

the disappearance of infectious virus.<sup>2-7</sup> With measles virus, viral RNA can still be detected 6–8 weeks after the clearance of infectious virus.<sup>8</sup> 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.<sup>1</sup> 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.

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- 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* 2020; **395**: 1054–62.
- Peiris JS, Chu CM, Cheng VC, et al. Clinical progression and viral load in a community outbreak of coronavirus-associated SARS pneumonia: a prospective study. *Lancet* 2003; **361**: 1767–72.
- Chan KH, Poon LL, Cheng VC, et al. Detection of SARS coronavirus in patients with suspected SARS. *Emerg Infect Dis* 2004; **10**: 294–99.
- Oh MD, Park WB, Choe PG, et al. Viral load kinetics of MERS coronavirus infection. *N Engl J Med* 2016; **375**: 1303–05.
- Wang Y, Guo Q, Yan Z, et al. Factors associated with prolonged viral shedding in patients with avian influenza A(H7N9) virus infection. *J Infect Dis* 2018; **217**: 1708–17.

- Sissoko D, Duraffour S, Kerber R, et al. Persistence and clearance of Ebola virus RNA from seminal fluid of Ebola virus disease survivors: a longitudinal analysis and modelling study. *Lancet Glob Health* 2017; **5**: e80–88.
- Paz-Bailey G, Rosenberg ES, Doyle K, et al. Persistence of Zika virus in body fluids—final report. *N Engl J Med* 2017; **379**: 1234–43.
- Lin W-HW, Kouyos RD, Adams RJ, Grenfell BT, Griffin DE. Prolonged persistence of measles virus RNA is characteristic of primary infection dynamics. *Proc Natl Acad Sci USA* 2012; **109**: 14989–94.

### 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.<sup>1</sup> 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.<sup>2</sup> Two negative SARS-CoV-2 RNA PCR tests, at least 24 h apart, was recommended by WHO<sup>3</sup> 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 (TCID<sub>50</sub>) in patients with influenza.<sup>4</sup> The temporal changes in viral load by RT-PCR were similar to that of TCID<sub>50</sub>.<sup>4</sup> 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.

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- 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* 2020; **395**: 1054–62.
- Charlton CL, Babady E, Ginocchio CC, et al. Practical guidance for clinical microbiology laboratories: viruses causing acute respiratory tract infections. *Clin Microbiol Rev* 2019; **32**: e00042–18.
- WHO. Clinical management of severe acute respiratory infection when COVID-19 is suspected. March 13, 2020. [https://www.who.int/publications-detail/clinical-management-of-severe-acute-respiratory-infection-when-novel-coronavirus-\(ncov\)-infection-is-suspected](https://www.who.int/publications-detail/clinical-management-of-severe-acute-respiratory-infection-when-novel-coronavirus-(ncov)-infection-is-suspected) (accessed April 4, 2020).
- Ip DKM, Lau LLH, Chan KH, et al. The dynamic relationship between clinical symptomatology and viral shedding in naturally acquired seasonal and pandemic influenza virus infections. *Clin Infect Dis* 2016; **62**: 431–37.

### The political nature of medicine

“What should we expect of scientists in society?” This is the question we read in Richard Horton’s Comment,<sup>1</sup> 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



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society since greatness is only achieved if these disciplines improve the daily lives of people and the global quality of life.

In other words, a physician will be able to realise great science only by watching, listening, or having direct contact with the real problems of society, such as violence, poverty, inequality, corruption, loneliness, discrimination, land grabbing, addictions, and all the human realities that are the subjects of political, legal, and sociological choices, as well as the medical research.

Science cannot be ghettoised by a box-system logic (the pre-systemic scientific logic). Scientists constitute part of the whole human community and, therefore, society must engage with them even more, both politically and socially.<sup>2</sup> Medical humanities (including politics, that Aristotle recognised as the higher form of ethics<sup>3</sup>) are not an embellishment. They are a baggage of competencies necessary for science to return in an anti-disciplinary logic to being part of a society that is no longer liquid anymore.

