

Mortality of 1,636 COVID19 Cancer Patients (Pts) and Associated Prognostic Factors

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BACKGROUND

- Patients with cancer have a higher risk of COVID-19 than patients without cancer¹⁻⁴
- Patients with cancer who develop COVID-19 have a higher short-term mortality risk than patients with cancer who are COVID-19 negative³
 - The long-term impact of COVID-19 on mortality in patients with cancer is increasingly clear but requires further examination^{4,5}
- Although many studies have shown no increased mortality risk for COVID-19–positive patients with cancer receiving anticancer treatments, including surgery, chemotherapy, immunotherapy, or targeted therapy, results have varied between studies⁶⁻¹¹
- An improved understanding of COVID-19’s contribution to cancer mortality and the interaction between COVID-19 and other features of cancer treatment, such as anticancer therapy, is needed

OBJECTIVES

- To assess the short-term (30-day) and long-term (overall) mortality risk of COVID-19 virus infection in patients with cancer receiving antineoplastic therapy
- To understand the impact of anticancer treatment on the effect of COVID-19 with respect to 30-day mortality

METHODS

Patient Population

- The Optum[®] de-identified COVID-19 Electronic Health Record dataset (January 7, 2021 release) was used to select patients with cancer with a definitive COVID-19–positive (*International Classification of Diseases, Ninth and Tenth Revisions, Clinical Modification* [ICD-9/10-CM] codes U07.1/U07.2 or positive test result) or –negative (negative test and no positive test at any time after the first negative result) status on their first test/diagnosis date (ie, the “index date”)
- Patients were excluded if they had <1-year database history, did not receive treatment ≤90 days before index date, were <18 years old, had implausible death dates, or were indexed outside of February–November 2020

Analyses

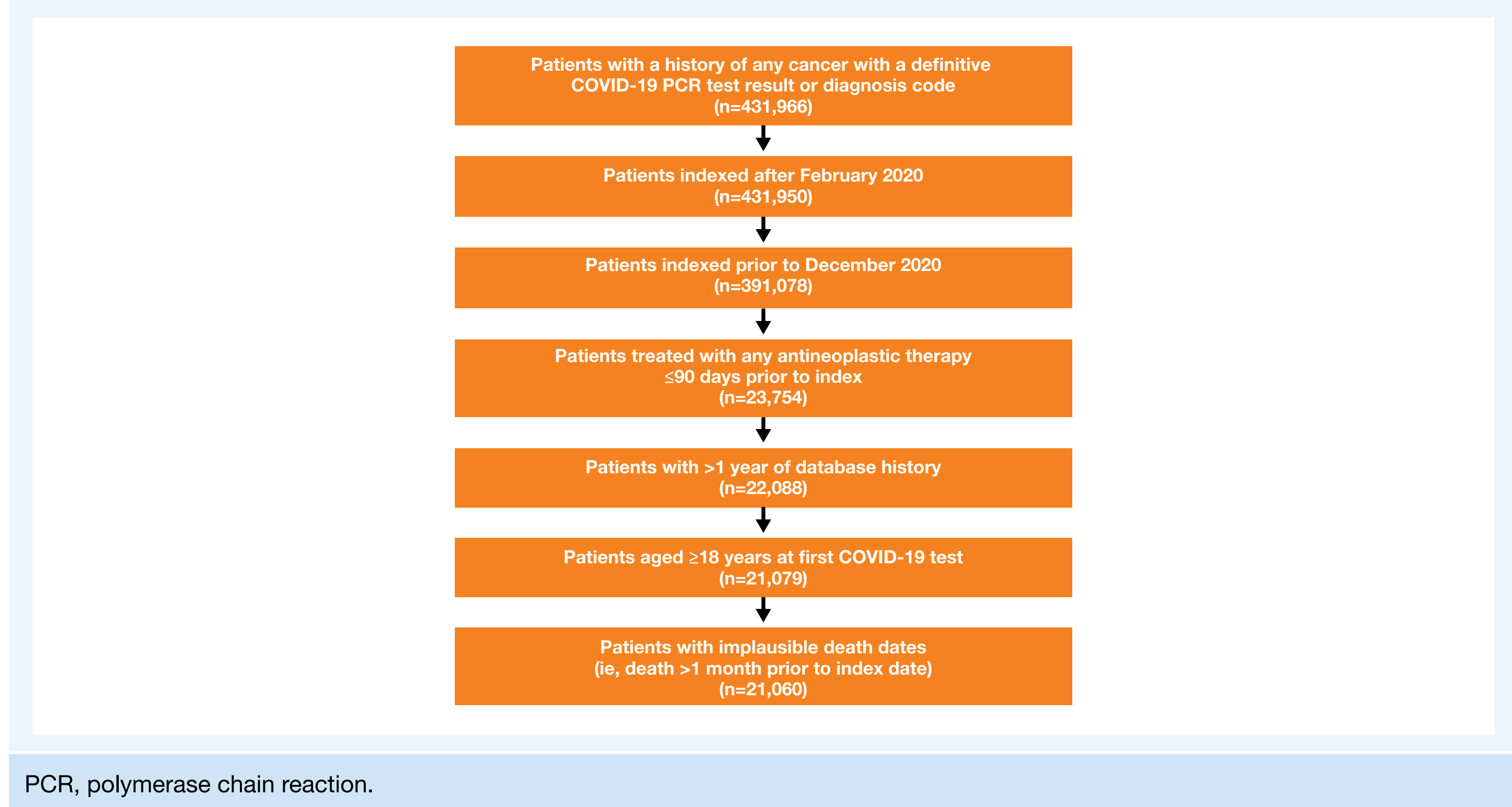
- COVID-19–positive and –negative patients were exact matched on cancer type (14 solid-tumor categories based on ICD hierarchy from C00 to C80) and metastatic status, then 1:1 greedy nearest-neighbor matched on propensity scores for all other variables of interest
- Missing values for the variables gender, healthcare setting, insurance type, region, and smoking status were imputed by chained equations (n imputations = 5)
- The primary outcome of 30-day mortality was evaluated by multivariable logistic regression adjusted for clinical covariates as well as interaction terms between treatment and COVID-19 positivity
- Matched mortality rate ratios (MRRs; death not limited to 30 days) were also calculated

