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BRIEF REPORT

# Examining reporting and representation of patients with cancer in COVID-19 clinical trials

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## Abstract

**Background:** Patients with cancer are particularly vulnerable in the current COVID-19 pandemic. Emerging evidence suggests that patients with a cancer diagnosis are three times more likely to die from COVID-19 compared to non-cancer patients. Due to these observed risks, it is critical that emerging COVID-19 therapies demonstrate safety and efficacy among patients with cancer.

**Aim:** This study sought to examine reporting and representation of patients with cancer among published COVID-19 treatment-related research studies.

**Methods and results:** All published COVID-19 treatment-related clinical research studies published from March 1 to August 20, 2020 recruiting from North America and Europe were identified. The date published, study design, therapeutics studied, and study population were evaluated. Of the 343 studies identified through initial search and researcher knowledge, 55 (16%) reported on COVID-19 treatments. Twenty-one COVID-19 therapeutic studies (n = 15, prospective; n = 6, retrospective) that recruited from the United States and Europe were identified. Among these studies, eight (38%) reported on the number of trial participants with a cancer diagnosis in the publication and two (10%) specified tumor type. Four of the studies (19%) did not collect cancer history. Among studies where cancer history was available, patients with a cancer diagnosis participated at a proportion higher than overall cancer prevalence and greater than the known proportion of COVID-19 patients with cancer.

**Conclusion:** This study observed that cancer history was not uniformly collected or reported among published COVID-19 therapeutic studies. Among reported publications, we observed that patients with a cancer diagnosis were generally overrepresented. However, patients with a cancer diagnosis were notably underrepresented in outpatient COVID-19 therapeutic studies.

KEYWORDS
cancer, clinical research participants, clinical trials, COVID-19, disparities

## 1 | INTRODUCTION

A large number of clinical trials testing a broad variety of interventions to treat SARS-CoV-2 infected patients have been reported since the onset of the global COVID-19 pandemic. In studies reported from the United States, the characteristics of study participants in COVID-19 treatment trials often do not reflect the distribution of the COVID-19 disease burden among the general population. In particular, racial and ethnic minorities face higher infection and mortality rates from COVID-19[1] yet are underrepresented in COVID-19 therapeutic clinical research.[2] It is not known if other vulnerable populations, such as patients with a cancer diagnosis, are also underrepresented in these trials. The inclusion of cancer patients in COVID-19 therapeutic trials is of importance, as cancer patients may develop cancer- or treatment-related symptoms that may influence a clinician's ability to diagnose COVID-19.[3] Furthermore, cancer treatments may also increase the risk of severe respiratory symptoms that can be seen with SARS-CoV-2 infection.[4]

Due to the potential additional risks associated with SARS-CoV-2 infection among patients with a cancer diagnosis, inclusion of patients with a cancer diagnosis in clinical trials testing COVID-19 therapeutic interventions is essential. This study sought to examine the extent to which COVID-19 therapeutic clinical trials have reported on the comorbidity of cancer diagnosis and, when available, achieved representation among participants.

## 2 | METHODS

COVID-19 treatment-related clinical research studies published from March 1 to August 20, 2020 were identified by searching "COVID-19 drug therapy" on PubMed and searching "COVID-19" using the Clinical Query filter. As shown in Figure 1, 343 articles were identified through initial search and researcher knowledge. Fifty-five of these (16%) reported on COVID-19 treatments. Twenty-one COVID-19 therapeutic studies (n = 15, prospective; n = 6, retrospective) were identified that recruited from the United States and Europe were identified. The date published, study design, treatment studied, eligibility criteria, the primary endpoint, study site, sample size, and the number of participants with a cancer diagnosis and their tumor types were noted for each eligible study. Investigators contacted all first authors of published studies seeking to identify the number of patients with a cancer diagnosis included in the sample and their tumor types, if not published. A univariate statistical descriptive analysis was employed.