To be a great physician, one needs to have good judgement skills to understand global health affairs and individual medical problems. In fact, more often these problems are strictly connected with much broader plans of existence. Of course, physicians cannot be polymaths, but they must have direct social experience to address such topics, otherwise they will miss the understanding of problems to deal with. Failing in the understanding of a reality equates to a scientific failure, since, as Blaise Pascal reminds us, our intellect is made for understanding.

Therefore, great science needs to deal with unconventional topics that matter for our existence and for medicine, which is prominent in this respect since medicine directly tackles such issues. This dynamic is also the breath rhythm of the inter-relationship "science-society-science",<sup>4</sup> where science takes its object from society, changing it, and therefore changing itself in the process.

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- 1 Horton R. Offline: The necessity of the engaged scientist. *Lancet* 2019; **394**: 1398.
- 2 Nature Methods. The politically engaged scientist. *Nat Methods* 2017; **14**: 457.
- 3 Aristotle. *The Nicomachean ethics*. London: Oxford University Press, 2009.
- 4 Mattila M, Rapeli L, Wass H, Söderlund P. *Health and political engagement*. London: Routledge, 2018.

## Bodily distribution of projectile injuries in Chilean protests

On Oct 14, 2019, a series of protests began in Chile after the Ministry of Transport introduced a fare increase for riding in the Metropolitan Public Transport Network, which led to an escalation of confrontations between local police, military forces, and protestors, in turn leading to a record number of patients with projectile-related injuries and severe ocular trauma.

Looking for the presence of projectiles, we retrospectively reviewed imaging studies, including CT scans and x-rays, for Oct 19–28, 2019, using the Picture Archiving and Communication System at Hospital Carlos Van Buren, Valparaíso, Chile. We determined the body segment distribution of these projectiles, their size, mean density in Hounsfield units (HU), and whether they were fragmented or multiple.

A total of 49 imaging studies showed projectiles. Two different curves appear in the projectile density distribution, probably explained by the presence of both pellets and bullets. About 40% of projectiles were located in the head or neck segment. The median density of projectiles

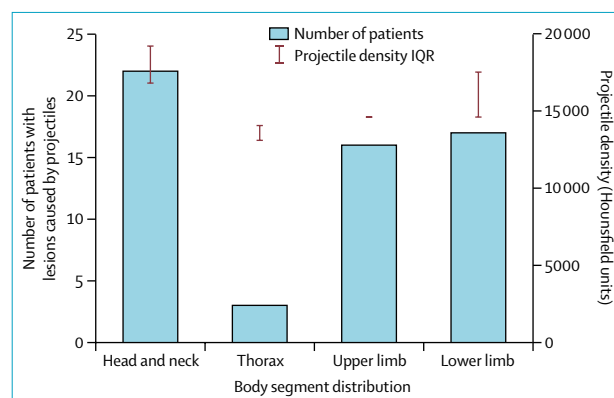


Figure: Projectile density and distribution by body segment

was 18 592 HU (IQR 16 827–19 231) for head and neck, 14 073 HU (13 111–14 073) for the thorax, 14 622 HU (14 622–14 623) for upper extremities, and 14 679 HU (14 622–17 542) for lower extremities (figure). The high density of the spherical projectiles measured in CT scans contradicts the official statement on the use of rubber ammunition for crowd control.

We therefore carried out physico-chemical analysis of the projectiles, such as scanning electron microscopy, energy dispersive spectroscopy, infrared spectroscopy, and gravimetric analysis. This analysis showed a mean density of 2.52 g cm<sup>-3</sup> (SD 0.04), with a weight percentage of 84% inorganic content and 16% organic content, and lead levels close to 24%. Surprisingly, the lead distribution was spread homogeneously inside the whole projectile. Other inorganic content was particularly distributed as a microconstituent, with microscopic particles spread in the organic matter.

We have found no other reports that are similar to our data considering the type of projectile and segmented body distribution. According to our experience in Valparaíso, the body segment most injured was the head and neck, leading to severely disabling lesions to the eye. We believe that crowd control protocols must ban the use of this ammunition, as they might lead to severe damage.

We declare no competing interests.