RESULTS

Patient Population

- A total of 21,060 patients with cancer were identified (**Figure 1**), of whom 1636 (7.8%) were positive for COVID-19 and 19,424 (92.2%) negative (**Table 1**)

Figure 1. Cohort Attrition



- Demographics and clinical characteristics were fairly well balanced prior to matching between COVID-19–negative and COVID-19–positive patients (**Table 1**)

Table 1. Baseline Characteristics

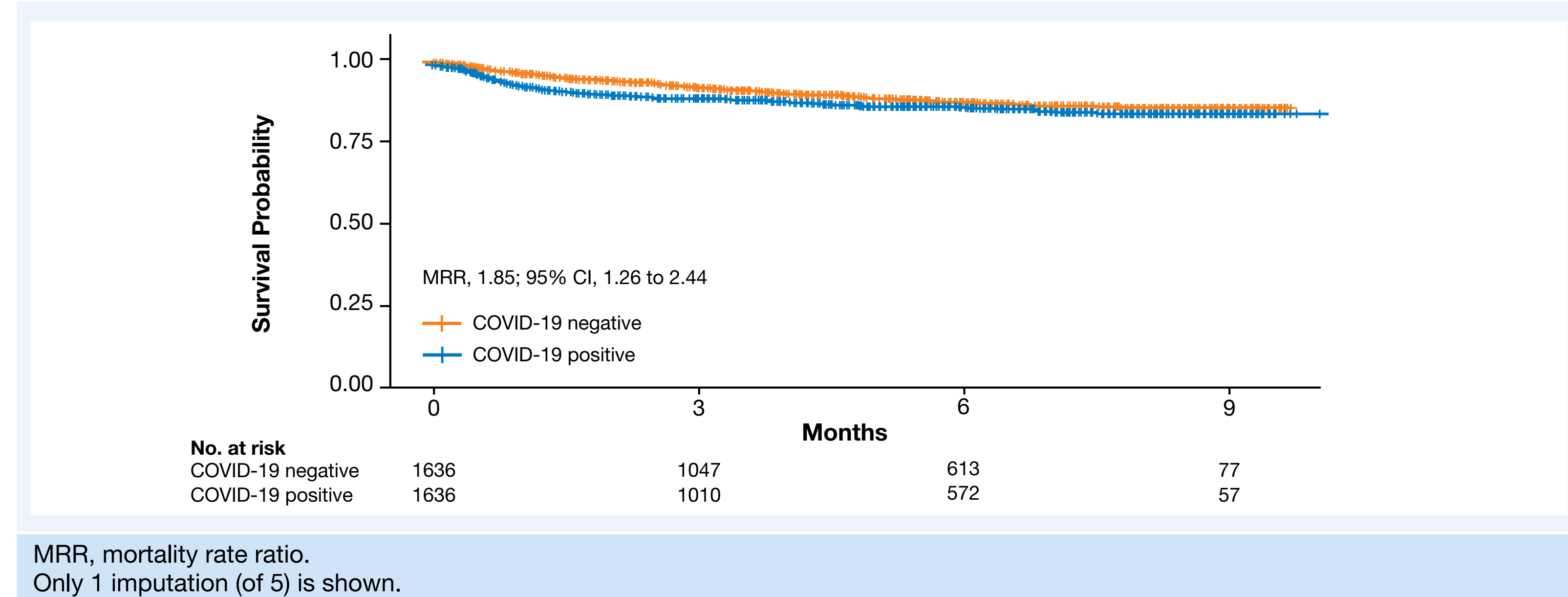
Characteristic, n (%)	COVID-19 Negative (N=19,424)	COVID-19 Positive (N=1636)
Age at first COVID-19 result, years		
<55	5183 (27)	490 (30)
55-64	5073 (26)	394 (24)
65-74	5231 (27)	416 (25)
≥75	3937 (20)	336 (21)
Male*	7116 (37)	548 (34)
COVID-19 setting[†]	n=13,044	n=1389
Ambulatory	6273 (48)	631 (45)
Inpatient	3749 (29)	480 (35)
Other	3022 (23)	278 (20)
Overweight or obese	14,329 (74)	1295 (79)
Smoking status[‡]	n=19,139	n=1612
Never smoked	8551 (45)	848 (53)
Previously smoked	8105 (42)	640 (40)
Current smoker	2483 (13)	124 (7.7)
CCI score		
0-2	9583 (49)	887 (54)
≥3	9841 (51)	749 (46)
Metastatic solid tumor	7984 (41)	540 (33)
Time since first cancer diagnosis, years		
0-1	5505 (28)	322 (20)
1-5	9702 (50)	910 (56)
5-10	3501 (18)	347 (21)
10+	716 (3.7)	57 (3.5)
Anticancer treatment		
Antibody-drug conjugate	186 (1.0)	9 (0.6)
Chemotherapy	7968 (41)	528 (32)
Hormone therapy	6883 (35)	682 (42)
Immunotherapy	2132 (11)	145 (8.9)
Targeted therapy, biologic	2707 (14)	201 (12)
Targeted therapy, nonbiologic	2686 (14)	243 (15)

CCI, Charlson Comorbidity Index.
Not shown: cancer type, region, insurance status, month/year of index.
*COVID-19 negative, n=19,419; COVID-19 positive, n=1635.
†The number of patients with non-missing values is denoted with n=XXX.

Mortality Risk

- We did not detect a statistically significant difference in the risk of 30-day mortality by COVID-19 status in our multivariable logistic regression model among 1636 pairs of matched COVID-19–positive and –negative patients (odds ratio [OR], 2.14; 95% CI, 0.71, 6.52); however, MRRs demonstrated a significantly increased risk of overall mortality (not limited to 30 days) among COVID-19–positive patients compared with COVID-19–negative patients (MRR, 1.85; 95% CI, 1.26, 2.44) (**Figure 2**)

