	COVID-19 related hospitalization			
				Yes	113 (17.12)	116 (29.0)	<.0001
				No	547 (82.88)	284 (71.0)	

Table 2: Factors* related to COVID-19 deaths in prostate cancer patients by race

Characteristics	Whites		Blacks	
	HR	95% CI	HR	95% CI
65-79 years old vs 50-64 years old	2.02	0.55 – 7.42	2.14	0.86 - 5.34
80+ years old vs 50-64 years old	4.40	1.11 -17.46	8.64	2.59 - 28.77
Current smoker vs Non-smoker	2.40	0.59 – 9.71	0.99	0.27- 3.70
Former smoker vs Non-smoker	3.55	1.44 – 8.73	1.15	0.52 - 2.55
Unknown vs Non-smoker	4.63	1.51- 14.15	0.91	0.30 - 2.75
Stage II vs Stage I	0.76	0.31- 1.84	1.83	0.65 – 5.11
Stage III vs Stage I	0.95	0.29- 3.07	0.71	0.18 – 2.75
Stage IV vs Stage I	4.67	1.35 -16.13	1.6	0.35 – 7.31
Stage unknown vs Stage I	1.04	0.37 - 2.97	1.25	0.35 – 4.52
COVID-19 related Hospitalization: Yes vs No	12.87	5.88 - 28.18	7.54	3.23 - 17.56

Abbreviations: HR= hazard ratio , CI= confidence interval

*Other covariates namely Charlson comorbidities, poverty and body mass index were also adjusted in the model but not shown in the table 2.

Conclusion

The one-year COVID-specific death was statistically significantly higher among Black COVID-prostate cancer patients than their White counterparts. Risk factors associated with increased COVID deaths varied by race. Old age and COVID-related hospitalization, however, significantly elevated the risk of dying from COVID for both White and Black COVID-19 prostate cancer patients. Further research is warranted to understand the underlying mechanism.

Acknowledgements

- NCI’s COVID-19 supplement funds to the Gulf South Minority/ Underserved Clinical Trials Network:UG1CA189854-07S1
- Surveillance, Epidemiology, End Result (SEER): HHSN2612018000071/HHSN26100002
- CDC’s National Program Cancer Registries (NPCR): NU58DP006332

References

1. Mackey, Katherine et al. “Racial and Ethnic Disparities in COVID-19-Related Infections, Hospitalizations, and Deaths : A Systematic Review.” *Annals of internal medicine* vol. 174,3 (2021): 362-373. doi:10.7326/M20-6306
2. Saini KS, Tagliamento M, Lambertini M, et al. Mortality in patients with cancer and coronavirus disease 2019: A systematic review and pooled analysis of 52 studies. *Eur J Cancer*. 2020;139:43-50. doi:10.1016/j.ejca.2020.08.011
3. Key Statistics for Prostate Cancer. American Cancer Society <https://www.cancer.org/cancer/prostatecancer/about/keystatistics.html#:~:text=Prostate%20cancer%20is%20the%20second%20leading%20cause%20of,with%20prostate%20cancer%20do%20not%20die%20from%20it.>
4. Chakravarty D, Ratnani P, Sobotka S, et al. Increased Hospitalization and Mortality from COVID-19 in Prostate Cancer Patients. *Cancers (Basel)*. Apr 1 2021;13(7)doi:10.3390/cancers13071630

