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- 1 Chauvin L. Peruvian COVID-19 vaccine scandal spreads. *Lancet* 2021; **397**: 783.

## Venezuela is collapsing without COVID-19 vaccines

Once considered a rich oil-producing country, Venezuela is confronting a rapidly increasing COVID-19 epidemic that adds to a complex humanitarian crisis that has been affecting the country since 2016.<sup>1</sup> The health-care system has collapsed and is incapable of responding to the ever-increasing number of patients who require hospitalisation. Health-care personnel, including doctors, nurses, and other first-line health staff, have been substantially affected by the epidemic, leading to the highest lethality reported in the Americas.<sup>2</sup> A desperate population is resorting to self-medication with unproven therapies, including the officially promoted so-called miraculous drops, a natural product that promises to be an infallible preventive and cure for the disease.<sup>3</sup>

While many other countries in the Latin American region negotiated, well in advance, for the procurement of vaccines and are already implementing vaccination programmes, the Launch and Scale Speedometer shows that Venezuela did not. To our knowledge, Venezuela does not have a known national COVID-19 vaccine plan, and the supply of vaccines is spasmodic, insufficient, and unplanned. On Feb 18, 2021, 200 000 Sputnik V vaccines were received with great fanfare, followed by a donation on March 11, 2021, from China of 500 000 doses of the Sinopharm vaccine, plus an additional batch of 50 000 doses of the Sputnik V vaccine that was received

on April 15, 2021. On March 22, 2021, Venezuelans were informed that additional batches of vaccines had been received: two Cuban vaccine candidates (30 000 doses each of Soberana-2 and Abdala, which are undergoing clinical trials in Cuba) and one from Russia (1000 doses of EpiVacCorona).<sup>4</sup> Although the Venezuelan Government announced the purchase of an additional 10 million doses of the Sputnik V vaccine on Dec 29, 2020, that purchase has not materialised. The number of doses that have arrived so far in Venezuela is insignificant compared with the need to vaccinate 15 million people, or 70% of the adult population in the country. No official information is available on the number of vaccine doses administered thus far, but we believe it is less than 200 000, with very few used to protect health-care personnel.

Venezuela's National Academy of Medicine is supporting ongoing efforts to bring vaccines to Venezuela via the COVID-19 Vaccine Global Access (COVAX) Facility, and other alternatives, to ensure that Venezuelans are not denied their human right to health and equitable access to safe and effective COVID-19 vaccines that are prequalified by WHO. International collaboration and cooperation is urgently needed to avoid a rapidly increasing humanitarian catastrophe in Venezuela.

We declare no competing interests.

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- 1 Page KR, Doocy S, Reyna Ganteaume F, Castro JS, Spiegel P, Beyrer C. Venezuela's public health crisis: a regional emergency. *Lancet* 2019; **393**: 1254–60.
- 2 Osio Cabrices R. The pandemic's brutal toll on Venezuelan doctors and nurses. 2021. <https://www.caracaschronicles.com/2021/04/02/the-pandemics-brutal-toll-on-venezuelan-doctors-and-nurses/> (accessed April 8, 2021).

- 3 McKenzie H. A miracle cure for COVID-19? We've heard that one before. 2021. <https://www.biospace.com/article/a-miracle-cure-for-covid-19-we-ve-heard-that-one-before/> (accessed April 8, 2021).
- 4 Feliciano D. Venezuela will begin to apply Cuban vaccine Abdala, without customary trials or regulatory approval. 2021. <https://riotimesonline.com/brazil-news/mercosur/venezuela/venezuelan-regime-will-begin-to-apply-in-july-the-cuban-vaccine-abdala-which-has-not-completed-the-trials-and-has-not-been-approved/> (accessed April 8, 2021).

## Long-term effects of COVID-19 on kidney function

We read with interest the long-term follow-up data from hospitalised patients with COVID-19 study by Chaolin Huang and colleagues.<sup>1</sup> The investigators report that 107 (13%) of 822 study participants with an estimated glomerular filtration rate (eGFR; calculated with the Chronic Kidney Disease Epidemiology Collaboration equation<sup>2</sup>) of 90 mL/min per 1.73 m<sup>2</sup> or more and no acute kidney injury during the acute phase had an eGFR of less than 90 mL/min per 1.73 m<sup>2</sup> at follow-up. Huang and colleagues interpret this observation as persistent renal dysfunction. A persistent and potentially progressive reduction in eGFR in the absence of acute kidney injury at the time of acute infection would indeed have important implications for COVID-19 follow-up surveillance. However, we want to point out that an alternative explanation is possible. eGFR is calculated on the basis of serum creatinine values, which undergo small fluctuations over time as a result of shifts in hydration and other factors.<sup>3</sup> Such fluctuations will stochastically place some individuals with normal GFR in the eGFR group of 90 mL/min per 1.73 m<sup>2</sup> or more during acute disease and in the eGFR group of less than 90 mL/min per 1.73 m<sup>2</sup> at follow-up, which is not necessarily a sign of worsening kidney function. Huang and colleagues show

an opposite seeming improvement of kidney function with an eGFR of 90 mL/min per 1.73 m<sup>2</sup> or more in 142 (29.7%) of 478 patients at follow-up with an eGFR of less than 90 mL/min per 1.73 m<sup>2</sup> and no evidence of acute kidney injury during the acute disease. We encourage the investigators to show eGFR trajectories between acute phase and follow-up independent from cutoffs to substantiate the robustness of their findings.