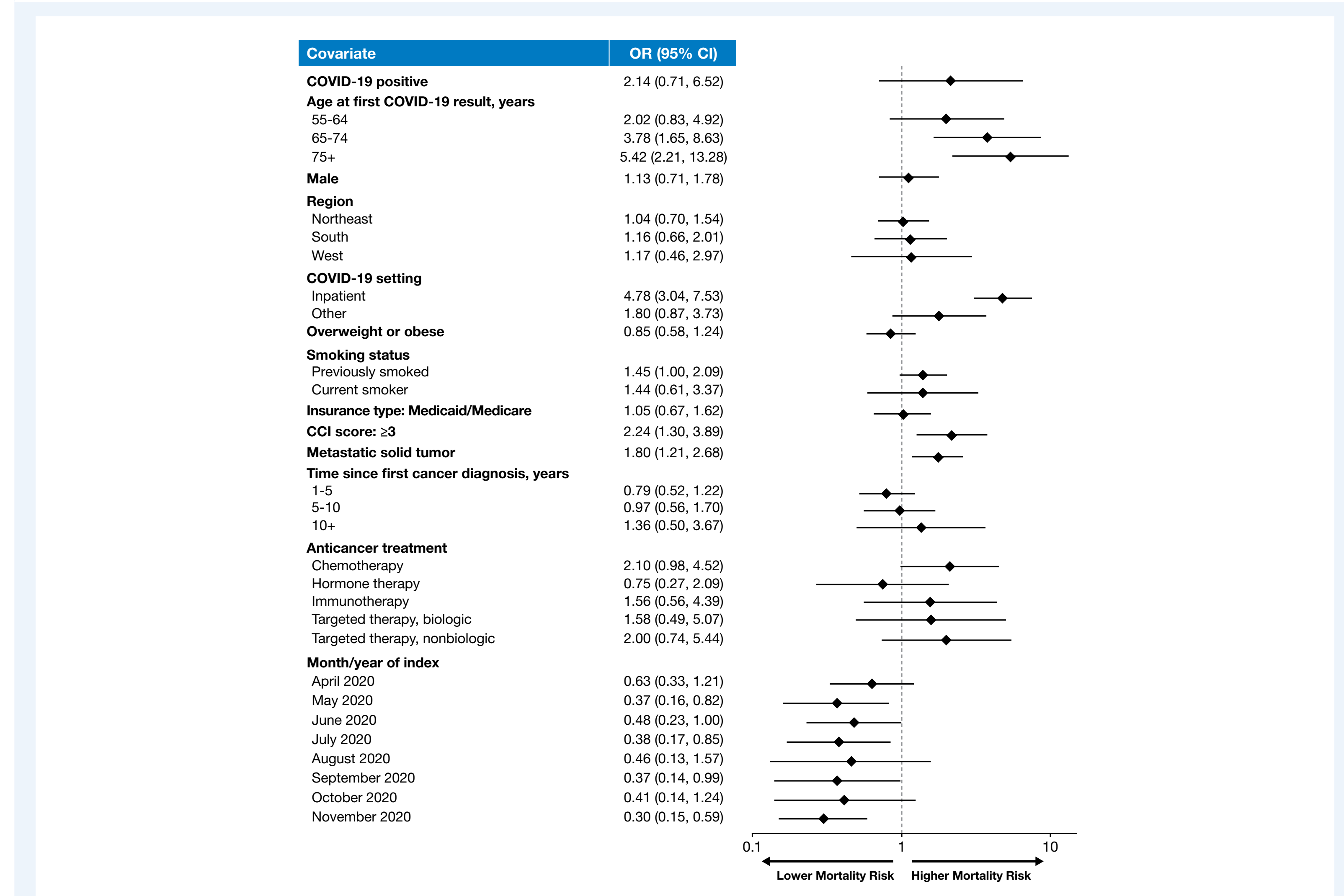
Figure 2. Overall Mortality Risk in Matched Pairs of COVID-19–Positive and –Negative Patients With Cancer



Predictors of Mortality Risk

- The strongest factors influencing 30-day mortality were age ≥75 years (OR, 5.42; 95% CI, 2.21, 13.28), inpatient COVID-19 testing/diagnosis (OR, 4.78; 95% CI, 3.04, 7.53), Charlson Comorbidity Index ≥3 (OR, 2.24; 95% CI, 1.30, 3.89), and metastatic disease (OR, 1.80; 95% CI, 1.21, 2.68) (**Figure 3A**)