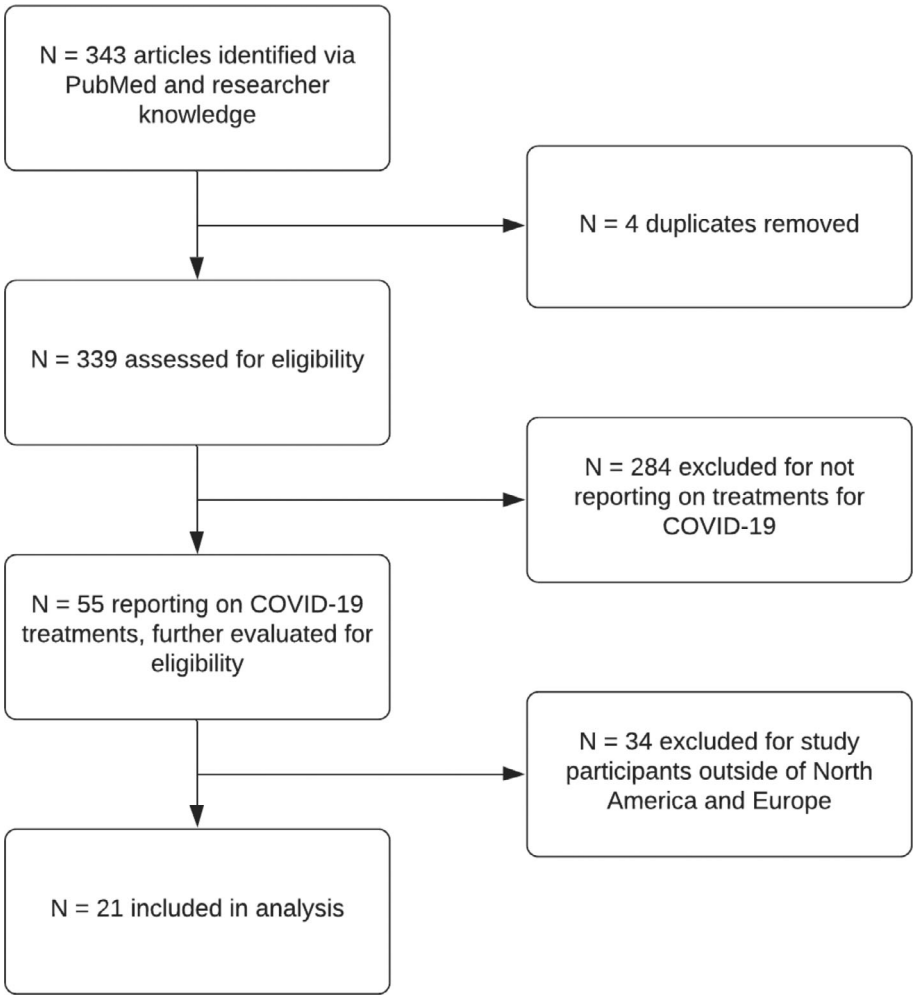


**FIGURE 1** CONSORT diagram of COVID-19 treatment studies in North America and Europe

**TABLE 1** Cancer patients in COVID-19 clinical studies

| Treatment | Design | Setting | Primary endpoint | Total (N) | Cancer (N) | Tumor type | Location |
|---|---|---|---|---|---|---|---|
| Remdesivir[5] | Prospective | Inpatient | Change in clinical status | 35 | 1 (2.9%) | Breast[a] | Europe (Luigi Sacco Hospital, Milan, Italy) |
| Colchicine[6] | Prospective | Inpatient | High-sensitivity cardiac troponin level and C-reactive protein; change in clinical status | 105 | Unknown | | Europe (16 tertiary care hospitals, Greece) |
| Hydroxychloroquine and azithromycin[7] | Retrospective | Inpatient | Change in clinical status, contagiousness | 80 | 5 (6.3%) | Unknown | Europe (University Hospital Institute Méditerranée Infection, Marseille, France) |
| Auxora (a novel CRAC channel inhibitor)[8] | Prospective | Inpatient | Change in clinical status | 30 | 1 (3.3%)[a] | Hairy cell leukemia[a] | North America (California, Michigan, Minnesota, Texas, and Virginia, USA) |
| Hydroxychloroquine[9] | Prospective | Outpatient | Reduction of viral RNA load; change in clinical status | 293 | 1 (0.3%)[a] | Breast[a] | Europe (Catalonia, Spain) |
| Convalescent Plasma[10] | Prospective | Inpatient | Change in clinical status | 10 | 0[a] | N/A | North America (Centro de Hematología y Medicina Interna, of the Clínica Ruiz, Puebla, Mexico) |
| Hydroxychloroquine and tocilizumab[11] | Retrospective | Inpatient | Change in clinical status | 176 | Unknown | | North America (Abington Hospital—Jefferson Health, Pennsylvania, USA) |
| Inhibition of bruton tyrosine kinase[12] | Prospective | Inpatient | Change in clinical status | 19 | 2 (10.5%) | Prostate, CLL | North America (USA) |
| Hydroxychloroquine[13] | Prospective | Outpatient | Change in clinical status | 423 | Not collected[a] | | North America (multisite, USA, Canada) |
| Low-dose tocilizumab[14] | Prospective | Inpatient | Fever resolution and CRP response | 32 | 1 (3.1%)[a] | CLL[a] | North America (University of Chicago, Illinois, USA) |
| Anticoagulation prior to infection[15] | Retrospective | Inpatient and outpatient | All cause mortality | 3772 | Not collected[a] | | North America (Mount Sinai, New York City, New York, USA) |
| Enhanced platelet inhibition[16] | Prospective | Inpatient | Change in PaO2, PaO2/FiO2 ratio and alveolar-arterial oxygen (A-a O2) gradient | 10 | 1 (10%) | Rectal (successfully treated 6 y prior) | Europe (Intermediate Respiratory Care Unit of L. Sacco University Hospital, Milano, Italy) |
| Ruxolitinib[17] | Retrospective | Inpatient | CIS reduction | 14 | 1 (7.1%)[a] | Lung[a] | Europe (Schwarzwald–Baar–Klinikum Villingen-Schwenningen, Germany) |
| Hyperimmune plasma[18] | Prospective | Inpatient | 7 days mortality rate | 46 | 7 (16%) | Unknown | Europe (Two university hospitals and one general hospital in Northern Italy) |
| Remdesivir[19] | Prospective | Inpatient | Time to recovery | 1059 | 71 (7.7%) | Not collected[a] | Multisite (73 sites in USA, Denmark, UK, Greece, Germany, Korea, Mexico, Spain, Japan, and Singapore) |

