correspondence

COVID-19 and Cancer: Lessons From a Pooled Meta-Analysis

TO THE EDITOR:

The coronavirus disease (COVID-19) pandemic continues, with more cases being reported in the United States over the last two weeks. The Centers for Disease Control and Prevention reports that most people in the United States will have little immediate risk of exposure to the virus.[1] However, as in other infectious diseases, people with compromised immune systems are at increased risk for COVID-19, which includes the 15,338,988 people with cancer and many more cancer survivors.[2]

Recently, Liang et al[3] reported a cancer prevalence of 1% (95% CI, 0.61% to 1.65%) among the 1,590 patient cases of COVID-19. This was higher compared with the overall cancer incidence of 0.29% in the Chinese population.[4] More importantly, patients with cancer had a higher risk of severe events (a composite end point defined as the percentage of patients who were admitted to the intensive care unit and required invasive ventilation or who died) compared with those without cancer (39% *v* 8%; hazard ratio (39% *v* 8%, HR: 5.34; 95% CI, 1.80 to 16.18; $P = .0026$). However, their analysis was limited by the sample size (only 18 patients with cancer). Despite this, their analysis is hypothesis generating, especially given the fact that inflammation and cytokine-associated lung injury play important roles in COVID-19.[5]

Therefore, the objective of our study was to obtain a pooled prevalence analysis of cancer among patients with COVID-19. We searched PubMed, Medline, and Web of Science databases until March 14, 2020, using text/word combinations. We limited the clinical studies to English language, full text, and humans only. The search strategy was constructed using terms including "COVID-19," "novel coronavirus," "SARS-CoV-2," "2019-nCov," and "cancer" or "neoplasm" or "tumor" or "malignancy." Clinical studies with ≥ 10 nonoverlapping patients undergoing COVID-19 treatment during hospitalization were considered eligible. We excluded studies from the same institutions and same timeframe, only including the study with the largest unique patient population.

Two reviewers (T.P. and S.S.) searched and selected the studies individually. The initial search with predefined limitations reported 276 articles, of which 266 were excluded because of duplication, review rather than study, or nonreported patient population. A total of 11 articles were selected meeting the qualifying criteria.[3,6-16] Any discrepancy was resolved by consensus and discussion with a coauthor (R.D.). Baseline clinical records, including demographics, pre-existing comorbidities, and outcomes, were extracted. Study outcomes included the pooled prevalence of cancer or malignancy.

We performed a meta-analysis using random-effects models to analyze the pooled prevalence of cancer among patients with COVID-19. The result was expressed as prevalence percentage with 95% CIs. Heterogeneity among studies was analyzed by the I^2 statistic, and $I^2 > 50\%$ was considered moderate heterogeneity. $P < .05$ was considered statistically significant.

We found that the overall pooled prevalence of cancer in patients with COVID-19 in these studies was 2.0% (95% CI, 2.0% to 3.0%; $I^2 = 83.2\%$). On further subgroup analysis based on sample size, we found that in studies with a sample size < 100, prevalence was slightly higher, at 3.0% (95% CI, 1.0% to 6.0%), but in larger studies, with a sample size > 100, we found a lower overall prevalence of 2.0% (95% CI, 1.0% to 3.0%; Fig 1). Despite these findings, our data are potentially limited by the retrospective nature of the studies used. However, taken together with previously published results, we found that patients with cancer and cancer survivors remain an important at-risk population for COVID-19.

In response to the COVID-19 pandemic, many major cancer centers have implemented policies such as screening all patients, staff, and providers for COVID-19 symptoms and travel history, minimizing follow-up visits and admissions, training staff in using personal protective equipment, engaging in telehealth and WebEx meetings, providing COVID-19 hotline and response teams, and placing restrictions on employee business travel.[17] ASCO recently released a COVID-19 clinical oncology FAQs document, which addresses some issues.[18] In addition to the above measures, ASCO further recommends home collection of routine laboratory samples and home infusion of chemotherapy drugs whenever possible.[18]

As the evidence continues to rise, we must strive to answer the unanswered clinical questions. We hope that additional data from China and Italy will provide information on the characteristics of patients with cancer at risk, type of cancers that confer higher risk, and systemic regimens that may increase COVID-19 infection complications.

