Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

retrospective studies. It remains unknown whether continuation or withdrawal of these drugs during hospitalization influenced outcomes in patients admitted with COVID-19.

In conclusion, our study provides reassurance that there is no increased risk of mortality or severe illness in patients using ACEIs and ARBs compared with nonusers. In patients with hypertension, use of ACEs and ARBs might be associated with reduced mortality: however, these findings need to be confirmed in prospective randomized controlled trials.

SUPPLEMENTAL ONLINE MATERIAL

Supplemental material can be found online at http://www.mayoclinicproceedings.org. Supplemental material attached to journal articles has not been edited, and the authors take responsibility for the accuracy of all data.

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1. Zhang P, Zhu L, Cai J, et al. Association of inpatient use of angiotensin converting enzyme inhibitors and angiotensin ii receptor blockers with mortality among patients with hypertension hospitalized with COVID-19. *Circ Res*. 2020;126:1671-1681.
2. Reynolds HR, Adhikari S, Pulgarin C, et al. Renin-angiotensin-aldosterone system inhibitors and risk of Covid-19. *N Engl J Med*. 2020;382(25):2441-2448.
3. Sanchis-Gomar F, Lavie CJ, Perez-Quilis C, Henry BM, Lippi G. Angiotensin-converting enzyme 2 and antihypertensives (angiotensin receptor blockers and angiotensin-converting enzyme inhibitors) in coronavirus disease 2019 (COVID-19). *Mayo Clin Proc*. 2020;95(6):1222-1230.
4. Zhu N, Zhang D, Wang W, et al. China Novel Coronavirus Investigating and Research Team. A novel coronavirus from patients with pneumonia in China, 2019. *N Engl J Med*. 2020;382(8):727-733.
5. Li W, Moore MJ, Vasilieva N, et al. Angiotensin-converting enzyme 2 is a functional receptor for the SARS coronavirus. *Nature*. 2003;426(6965):450-454.
6. Ferrario CM, Jessup J, Chappell MC, et al. Effect of angiotensin-converting enzyme inhibition and angiotensin II receptor blockers on cardiac angiotensin-converting enzyme 2. *Circulation*. 2005;111(20):2605-2610.
7. Messerli FH, Siontis G, Rexhaj E. COVID-19 and renin angiotensin blockers: current evidence and recommendations. *Circulation*. 2020;141(25):2042-2044.
8. Moher D, Shamseer L, Clarke M, et al; PRISMA-P Group. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Syst Rev*. 2015;4(1):1.
9. Peng YD, Meng K, Guan HQ, et al. Clinical characteristics and outcomes of 112 cardiovascular disease patients infected by 2019-nCoV. *Zhonghua Xin Xue Guan Bing Za Zhi*. 2020;48(6):450-455.
10. Mehra MR, Desai SS, Kuy S, Henry TD, Patel AN. Cardiovascular disease, drug therapy, and mortality in Covid-19. *N Engl J Med*. 2020;382:e102.
11. Mehta N, Kalra A, Nowacki AS, et al. Association of use of angiotensin-converting enzyme inhibitors and angiotensin ii receptor blockers with testing positive for coronavirus disease 2019 (COVID-19). *JAMA Cardiol*. 2020 May 5 [Epub ahead of print], https://doi.org/10.1001/jamacardio.2020.1855.
12. Mancia G, Rea F, Ludergnani M, Apolone G, Corrao G. Renin-angiotensin-aldosterone system blockers and the risk of Covid-19. *N Engl J Med*. 2020;382(25):2431-2440.
13. Li J, Wang X, Chen J, Zhang H, Deng A. Association of renin-angiotensin system inhibitors with severity or risk of death in patients with hypertension hospitalized for coronavirus disease 2019 (COVID-19) infection in Wuhan, China. *JAMA Cardiol*. 2020;5(7):825-830.
14. Yang G, Tan Z, Zhou L, et al. Effects of angiotensin II receptor blockers and ACE (angiotensin-converting enzyme) inhibitors on virus infection, inflammatory status and clinical outcomes in patients with COVID-19 and hypertension: a single-center retrospective study. *Hypertension*. 2020;76(1):51-58.
15. Feng Y, Ling Y, Bai T, et al. COVID-19 with different severities: a multi-center study of clinical features. *Am J Respir Crit Care Med*. 2020;201(11):1380-1388.
16. Wang Y, Lu X, Chen H, et al. Clinical course and outcomes of 344 intensive care patients with COVID-19. *Am J Respir Crit Care Med*. 2020;201(11):1430-1434.
17. Li X, Xu S, Yu M, et al. Risk factors for severity and mortality in adult COVID-19 inpatients in Wuhan. *J Allergy Clin Immunol*. 2020;146(1):110-118.
18. Meng J, Xiao G, Zhang J, et al. Renin-angiotensin system inhibitors improve the clinical outcomes of COVID-19 patients with hypertension. *Emerg Microbes Infect*. 2020;9(1):757-760.
19. de Abajo FJ, Rodríguez-Martín S, Lerma V, et al. MED-ACE2-COVID19 study group. Use of renin-angiotensin-aldosterone system inhibitors and risk of COVID-19 requiring admission to hospital: a case-population study. *Lancet*. 2020;395(10238):1705-1714.
20. Conversano A, Melillo F, Napolano A, et al. Renin-angiotensin-aldosterone system inhibitors and outcome in patients with SARS-CoV-2 pneumonia: a case series study. *Hypertension*. 2020;76(2):e10-e12.
21. Madjid M, Safavi-Naeini P, Solomon SD, Vardeny O. Potential effects of coronaviruses on the cardiovascular system: a review. *JAMA Cardiol*. 2020;5(7):831-840.
22. Vaduganathan M, Vardeny O, Michel T, McMurray J, Pfeffer MA, Solomon SD. Renin—angiotensin—aldosterone system inhibitors in patients with Covid-19. *N Engl J Med*. 2020;382(17):1653-1659.
23. Kuba K, Imai Y, Rao S, et al. A crucial role of angiotensin converting enzyme 2 (ACE2) in SARS coronavirus-induced lung injury. *Nat Med*. 2005;11(8):875-879.