(Continues)

**TABLE 1** (Continued)

| Treatment | Design | Setting | Primary endpoint | Total (N) | Cancer (N) | Tumor type | Location |
|---|---|---|---|---|---|---|---|
| Hydroxychloroquine as postexposure prophylaxis[20] | Prospective | Outpatient | Incidence of Covid-19 within 14 days | 821 | 1 (0.2%) | Not collected[a] | North America (Minneapolis, Minnesota, USA, and Montreal, Quebec, Canada) |
| Hydroxychloroquine and azithromycin[21] | Prospective | Inpatient | Presence/absence of virus | 36 | Unknown | | Europe (Marseille, Nice, Avignon, and Briancon centers, South France) |
| Hydroxychloroquine[22] | Retrospective | Inpatient | Time from study baseline to intubation or death | 1376 | 176 (12.8%) | 30 different tumor types[a] | North America (NYP-CUIMC, New York, USA) |
| Remdesivir[23] | Prospective | Inpatient | Change in clinical status | 53 | Not collected[a] | | Multisite (22 subjects in the United States, 22 in Europe or Canada, and 9 in Japan) |
| Hydroxychloroquine with or without concomitant azithromycin[24] | Retrospective | Inpatient | Change in QT interval | 90 | Not collected[a] | | North America (Boston, Massachusetts, USA) |
| Remdesivir[25] | Prospective | Inpatient | Change in clinical status | 397 | Unavailable[a] | | Multisite (55 hospitals in the USA, Italy, Spain, Germany, Hong Kong, Singapore, South Korea, and Taiwan) |

[a]Cancer and tumor type information captured by contacting study's corresponding author.

## 3 | RESULTS

As shown in Table 1, there have been 21 COVID-19 therapeutic studies (n = 7, randomized clinical trial; n = 5, single arm; n = 6, observational; n = 3, compassionate use) published to date with participants in North America and Europe. Thirty-eight percent (n = 8) reported the number of trial participants with a cancer diagnosis in the publication. Two of those publications specified the type of malignancy. Investigators were able to obtain the number of patients with cancer included in five additional studies by contacting authors directly, of which four also shared data on tumor type. Four first authors confirmed that cancer history information was not collected for their published studies. Two of the studies reported the number of participants with cancer but did not collect data on tumor type. Investigators were unable to determine the existence of cancer data beyond that which was published for five of the studies. Of the studies for which data were available, 6.2% of study participants carried a cancer diagnosis.