Given that the limited data have shown a higher risk of clinically severe events for patients who underwent chemotherapy or surgery in the past month (75% *v* 43%),[3] several questions arise: Should we intentionally postpone adjuvant chemotherapy or elective surgery for patients with cancer with stable disease? Should we advise patients with cancer and survivors to use

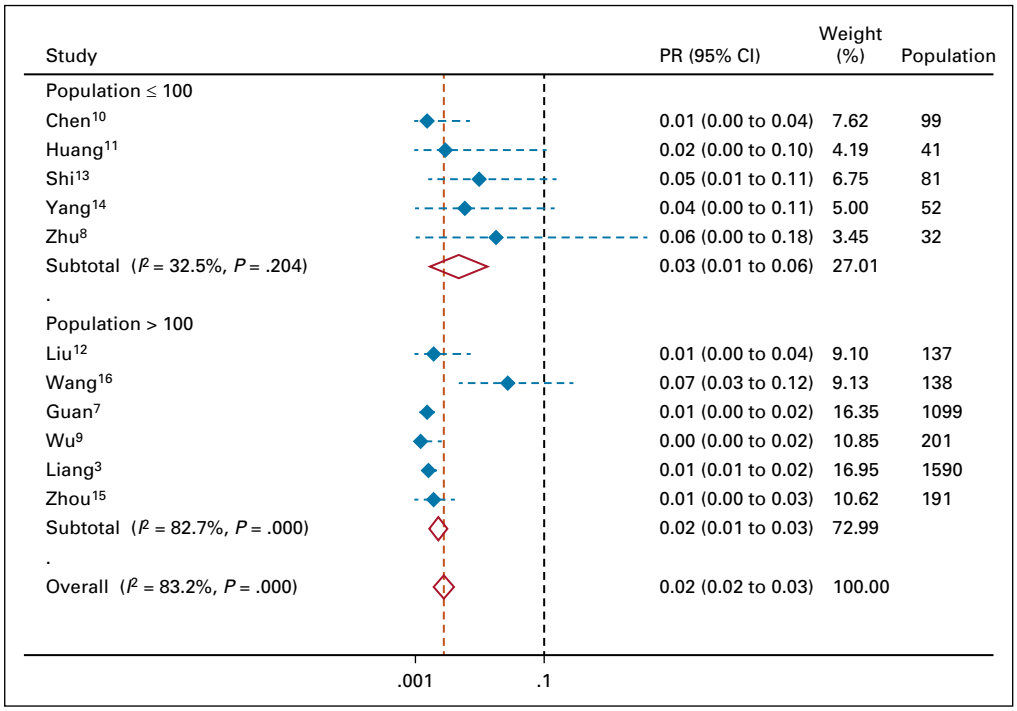

FIG 1. Random effects pooled prevalence of cancer among patients with COVID-19. PR, prevalence date.

stronger personal protection? Is there a role for online medical counseling or identification and treatment of critical patient cases of cancer? How should we deal with a potential delay in clinical trials if enforced quarantine complicates hospital attendance for appointments or continuity in care?

Currently, no evidence or recommendations exist regarding holding chemotherapy or immunotherapy or delaying adjuvant therapy or radiotherapy treatment in cancer patients.[18] Furthermore, no evidence currently indicates an increased risk of pneumonitis in patients receiving immunotherapy or radiotherapy.

Overall, current evidence on the association between cancer and COVID-19 remains inconclusive. However, we must give more intensive attention to patients with cancer, especially those undergoing bone marrow or stem cell transplantation, those with hematologic malignancies, and those receiving active treatment, given the higher risk. As we brace ourselves for the surge of COVID-19 cases in the United States, in addition to designing contingency plans and increasing intensive care unit beds, hospital space, and respirators, the common-sense epidemiologic concept of flattening the curve remains of prime importance to protect patients with cancer and cancer survivors.

Aakash Desai, MBBS, MPH
Department of Medicine, University of Connecticut, Farmington, CT

Sonali Sachdeva, MBBS
Department of Medicine, Lady Hardinge Medical College, New Delhi, India

Tarang Parekh, MBBS, MS
Department of Health Administration and Policy, George Mason University, Fairfax, VA

Rupak Desai, MBBS
Division of Cardiology, Atlanta VA Medical Center, Decatur, GA

CORRESPONDING AUTHOR

Aakash Desai, MBBS, MPH, University of Connecticut, 263 Farmington Ave, Farmington, CT 06030; Twitter: @ADesaiMD; e-mail: dr.aakashdesai@gmail.com.

AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

The following represents disclosure information provided by authors of this manuscript. All relationships are considered compensated unless otherwise noted. Relationships are self-held unless noted. I = Immediate Family Member, Inst = My Institution. Relationships may not relate to the subject matter of this manuscript. For more information about ASCO's conflict of interest policy, please refer to www.asco.org/rwc or ascopubs.org/go/site/misc/authors.html.

Open Payments is a public database containing information reported by companies about payments made to US-licensed physicians (Open Payments).

No potential conflicts of interest were reported.

REFERENCES

1. Centers for Disease Control and Prevention: Situation summary. https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/summary.html
2. National Cancer Institute: Surveillance, Epidemiology, and End Results Program. https://seer.cancer.gov/
3. Liang W, Guan W, Chen R, et al: Cancer patients in SARS-CoV-2 infection: A nationwide analysis in China. Lancet Oncol 21:335-337, 2020

4. Zheng RS, Sun KX, Zhang SW, et al: Report of cancer epidemiology in China, 2015 [in Chinese]. Zhonghua Zhong Liu Za Zhi 41:19-28, 2019
5. Xu Z, Shi L, Wang Y, et al: Pathological findings of COVID-19 associated with acute respiratory distress syndrome. Lancet Respir Med [epub ahead of print on February 18, 2020; Erratum: Lancet Respir Med (epub ahead of print on February 25, 2020)]
6. Chen Y, Jin YL, Zhu LJ, et al: The network investigation on knowledge, attitude and practice about novel coronavirus pneumonia of the residents in Anhui Province [in Chinese]. Zhonghua Yu Fang Yi Xue Za Zhi 54:E004, 2020
7. Guan WJ, Ni ZY, Hu Y, et al: Clinical characteristics of coronavirus disease 2019 in China. N Engl J Med [epub ahead of print on February 28, 2020]
8. Zhu W, Xie K, Lu H, et al: Initial clinical features of suspected coronavirus disease 2019 in two emergency departments outside of Hubei, China. J Med Virol [epub ahead of print on March 13, 2020]
9. Wu C, Chen X, Cai Y, et al: Risk factors associated with acute respiratory distress syndrome and death in patients with coronavirus disease 2019 pneumonia in Wuhan, China. JAMA Intern Med [epub ahead of print on March 13, 2020]
10. Chen N, Zhou M, Dong X, et al: Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: A descriptive study. Lancet 395:507-513, 2020
11. Huang C, Wang Y, Li X, et al: Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 395:497-506, 2020 [Erratum: Lancet 395:496, 2020]
12. Liu K, Fang YY, Deng Y, et al: Clinical characteristics of novel coronavirus cases in tertiary hospitals in Hubei Province. Chin Med J (Engl) [epub ahead of print on February 7, 2020]
13. Shi H, Han X, Jiang N, et al: Radiological findings from 81 patients with COVID-19 pneumonia in Wuhan, China: A descriptive study. Lancet Infect Dis [epub ahead of print on February 24, 2020]
14. Yang X, Yu Y, Xu J, et al: Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: A single-centered, retrospective, observational study. Lancet Respir Med [epub ahead of print on February 24, 2020; Erratum: Lancet Respir Med (epub ahead of print on February 28, 2020)]
15. Zhou F, Yu T, Du R, et al: Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: A retrospective cohort study. Lancet [epub ahead of print on March 11, 2020; Erratum: Lancet (epub ahead of print on March 12, 2020)]
16. Wang D, Hu B, Hu C, et al: Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. JAMA [epub ahead of print on February 7, 2019]
17. Pergam S, Pisters PWT, Platanias L: Is your cancer center ready for COVID-19? https://cancerletter.com/articles/20200313_3/
18. American Society of Clinical Oncology: ASCO coronavirus resources. https://www.asco.org/asco-coronavirus-information

DOI: https://doi.org/10.1200/GO.20.00097; published at ascopubs.org/journal/go on April 6, 2020.