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- Huang C, Huang L, Wang Y, et al. 6-month consequences of COVID-19 in patients discharged from hospital: a cohort study. *Lancet* 2021; **397**: 220–32.
- Levey AS, Stevens LA, Schmid CH, et al. A new equation to estimate glomerular filtration rate. *Ann Intern Med* 2009; **150**: 604–12.
- Hilderink JM, van der Linden N, Kimenai DM, et al. Biological variation of creatinine, cystatin C, and eGFR over 24 hours. *Clin Chem* 2018; **64**: 851–60.

Chaolin Huang and colleagues<sup>1</sup> have highlighted the putative renal consequences of COVID-19 at 6 months from discharge. A decreased estimated glomerular filtration rate (eGFR) was defined as less than 90 mL/min per 1.73 m<sup>2</sup> and was observed in 35% of participants during follow-up. The term decreased eGFR is ambiguous. According to the mean age of the cohort, chronic kidney disease should be defined as an eGFR of less than 60 mL/min per 1.73 m<sup>2</sup>.<sup>2</sup> The usual prevalence of eGFR less than 90 mL/min per 1.73 m<sup>2</sup> in the Chinese general population of similar ages to those in Huang and colleagues' cohort ranges between 35% and 50%.<sup>3,4</sup> In other words, the prevalence of eGFR of less than 90 mL/min per 1.73 m<sup>2</sup> in COVID-19 survivors might not differ from the

general population. Furthermore, the majority of patients with eGFR less than 90 mL/min per 1.73 m<sup>2</sup> during follow-up did not show acute kidney injury during the acute phase, which suggests that the eGFR of these patients was already less than 90 mL/min per 1.73 m<sup>2</sup> before COVID-19. Therefore, the prevalence of patients with eGFR less than 60 mL/min per 1.73 m<sup>2</sup> at 6 months from discharge is required to factually assess the long-term effect of COVID-19 on renal function. The pathological relevance of an eGFR between 60 and 90 mL/min per 1.73 m<sup>2</sup> is questionable in the absence of proteinuria.<sup>2</sup> Proteinuria has been frequently described in patients with COVID-19. Our follow-up observations suggest a spontaneous remission within a few weeks after discharge.<sup>5</sup> The available data of Huang and colleagues do not support their alarming conclusions about the poor renal prognosis at 6 months after COVID-19.

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- Huang C, Huang L, Wang Y, et al. 6-month consequences of COVID-19 in patients discharged from hospital: a cohort study. *Lancet* 2021; **397**: 220–32.
- Delanaye P, Jager KJ, Bökenkamp A, et al. CKD: a call for an age-adapted definition. *J Am Soc Nephrol* 2019; **30**: 1785–805.
- Zhang L, Wang F, Wang L, et al. Prevalence of chronic kidney disease in China: a cross-sectional survey. *Lancet* 2012; **379**: 815–22.
- Wang S, Chen R, Liu Q, Shu Z, Zhan S, Li L. Prevalence, awareness and treatment of chronic kidney disease among middle-aged and elderly: The China Health and Retirement Longitudinal Study. *Nephrology (Carlton)* 2015; **20**: 474–84.
- Huart J, Bouquegneau A, Lutterli L, et al. Proteinuria in COVID-19: prevalence, characterization and prognostic role. *J Nephrol* 2021; **34**: 355–64.

## Authors' reply

In our study,<sup>1</sup> we observed a considerable number of patients presenting with low estimated glomerular filtration rate (eGFR) over time without acute kidney injury and an eGFR of 90 mL/min per 1.73 m<sup>2</sup> or more during hospitalisation. Another study has shown that the use of creatinine to diagnose acute kidney injury might underestimate the patients with acute kidney injury at acute phase.<sup>2</sup> We found that reduced eGFR at follow-up is possibly associated with kidney injury at acute phase, which was not recognised on the basis of serum creatinine values.

Philipp Enghard and colleagues reported that other factors (eg, hydration) could lead to fluctuations of serum creatinine values and further affect the calculated eGFR values. Patients categorised into the group with an eGFR of 90 mL/min per 1.73 m<sup>2</sup> or more at acute phase all had eGFR values that were 90 mL/min per 1.73 m<sup>2</sup> or more during hospitalisation. According to our data, 1366 (80.1%) of 1703 had at least two eGFR values and 956 (56.0%) of 1703 patients had at least three eGFR values, which, to some extent, excluded the possibility of misclassification resulting from fluctuations. For the eGFR value at 6 months after symptom onset, fluctuations might have existed, as the value was obtained once. However, attention should be paid to the group of people that had a lower eGFR value after discharge than at acute phase and are at risk of long-term kidney damage, and who need help from health-care providers and further follow-up to differentiate kidney damage from fluctuation or physiological decrease.

Pierre Delanaye and colleagues reported that among patients without acute kidney injury during acute phase, an eGFR less than 90 mL/min per 1.73 m<sup>2</sup> during follow-up might be attributable to lowered eGFR before COVID-19. For patients



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