Patients with a cancer diagnosis comprised a small subset of COVID-19 clinical research participants. An average of 5% of study participants in North America, 7.1% of study participants in Europe, and 7.7% of multisite study participants had a cancer diagnosis. Figure 2A summarizes the distribution of cancer patients across the studies surveyed and compares it with the reported cancer prevalence in those populations. The cancer prevalence is 5.34% in North America and 1.92% in Europe, an average of 3.63% across all study sites included in our analysis.[26] Patients with cancer are underrepresented in COVID-19 clinical research studies in North America (5% of study participants vs 5.34% cancer prevalence). However, patients with a cancer diagnosis were overrepresented in Europe (7.1% of study participants vs 1.92% cancer prevalence) and multisite studies (7.7% of study participants vs 3.63% cancer prevalence). In a meta-analysis of 32 studies involving 46 499 COVID-19 patients, 3.82% (1776 patients) had cancer.[27] Figure 2B illustrates that patients with cancer were overrepresented in both prospective (5.4%) and retrospective (8.73%) studies based on the overall percentage of COVID-19 patients with cancer (3.82%). While patients with cancer were overrepresented in inpatient studies (7.24%), as shown in Figure 2C, they were significantly underrepresented in outpatient studies (0.25%).

## 4 | DISCUSSION

The potential impact of a cancer diagnosis on COVID-19 outcomes, and conversely the impact of SARS-CoV-2 infection on cancer outcomes, underscores the importance of inclusion of cancer patients in COVID-19 therapeutic trials. Achieving full representation of patients with cancer in COVID-19 therapeutic trials would provide stronger safety and efficacy data among these vulnerable patients.

This study demonstrates that cancer history is inconsistently collected and reported among COVID-19 therapeutic research studies, as only 38% of the studies analyzed reported the number of participants with a cancer diagnosis. While patients carrying a cancer