https://doi.org/10.1016/j.mayocp.2020.09.010

In reply— Association of Renin-Angiotensin System Blockers with Outcomes in Patients With COVID-19

To The Editor: Current guidelines and health professional recommendations endorse the continuation of both antihypertensives angiotensin-

converting-enzyme (ACE) inhibitors (ACEIs) or angiotensin receptor blockers (ARBs) for managing hypertension (HTN) during the COVID-19 pandemic. We have emphasized repeatedly that it is highly unlikely that the use of ACEIs and ARBs would be associated with increased severity or mortality risk in patients with COVID-19.[1,2] In the meta-analysis of Garg et al,[3] which included studies published until May 31, 2020, both mortality and risk of severe disease were not increased among patients using ACEIs and ARBs. However, it was noted that administration of these drugs might reduce mortality in patients with HTN.

In a recent study, not included in their meta-analysis, López-Otero et al[4] retrospectively evaluated 965 patients diagnosed with COVID-19; 210 of these patients were using ACEI or ARB drugs. These authors also concluded that treatment with ACEIs and ARBs was not associated with mortality (odds ratio [OR], 0.62; 95% confidence interval [CI], 0.17 to 2.26; P=.486), heart failure (OR, 1.37; 95% CI, 0.39 to 4.77; P=.622), rate of hospitalization (OR, 0.85; 95% CI, 0.45 to 1.64; P=.638), admission to intensive care units (OR, 0.87; 95% CI, 0.30 to 2.50; P=.798), or major acute cardiovascular events (OR, 1.06; 95% CI, 0.39 to 2.83; P=.915). In another observational study (NCT04331574) of 1591 patients, Iaccarino et al[5] reported that ACEI and ARB therapy does not significantly contribute to increasing COVID-19 fatalities. Finally, in a recent systematic review, Nunes[6] concluded that the use of ACEIs is not associated with higher rates of COVID-19 mortality, recommending additional clinical trials to confirm the safety profile of these drugs in this setting.

