Localising an asset-based COVID-19 response in Ecuador

With 10·93 deaths per million people from coronavirus disease 2019 (COVID-19), as of April 6, 2020, Ecuador has one of the highest rates of COVID-19 mortality in Latin America (figure; appendix).[1] With only 7·46 PCR tests per 10 000 people,[1] the government is in critical need of a systematic mechanism to bolster self-reporting, contact tracing, and effective isolation of suspected cases. The Ministry of Health has focused on closing gaps in medical resources by increasing availability of personal protective equipment and hospital beds and attempting to remedy overburden of health-care facilities and mortuary services in Guayas province, the country's main hotspot of the outbreak (appendix), but 417 health personnel in Ecuador have COVID-19.[2]

Given the low number of tested individuals (13 039 tested in a country with 17·47 million people),[1] it is likely that only symptomatic cases and close contacts of confirmed cases are being tested, probably because of limited test availability. The 23-day lockdown has been unevenly enforced, allowing people to concentrate in public places where circulation is allowed. Mobile phone use is not universal,[3] making self-reporting and case monitoring challenging, particularly for disadvantaged people such as indigenous populations and the more than 350 000 Venezuelan refugees.[4]

Ecuador lacks universal health coverage and medical records that can be accessed virtually across public and private providers. However, the country has capacity, from civil society organisations, local political offices, and public institutions with knowledge of and contact with their communities,[5] that could contribute to containment and mitigation efforts. These local multisector structures could help adopt a modular testing and informational strategy that would curb unnecessary mobility and pressure on health-care facilities.

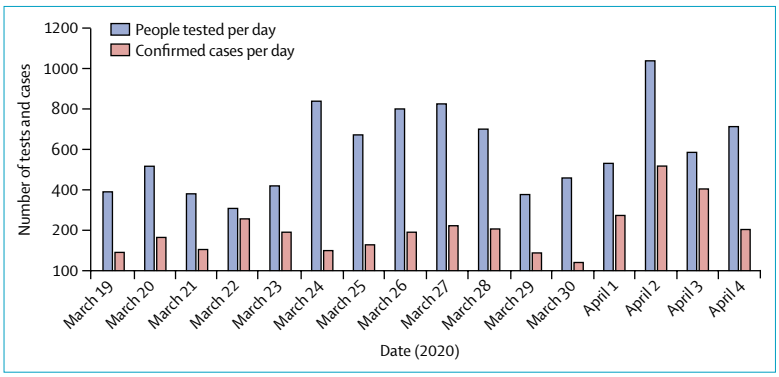

Figure: **Daily number of tests and confirmed cases of coronavirus disease 2019 in Ecuador, from March 19 to April 4, 2020**
Data source: Ministry of Health of Ecuador.[1]

Local multisectoral structures could function as health and surveillance clusters that register epidemiological data, trace contacts (including contacts of confirmed and suspected cases that have already been tested), and support close monitoring of mild and asymptomatic symptoms in people with confirmed or suspected infection. Managing the COVID-19 epidemic locally would allow verified recommendations that promote uptake of personal measures to be disseminated effectively (and in native languages) and would help channel complementary resources, such as food, to ensure proper isolation of cases.

Depending on context, such as local communication capabilities and geographical and ethnic factors, each health and surveillance cluster would be responsible for modules of about 1000 households. Health centres would aggregate data to improve epidemiological modelling and provide specialist support. Where infection incidence is low, potential clusters should already begin to work, convening local stakeholders to assess existing social assets and potential support from the wider health system.

We declare no competing interests.

Irene Torres, Fernando Sacoto
irene@octaedro.org

Fundacion Octaedro, Quito 170408, Ecuador (IT); and Ecuadorian Society of Public Health, Quito, Ecuador (IT, FS)

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Published **Online**
April 8, 2020
https://doi.org/10.1016/S0140-6736(20)30851-5

See **Online** for appendix

SARS-CoV-2 shedding and infectivity

Fei Zhou and colleagues[1] estimated mean duration of viral shedding by assessing the presence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) viral RNA in patient samples. Assessing potential infectivity is a labour-intensive process, but the presence of nucleic acid alone cannot be used to define viral shedding or infection potential, as the authors state is possible within their methods.