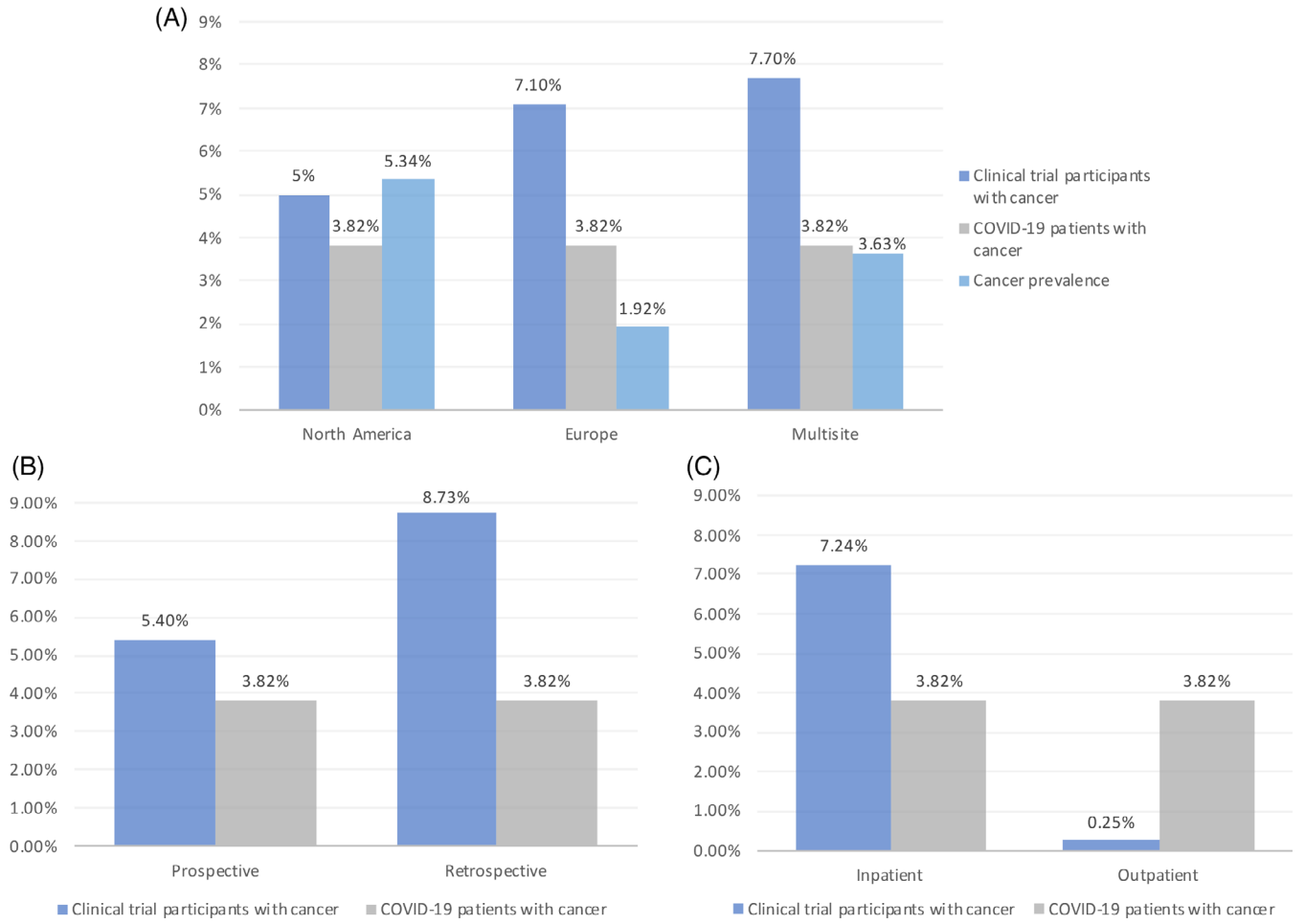


**FIGURE 2** Comparison of representation of patients with cancer diagnosis by: (A) Regional comparison (North America vs Europe vs Multisite); (B) Study design comparison (prospective vs retrospective); (C) Study clinical setting comparison (inpatient vs outpatient)

diagnosis were generally overrepresented in COVID-19 therapeutic studies, they were notably underrepresented in outpatient studies as only 0.25% of participants in outpatient COVID-19 therapeutic studies had a cancer diagnosis.

Patients with cancer are more susceptible to infection than those without cancer due to immunosuppression caused by malignancy and/or anticancer treatments.[28] In general, patients with cancer seem to be at a higher risk both of being infected with SARS-CoV-2, and if infected, of becoming severely ill. Thirty-six point 5 % of COVID-19 patients with cancer reach a critical/severe status compared to 19% of the general COVID-19 population.[29] An early analysis from China reported that 1% of COVID-19 patients had a history of cancer, an incidence higher than that of cancer in the general Chinese population (0.29%). These patients suffered severe events—defined as requiring mechanical ventilation or death—during their COVID-19 illness at a rate 3.5 times that of the general population.[30] Overall, patients with cancer have an increased risk of all severe outcomes from COVID-19, including ICU admission, developing severe symptoms, requiring mechanical ventilation, and death.[31] Furthermore, patients with cancer in China experienced a fatality rate from COVID-19 of 28.6%,[32] compared to the overall COVID-19 fatality rate in China of 2.3%.[33] A review of publications on the impact of COVID-19 on patients with cancer worldwide found reported mortality rates among patients with cancer range from 9% to 33.3%, compared to an overall 3% to 6% fatality rate.[34] One recent study found that patients with cancer and COVID-19 face an increased likelihood of in-hospital death compared to COVID-19 patients without cancer (31.7% vs 20.0%, respectively).[35] Additionally, an early report of COVID-19 fatalities in Italy found that patients with active cancer accounted for 20.3% of the deceased.[36] Thus, the overrepresentation of patients with cancer in inpatient studies likely reflects the higher likelihood of hospitalization in COVID-19 patients with cancer. Since most of the studies analyzed (18 of 21) included hospitalized participants, this may also explain the overall overrepresentation of patient with cancer in COVID-19 clinical research studies.

Given this vulnerability, it is even more important to carefully consider the treatment of patients with cancer during the COVID-19 pandemic. Any treatment must be based on a discussion of the risks and benefits with the patient per recently published European and American guidelines.[37,38]

Although it is clear that patients with a cancer diagnosis are particularly vulnerable to COVID-19 and that cancer pathology may

affect COVID-19 illness, only one trial included in this study published a stratified analysis detailing the differences in treatment outcome in patients with cancer. Considering the unique relationship between COVID-19 and cancer, it is especially important that the effects of potential COVID-19 treatments be analyzed in patients with cancer.

Eligibility criteria for participation in COVID-19 therapeutic trials are not consistent across clinical research studies. Patients with a cancer diagnosis were systematically excluded from several of the published studies reviewed due to immunosuppressed status as a result of concurrent medications. Notably, two of the three outpatient trials analyzed excluded patients receiving active cancer treatment. This exclusion likely contributed to the observed underrepresentation of patients with a cancer diagnosis in outpatient trials. While this exclusion may be appropriate given potential interactions between antiviral therapeutics and antineoplastic agents, it limits the ability to draw conclusions in this group of patients.