In a recent study performed by members of our group, the circulating levels of angiotensin II (AngII) were measured in patients with COVID-19.[7] Despite a case series from China that reported extremely high levels of AngII in patients with COVID-19,[8] in our cohort of 30 patients with COVID-19, circulating AngII levels were normal regardless of COVID-19 severity, with no significant differences between patients with COVID-19 and healthy controls.[7] Although circulating levels of AngII may not reflect the local lung milieu, it seems unlikely that AngII is a driver of systemic disease in COVID-19. Although ACE2 expression is likely attenuated by severe acute respiratory syndrome (SARS-CoV-2) binding, these data suggest that AngII is readily metabolized in alternative metabolic pathways, resulting in normal circulating levels. This finding is consistent with the clinical study by López-Otero et al,[4] in which no beneficial association of ACEI or ARB use was found for COVID-19 severity or mortality, as would be expected, given the normal circulating levels of AngII. Hence, we suggest that the potential benefits of ACEIs and ARBs observed in some COVID-19 studies may be more attributable to effective intervention for a modifiable risk factor for poor COVID-19 outcomes (ie, HTN), with efficacious therapy minimizing HTN-induced endothelial dysfunction and end-organ injury that would otherwise be susceptible to further deterioration with SARS-CoV-2 infection.

Only retrospective observational studies regarding the potentially deleterious effects of ACEIs and ARBs in patients with COVID-19 have been conducted to date, and these findings need to be confirmed in prospective randomized controlled trials (RCTs). To the best of our knowledge, there are several ongoing RCTs, and new and more reliable results will emerge shortly. Studies in randomized COVID-19 patients—such as the BRACE CORONA trial (NCT04364893), evaluating whether to continue or interrupt ACEI or ARB therapy—are underway. Results from this study will be presented at the forthcoming European Society of Cardiology meeting. Overall, owing to the lack of evidence on negative effects on mortality of ACEIs and ARBs in patients with COVID-19, we reaffirm our previous advice that discontinuing these drugs for managing HTN at the time of COVID-19 pandemic remains clinically unjustified.

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1. Sanchis-Gomar F, Lavie CJ, Perez-Quilis C, Henry BM, Lippi G. In Reply - angiotensin-converting enzyme 2 and the resolution of inflammation: in support of continuation of prescribed angiotensin-converting enzyme inhibitors and angiotensin-receptor blockers. *Mayo Clin Proc*. 2020;95(7):1553-1556.
2. Sanchis-Gomar F, Lavie CJ, Perez-Quilis C, Henry BM, Lippi G. Angiotensin-converting enzyme 2 and anti-hypertensives (angiotensin receptor blockers and angiotensin converting enzyme inhibitors) in coronavirus disease 2019 (COVID-19). *Mayo Clin Proc*. 2020;95(6):1222-1230.
3. Garg A, Rout A, Sharma A, Fiorello B, Kostis JB. Association of renin angiotensin system blockers with outcomes in patients with COVID-19. *Mayo Clin Proc*. 2020. https://doi.org/10.1016/jmayocp.2020.09.010 [Epub ahead of print].
4. Lopez-Otero D, Lopez-Pais J, Cacho-Antonio CE, et al. Impact of angiotensin-converting enzyme inhibitors and angiotensin receptor blockers on COVID-19 in a western population. CARDIOVID registry. *Rev Esp Cardiol (Engl Ed)*. 2020. https://doi.org/10.1016/j.rec.2020.1005.1018 [Epub ahead of print].
5. Iaccarino G, Grassi G, Borghi C, et al. Age and multimorbidity predict death among COVID-19 patients: results of the SARS-RAS study of the Italian Society of Hypertension. *Hypertension*. 2020;76(2):366-372.
6. Nunes JPL. Mortality and use of angiotensin converting enzyme inhibitors in Covid 19 disease: a systematic review. *medRxiv*. 2020. https://doi.org/10.1101/2020.05.29.20116483.
7. Henry BM, Benoit S, Lippi G, Benoit J. Circulating plasma levels of angiotensin II and aldosterone in patients with coronavirus disease 2019 (COVID-19): a preliminary report. *Prog Cardiovasc Dis*. 2020. https://doi.org/10.1016/j.pcad.2020.07.006 [Epub ahead of print].
8. Liu Y, Yang Y, Zhang C, et al. Clinical and biochemical indexes from 2019-nCoV infected patients linked to viral loads and lung injury. *Sci China Life Sci*. 2020;63(3):364-374.

