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A prognostic model of all-cause mortality at 30 days in patients with cancer and COVID-19

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ANNALS OF ONCOLOGY driving innovation in oncology

GENERAL INTEREST

500P The impact of COVID-19 on the management and outcome of oncology patients: The results of the Middle East and North African (MENA) COVID-19 and Cancer Registry (MCCR)

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Background: Despite extensive studies of the impact of COVID-19 on patients with cancer, there is a dearth of information from the MENA region. Our study aims to report pertinent MCCR findings on patient management and outcomes.

Methods: MCCR was adapted from ASCO COVID-19 Registry to collect data on patients with cancer and SARS-CoV-2 infection from 12 centers in eight countries including: Saudi Arabia, Jordan, Lebanon, Turkey, Egypt, Algeria, United Arab Emirates, and Morocco. The Registry included data on patients and disease characteristics, treatment, and patient outcomes.

Results: Between November 29, 2020 and December 7, 2021, data on 1345 patients were captured. Median age was 57 years (18-98), 56.1% females, and 27.1% were current or ex-smokers. Out of the 1144 patients (85.1%) with solid tumors, delays of planned treatment $>$ 14 days occurred in 81.4% for surgery, 51.7% for radiation therapy and 34.6% for drug therapy. No delays in surgery and radiation therapy occurred after June 1, 2020, and the delays of drug therapy were reduced from 20.8% to 5.2% ($P < 0.0001$). All-cause mortality at 30 and 90 days were 15.9% and 22.1%, respectively. All-cause mortality rates at 30 and 90 days were reduced after June 1st, 2020, from 17.3% to 3.7%, and from 24.2% to 3.7%, respectively ($P < 0.0001$). Univariate analysis showed multiple prognotic factors such as age $>$ 70 years, male gender, lung cancer vs other solid tumors, diagnosis of COVID-19 before June 2020, ever smokers, among others. The Multivariate Logistic Regression analysis results shown in Table.

Conclusions: Patients with cancer in MENA region experienced similar risks and outcome of COVID-19 reported in other populations. The reduction in mortality rate after June 2020 reflects a better approach to managing these patients resulting in improved outcome.

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501P A prognostic model of all-cause mortality at 30 days in patients with cancer and COVID-19

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Background: Patients with cancer are at higher risk of dying of COVID-19. Known risk factors for 30-day all-cause mortality (ACM-30) in patients with cancer are older age, sex, smoking status, performance status, obesity, and co-morbidities. We hypothesized that common clinical and laboratory parameters would be predictive of a higher risk of 30-day ACM, and that a machine learning approach (random forest) could produce high accuracy.

Methods: In this multi-institutional COVID-19 and Cancer Consortium (CCC19) registry study, 12,661 patients enrolled between March 17, 2020 and December 31, 2021 were utilized to develop and validate a model of ACM-30. ACM-30 was defined as death from any cause within 30 days of COVID-19 diagnosis. Pre-specified variables were: age, sex, race, smoking status, ECOG performance status (PS), timing of cancer treatment relative to COVID19 diagnosis, severity of COVID19, type of cancer, and other laboratory measurements. Missing variables were imputed using random forest proximity. Random forest was utilized to model ACM-30. The area under the curve (AUC) was computed as a measure of predictive accuracy with out-of-bag prediction. One hundred bootstrapped samples were used to obtain the standard error of the AUC.

Results: The median age at COVID-19 diagnosis was 65 years, 53% were female, 18% were Hispanic, and 16.7% were Black. Over half were never smokers and the median body mass index was 28.2. Random forest with under sampling selected 20 factors prognostic of ACM-30. The AUC was 88.9 (95% CI 88.5-89.2). Highly informative parameters included: COVID-19 severity at presentation, cancer status, age, troponin level, ECOG PS and body mass index.

Conclusions: This prognostic model based on readily available clinical and laboratory values can be used to estimate individual survival probability within 30-days for COVID-19. In addition, this model can be used to select or classify patients with cancer and COVID-19 into risk groups based on validated cut points, for treatment selection, prophylaxis prioritization, and/or enrollment in clinical trials. Future work

Table: 500P Multivariate logistic regression analysis of 30- and 90-days all-cause mortality (N = 1345 patients)

	30 Days All-Cause Mortality			90 Days All-Cause Mortality		
	OR	95% CI	P-value	OR	95% CI	P-value
Diagnosed after June 1, 2020 vs. before June 1, 2020*	0.251	0.095-0.663	0.005	0.125	0.047-0.328	<0.0001
On chemotherapy at diagnosis yes vs. no*	0.645	0.398-1.045	0.075	0.642	0.411-1.000	0.050
Stable Disease vs. Progressing disease*	0.244	0.132-0.451	<0.0001	0.185	0.108-0.319	<0.0001
Metastatic vs. Locoregional disease*	2.408	1.222-4.748	0.011	3.313	1.783-6.156	<0.0001
Comorbidities vs. no comorbidity*	1.732	1.067-2.813	0.026	1.799	1.150-2.814	0.010
Obesity vs. none*	0.716	0.444-1.155	0.171	0.591	0.381-0.915	0.018

* Reference group.

includes external validation using other large datasets of patients with COVID-19 and cancer.

Clinical trial identification: NCT04354701.

Legal entity responsible for the study: Vanderbilt University Medical Center.

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502P Association of immunotherapy and immunosuppression with severe COVID-19 disease in patients with cancer

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Background: Cytokine storm due to COVID-19 can cause high morbidity and mortality. Patients with cancer treated with immunotherapy (IO) and those with immunosuppression may have higher rates of cytokine storm due to immune dysregulation. We sought to evaluate the association of IO and immunosuppression with COVID-19 outcomes and cytokine storm occurrence among patients with cancer and COVID-19, based on data from the COVID-19 and Cancer Consortium (CCC19).

Methods: A registry-based retrospective cohort study was conducted on patients reported to the CCC19 registry from March 2020 to September 2021. The primary outcome was defined as an ordinal scale of COVID-19 severity. The secondary outcome was the occurrence of a cytokine storm using CCC19 variables, defined as biological and clinical evidence of severe inflammation, with end-organ dysfunction (Fajgenbaum D.C. et al., N Engl J Med., 2020). The association of IO or immunosuppression with the outcomes of interest were evaluated using a multivariable logistic regression balanced for covariate distributions through inverse probability of treatment weighting (IPTW).

Results: A total of 10,214 patients were included, among which 482 (4.7%) received IO, 3,715 (36.4%) received non-IO systemic therapies, and 6,017 (58.9%) were untreated in the 3 months prior to COVID-19 diagnosis. No difference in COVID-19 severity or the development of a cytokine storm was found in the IO group compared to the untreated group (aOR: 0.77; 95%CI:0.45-1.32, and aOR: 1.06; 95%CI:0.42-2.67, respectively). On multivariable analysis, baseline immunosuppression was associated with worse outcomes both in relation to COVID-19 severity (aOR: 1.89; 95%CI:1.51-2.35) and the presence of a cytokine storm (aOR: 1.75; 95%CI:1.30-2.35).

Conclusions: Administration of IO was not associated with severe outcomes in patients with cancer and COVID-19, whereas pre-existing baseline immunosuppression appears to be independently associated with worse clinical outcomes including cytokine storm.

Legal entity responsible for the study: COVID-19 and Cancer Consortium (CCC19).

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