The limitations of this study include the small sample size and the diversity in study designs assessed. Only 21 clinical research studies were assessed. Over twice as many were excluded based on geography. While this exclusion is a significant limitation, we chose to select studies only from North America and Europe because the methodology for determining cancer prevalence and, as a result, its accuracy, varies widely. For this first analysis, we thus intentionally selected studies from North America and Europe, which have reasonably homogenous cancer reporting processes. Furthermore, this analysis included a variety of study designs, both prospective and retrospective. We pooled articles without regard for their heterogeneity, allowing the possibility of inaccurate conclusions from combining dissimilar studies. Additionally, the rush to find COVID-19 treatments also has meant that many trials are not developed, conducted, and analyzed as rigorously as usual.[39] New research on COVID-19 therapeutics is published daily, making it difficult to capture an up-to-date portrait of study participants worldwide. We employed a search in the PubMed database in order to render clinical-relevant literature. However, this research approach leads to potential bias toward US-based studies.

The exclusion and subsequent underrepresentation of patients with a cancer diagnosis in outpatient studies of COVID-19 therapeutics is concerning, given the vulnerability of patients with cancer to COVID-19. Developing safe and effective outpatient treatments for COVID-19 that prevent hospitalization is critical in reducing death rates,[40] so this underrepresentation of patients with a cancer diagnosis, particularly in outpatient COVID-19 clinical studies, is of concern. Inadequate evaluation of potential outpatient therapies in patients with cancer may result in less effective treatments since the SARS-CoV-2 virus, COVID-19 illness, and potential treatments may be affected by cancer pathology and treatments. To date, there are 135 outpatient COVID-19 clinical trials recruiting in North America and Europe.[41] It is important that these trials include a significant proportion of patients with a cancer diagnosis and that all COVID-19 clinical trials report a stratified analysis of their results focused on their participants with a cancer diagnosis.

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## CONFLICTS OF INTEREST

The authors have stated explicitly that there are no conflicts of interest in connection with this article.

## AUTHOR CONTRIBUTIONS

*Conceptualization*, M.R., H.B.; *Data Curation*, M.R., P.T., H.B.; *Investigation*, M.R.; *Supervision*, S.Z., E.J.S., H.B.; *Visualization*, M.R.; *Writing-Original Draft*, H.B.; *Writing-Original Draft*, M.R.; *Writing-Review & Editing*, C.W., S.Z., E.J.S., H.B.

## ETHICAL APPROVAL

All study procedures received institutional ethical approval.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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## REFERENCES

1. Webb Hooper M, Nápoles AM, Pérez-Stable EJ. COVID-19 and racial/ethnic disparities. *JAMA*. 2020;323(24):2466-2467. https://doi.org/10.1001/jama.2020.8598.
2. Borno HT, Zhang S, Gomez S. COVID-19 disparities: an urgent call for race reporting and representation in clinical research. *Contemp Clin Trials Commun*. 2020;19:100630. https://doi.org/10.1016/j.conctc.2020.100630.
3. Miaskowski C, Paul SM, Snowberg K, et al. Oncology patients' perceptions of and experiences with COVID-19. *Support Care Cancer*. 2020;1-10. https://doi.org/10.1007/s00520-020-05684-7.
4. Lee LY, Cazier JB, Angelis V, et al. COVID-19 mortality in patients with cancer on chemotherapy or other anticancer treatments: a prospective cohort study [published correction appears in Lancet. 2020 Aug 22;396(10250):534]. *Lancet*. 2020;395(10241):1919-1926. https://doi.org/10.1016/S0140-6736(20)31173-9.
5. Antinori S, Cossu MV, Ridolfo AL, et al. Compassionate remdesivir treatment of severe Covid-19 pneumonia in intensive care unit (ICU) and Non-ICU patients: clinical outcome and differences in post-treatment hospitalisation status. *Pharmacol Res*. 2020;158:104899. https://doi.org/10.1016/j.phrs.2020.104899.
6. Deftereos SG, Giannopoulos G, Vrachatis DA, et al. Effect of colchicine vs standard care on cardiac and inflammatory biomarkers and clinical outcomes in patients hospitalized with coronavirus disease 2019: the GRECCO-19 randomized clinical trial. *JAMA Netw Open*. 2020;3(6):e2013136. https://doi.org/10.1001/jamanetworkopen.2020.13136.
7. Gautret P, Lagier JC, Parola P, et al. Clinical and microbiological effect of a combination of hydroxychloroquine and azithromycin in 80 COVID-19 patients with at least a six-day follow up: a pilot observational study. *Travel Med Infect Dis*. 2020;34:101663. https://doi.org/10.1016/j.tmaid.2020.101663.