For many viral diseases (SARS-CoV, Middle East respiratory syndrome coronavirus, influenza virus, Ebola virus, and Zika virus) it is well known that viral RNA can be detected long after

Published **Online**
April 15, 2020
https://doi.org/10.1016/S0140-6736(20)30868-0

the disappearance of infectious virus.[2–7] With measles virus, viral RNA can still be detected 6–8 weeks after the clearance of infectious virus.[8] The immune system can neutralise viruses by lysing their envelope or aggregating virus particles; these processes prevent subsequent infection but do not eliminate nucleic acid, which degrades slowly over time.

We were surprised to note the absence of viral load data in this study.[1] Although the use of sensitive PCR methods offers value from a diagnostic viewpoint, caution is required when applying such data to assess the duration of viral shedding and infection potential because PCR does not distinguish between infectious virus and non-infectious nucleic acid.

The timely publication of insightful data is paramount in responding to outbreaks of novel pathogens. However, the findings in this study should not be used to conclude prolonged viral shedding or provide rationale to amend isolation policies, as concluded by the authors; infectivity data are required to demonstrate these specific aspects.

We declare no competing interests.

*Barry Atkinson, *Eskild Petersen*
eskild.petersen@gmail.com

National Collection of Pathogenic Viruses, Public Health England, Salisbury, UK (BA); Directorate General for Disease Surveillance and Control, Ministry of Health, Muscat, Oman (EP); European Society for Clinical Microbiology and Infectious Diseases Task Force for Emerging Infections, Basel, Switzerland (EP); and Institute for Clinical Medicine, Faculty of Health Sciences, University of Aarhus, 8200 Aarhus, Denmark (EP)

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Published **Online** April 15, 2020 https://doi.org/10.1016/S0140-6736(20)30869-2

Authors' reply

We thank Barry Atkinson and Eskild Petersen for their comments on our Article describing the clinical course and risk factors for mortality of adult inpatients with coronavirus disease 2019 (COVID-19) in Wuhan, China.[1] We agree that the presence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) viral RNA in a respiratory specimen cannot be directly interpreted as a potential for disease transmission and infection.

Although viral culture is an important method to evaluate viral infectivity and activity, it is unavailable in clinical practice because of its low sensitivity and long turn-around time for virus detection.[2] Two negative SARS-CoV-2 RNA PCR tests, at least 24 h apart, was recommended by WHO[3] as one of several criteria for discharge. Prolonged periods of detectable SARS-CoV-2 RNA suggest a sustained viral replication in some kinds of host cells in patients with COVID-19. A comparison has previously been made between viral shedding, as quantified by real time PCR (RT-PCR), and median tissue culture infectious dose (TCID50) in patients with influenza.[4] The temporal changes in viral load by RT-PCR were similar to that of TCID50.[4] For COVID-19, the association between viral load in respiratory tract specimens, quantified by RT-PCR, and viral culture needs evaluation.

Viral activity is only one of various factors that might influence disease transmission. Epidemiology is the gold standard to measure transmission potential of patients who recover from COVID-19 yet are still positive for SARS-CoV-2 RNA. Further effort is urgently needed to evaluate the basic reproductive number in these patients.

We declare no competing interests.

*Fei Zhou, Guohui Fan, Zhibo Liu, *Bin Cao*
caobin_ben@163.com

Department of Pulmonary and Critical Care Medicine, Center of Respiratory Medicine, National Clinical Research Center for Respiratory Diseases, Institute of Respiratory Medicine, Chinese Academy of Medical Sciences, Peking Union Medical College, Beijing 100029, China (FZ, GF, ZL, BC); Institute of Clinical Medical Sciences, China-Japan Friendship Hospital, Beijing, China (GF); Department of Respiratory Medicine, Capital Medical University, Beijing, China (BC); and Tsinghua University School of Medicine, Beijing, China (BC)

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The political nature of medicine

"What should we expect of scientists in society?" This is the question we read in Richard Horton's Comment,[1] which is quite important since the answer will be the same as for other similar questions: what should we expect of people having professions in different fields, such as engineers, musicians, economists, or soldiers in society? We agree that to achieve great science, there needs to be excellence in the field. We need to be able to provide the best diagnosis, best design, best music, best management of resources, and so on. However, to do great science or medicine, we also need to engage with