https://doi.org/10.1016/j.mayocp.2020.09.011

Responsibilities and Job Characteristics of Health Care Chief Wellness Officers in the United States

To The Editor: The high prevalence of occupational distress in physicians and other health care professionals relative to workers in other fields has been recognized over the past decade.[1] Appreciation that this problem is due to characteristics of the practice environment, rather than deficits in personal resilience, has helped focus mitigation efforts on improving characteristics of organizational culture and practice efficiency.[2] Many organizations have also been motivated to act on the basis of the evidence of a link between occupational distress in health care professionals and quality of care, patient experience, turnover, and the economic health of the organization.[3] This chronic occupational distress has only been exacerbated by the coronavirus disease 2019 pandemic, spurring even more organizations to attend to this issue.

Organizational progress requires system-level infrastructure and leadership. In recognition of this fact, leaders from across the country, including the presidents of the Association of American Medical Colleges, American College of Graduate Medical Education, and the National Academy of Medicine have recommended that every large health care organization create an executive-level leader or "chief wellness officer" (CWO) position to oversee such efforts.[2,4] This recommendation was subsequently also affirmed by the National Academy of Medicine.[2] Health care CWOs play a role distinct from CWOs outside of health care who typically focus on leading workplace wellness programs with the goal of promoting healthy lifestyle (eg, smoking cessation, weight loss, and stress reduction) and reducing organizational employee health care costs. After Stanford University created one of the first health care CWO position in 2017, a number of organizations have subsequently followed suit. Although recent articles have articulated design considerations for organizational programs on health care professional well-being as well as recommendations addressing the roles and responsibilities of the health care CWO,[5] there is little information published regarding the typical responsibilities and job characteristics of existing health care CWOs in the United States.

In mid-2019, we formed the Collaborative for Healing and Renewal in Medicine CWO Network. Formal criteria for members were established in February 2021 (Appendix 1, available online at http://www.mayoclinicproceedings.org). This network comprises health care CWOs or equivalent executive-level leaders responsible for overseeing the health care professional well-being efforts of their institutions. In early 2020, we asked network members to describe the characteristics of their positions and summarize here the profile of 21 health care CWOs across the United States. Analysis of these data for publication was deemed exempt by the Stanford Institutional Review Board.

The organizations represented by these CWOs are listed in Appendix 2 (available online at http://www.mayoclinicproceedings.org). In aggregate, 18 of 21 participating CWOs (85.7%) were located at university-affiliated academic centers. The primary organizational motivation for establishing a CWO was reported to be a desire to reduce burnout and increase professional fulfillment (n=16 [76.2%]), with fewer respondents reporting a desire to reduce depression/suicide (n=2 [9.5%]), reduce turnover (n=1 [4.8%]), generate a financial return on investment (n=1 [4.8%]), or reduce health care costs by improving the health of the workforce (n=1 [4.8%]).

The position title for most of these individuals (17 of 21 [81.0%]) (Table) was CWO. Most (18 of 21 [85.7%]) devoted 50% or more of their professional work effort to their CWO role, with nearly 40% (8 of 21) dedicating 70% or