8. Miller J, Bruen C, Schnaus M, et al. Auxora versus standard of care for the treatment of severe or critical COVID-19 pneumonia: results from a randomized controlled trial. *Crit Care*. 2020;24(1):502. https://doi.org/10.1186/s13054-020-03220-x.
9. Mitjà O, Corbacho-Monné M, Ubals M, et al. Hydroxychloroquine for early treatment of adults with mild Covid-19: a randomized-controlled trial. *Clin Infect Dis*. 2020;ciaa1009. https://doi.org/10.1093/cid/ciaa1009.
10. Olivares-Gazca JC, Priesca-Marín JM, Ojeda-Laguna M, et al. Infusion of convalescent plasma is associated with clinical improvement in critically Ill patients with COVID-19: a pilot study. *Rev Invest Clin*. 2020;72(3):159-164. https://doi.org/10.24875/RIC.20000237.
11. Roomi S, Ullah W, Ahmed F, et al. Efficacy of hydroxychloroquine and tocilizumab in patients with COVID-19: single-center retrospective chart review. *J Med Internet Res*. 2020;22(9):e21758. https://doi.org/10.2196/21758.
12. Roschewski M, Lionakis MS, Sharman JP, et al. Inhibition of Bruton tyrosine kinase in patients with severe COVID-19. *Sci Immunol*. 2020;5(48):eabd0110. https://doi.org/10.1126/sciimmunol.abd0110.
13. Skipper CP, Pastick KA, Engen NW, et al. Hydroxychloroquine in nonhospitalized adults with early COVID-19: a randomized trial. *Ann Intern Med*. 2020;173(8):623-631. https://doi.org/10.7326/M20-4207.
14. Strohbehn GW, Heiss BL, Rouhani SJ, et al. COVIDOSE: low-dose tocilizumab in the treatment of Covid-19. *medRxiv*. 2020;2020:20157503. https://doi.org/10.1101/2020.07.20.20157503.
15. Tremblay D, van Gerwen M, Alsen M, et al. Impact of anticoagulation prior to COVID-19 infection: a propensity score-matched cohort study. *Blood*. 2020;136(1):144-147. https://doi.org/10.1182/blood.2020006941.
16. Viecca M, Radovanovic D, Forleo GB, Santus P. Enhanced platelet inhibition treatment improves hypoxemia in patients with severe Covid-19 and hypercoagulability. A case control, proof of concept study. *Pharmacol Res*. 2020;158:104950. https://doi.org/10.1016/j.phrs.2020.104950.
17. La Rosée F, Bremer HC, Gehrke I, et al. The Janus kinase 1/2 inhibitor ruxolitinib in COVID-19 with severe systemic hyperinflammation. *Leukemia*. 2020;34(7):1805-1815. https://doi.org/10.1038/s41375-020-0891-0.
18. Perotti C, Baldanti F, Bruno R, et al. Mortality reduction in 46 severe Covid-19 patients treated with hyperimmune plasma. A proof of concept single arm multicenter trial. *Haematologica*. 2020;105:261784. https://doi.org/10.3324/haematol.2020.261784.
19. Beigel JH, Tomashek KM, Dodd LE, et al. Remdesivir for the Treatment of Covid-19-preliminary report. *N Engl J Med*. 2020;383:1813-1826. https://doi.org/10.1056/NEJMoa2007764.
20. Boulware DR, Pullen MF, Bangdiwala AS, et al. A Randomized Trial of Hydroxychloroquine as Postexposure Prophylaxis for Covid-19. *N Engl J Med*. 2020;383(6):517-525. https://doi.org/10.1056/NEJMoa2016638.
21. Gautret P, Lagier JC, Parola P, et al. Hydroxychloroquine and azithromycin as a treatment of COVID-19: results of an open-label non-randomized clinical trial. *Int J Antimicrob Agents*. 2020;56(1):105949. https://doi.org/10.1016/j.ijantimicag.2020.105949.
22. Geleris J, Sun Y, Platt J, et al. Observational Study of Hydroxychloroquine in Hospitalized Patients with Covid-19. *N Engl J Med*. 2020;382(25):2411-2418. https://doi.org/10.1056/NEJMoa2012410.
23. Grein J, Ohmagari N, Shin D, et al. Compassionate use of remdesivir for patients with severe Covid-19. *N Engl J Med*. 2020;382(24):2327-2336. https://doi.org/10.1056/NEJMoa2007016.