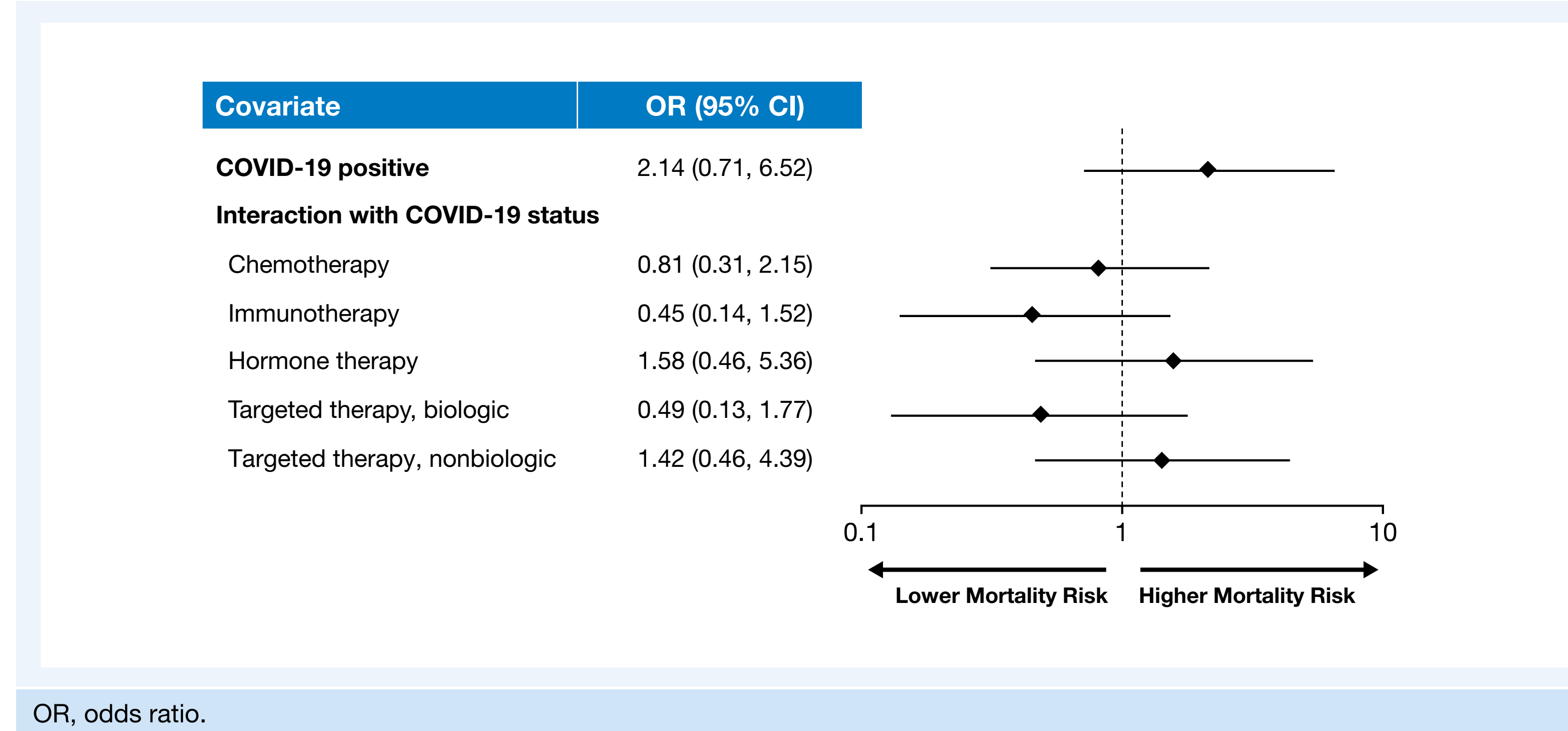
Figure 3A. OR Estimates for 30-Day Mortality by Variable From Multivariate Logistic Regression Models*



Anticancer Therapy and Mortality Risk

- Although our study found no significant interaction between therapy type and COVID-19 status (positive/negative) with respect to 30-day mortality (**Figure 3B**), we are unable to rule out potentially clinically relevant effects within the bounds of the 95% CIs for each interaction term

Figure 3B. OR Estimates for 30-Day Mortality by Variable From Multivariate Logistic Regression Models



CONCLUSIONS

- COVID-19 showed a trend toward an increased 30-day mortality risk and significantly increased the overall mortality risk not limited to a 30-day window
- Anticancer therapy did not appear to interact with COVID-19 status with respect to 30-day mortality, although clinically relevant effects could not be ruled out in our study

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AUTHOR DISCLOSURES

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