24. Mercuro NJ, Yen CF, Shim DJ, et al. Risk of QT interval prolongation associated with use of hydroxychloroquine with or without concomitant azithromycin among hospitalized patients testing positive for coronavirus disease 2019 (COVID-19). *JAMA Cardiol*. 2020;5:e201834. https://doi.org/10.1001/jamacardio.2020.1834.
25. Goldman JD, Lye DCB, Hui DS, et al. Remdesivir for 5 or 10 days in patients with severe Covid-19. *N Engl J Med*. 2020;383:1827-1837. https://doi.org/10.1056/NEJMoa2015301.
26. Global Burden of Disease Study 2017 (GBD). (2017). Data Resources. *GHDx*, 2018. http://ghdx.healthdata.org/gbd-2017. Accessed September 8, 2020.
27. Giannakoulis VG, Papoutsi E, Siempos II. Effect of cancer on clinical outcomes of patients with COVID-19: a meta-analysis of patient data. *JCO Glob Oncol*. 2020;6:799-808. https://doi.org/10.1200/GO.20.00225.
28. Penn I, Starzl TE. Immunosuppression and cancer. *Transplant Proc*. 1973;5(1):943-947.
29. Yang F, Shi S, Zhu J, Shi J, Dai K, Chen X. Clinical characteristics and outcomes of cancer patients with COVID-19. *J Med Virol*. 2020;92:2067-2073. https://doi.org/10.1002/jmv.25972.
30. Liang W, Guan W, Chen R, et al. Cancer patients in SARS-CoV-2 infection: a nationwide analysis in China. *Lancet Oncol*. 2020;21:335-337. https://doi.org/10.1016/S1470-2045(20)30096-6.
31. Dai M, Liu D, Liu M, et al. Patients with cancer appear more vulnerable to SARS-CoV-2: a multicenter study during the COVID-19 outbreak. *Cancer Discov*. 2020;10(6):783-791. https://doi.org/10.1158/2159-8290.CD-20-0422.
32. Zhang L, Zhu F, Xie L, et al. Clinical characteristics of COVID-19-infected cancer patients: a retrospective case study in three hospitals within Wuhan. *China Ann Oncol*. 2020;31:894-901. https://doi.org/10.1016/j.annonc.2020.03.296.
33. Onder G, Rezza G, Brusaferro S. Case-fatality rate and characteristics of patients dying in relation to COVID-19 in Italy. *JAMA*. 2020;323(18):1775-1776. https://doi.org/10.1001/jama.2020.4683.
34. Addeo A, Friedlaender A. Cancer and COVID-19: unmasking their ties. *Cancer Treat Rev*. 2020;88:102041. https://doi.org/10.1016/j.ctrv.2020.102041.
35. de Azambuja E, Brandão M, Wildiers H, The Belgian Collaborative Group on COVID-19 Hospital Surveillance and the Belgian Society of Medical Oncology (BSMO), et al. Impact of solid cancer on in-hospital mortality overall and among different subgroups of patients with COVID-19: a nationwide, population-based analysis. *ESMO Open*. 2020;5:e000947. https://doi.org/10.1136/esmoopen-2020-000947.
36. Onder G, Rezza G, Brusaferro S. Case-Fatality rate and characteristics of patients dying in relation to COVID-19 in Italy. *JAMA*. 2020, 323(18):1775-1776. https://doi.org/10.1001/jama.2020.4683
37. EMSO. Cancer Patient Management During the COVID-19 Pandemic. (2020). Available from https://www.esmo.org/guidelines/cancer-patient-management-during-the-covid-19-pandemic. Accessed December 7, 2020.
38. ASCO. Cancer Screening, Diagnosis, Staging & Surveillance. (2020, June 22). Available from https://www.asco.org/asco-coronavirus-resources/care-individuals-cancer-during-covid-19/cancer-screening-diagnosis-staging. Accessed December 7, 2020.
39. Alexander PE, Debono VB, Mammen MJ, et al. COVID-19 coronavirus research has overall low methodological quality thus far: case in point for chloroquine/hydroxychloroquine. *J Clin Epidemiol*. 2020;123:120-126. https://doi.org/10.1016/j.jclinepi.2020.04.016.
40. Risch HA. Early outpatient treatment of symptomatic, high-risk COVID-19 patients that should be ramped-up immediately as key to the pandemic crisis. *Am J Epidemiol*. 2020;189:kwaa093. https://doi.org/10.1093/aje/kwaa093.
41. Global coronavirus COVID-19 clinical trial tracker (2020). Available from https://www.covid-trials.org. Accessed September 19, 2020.

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