

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.² Medical humanities (including politics, that Aristotle recognised as the higher form of ethics³) 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",⁴ where science takes its object from society, changing it, and therefore changing itself in the process.

We declare no competing interests.

*Giampaolo Ghilardi,
Laura Leondina Campanozzi,
Massimo Ciccozzi, Giovanna Ricci,
Vittoradolfo Tambone
g.ghilardi@unicampus.it

Institute of Philosophy of Scientific and Technological Practice (GG, LLC, VT) and Department of Medical Statistics and Epidemiology Unit (MC), Campus Bio-Medico, University of Rome, Rome 00128, Italy; and Medico Legal Section, School of Law, University of Camerino, Macerata, Italy (GR)

- 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

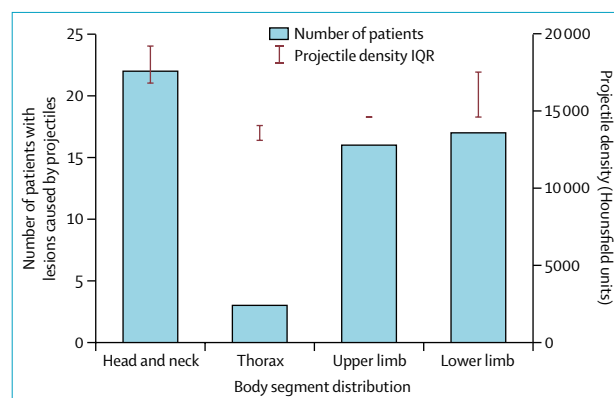


Figure: Projectile density and distribution by body segment

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⁻³ (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.

*Pablo Cox, Rodrigo Riveros, Camila Leiva, Yuri Carvajal, Pablo Fuentes, Jaime Recasens, Alvaro Covarrubias, Francisco Torres, Daniel Ramírez, Marcelo Verdugo, Pablo Muñoz

pablo.cox@gmail.com

Unidad de Imagenología, Hospital Carlos Van Buren, Valparaíso 2341131, Chile (PC, RR, CL, PF, JR, AC, FT); Centro de Neurología Traslacional (PC, PM) and Centro de Investigación Biomédica (PM), Universidad de Valparaíso, Valparaíso, Chile; Escuela de Salud Pública, Universidad de Chile, Santiago, Chile (YC); and Instituto de Química y Bioquímica, Facultad de Ciencias, Universidad de Valparaíso, Valparaíso, Chile (DR, MV)

Rebuilding the broken health contract in Chile

Many Chileans think that their country has lost its way. Massive protests highlight the need for a political reform to prioritise universal health care. The uncritical worship of the most extreme version of the free market by the Pinochet dictatorship led to the dismantling of the social contract and privatisation of the social security system. A system of personal retirement accounts was mandatory for new workers whereas the current workforce could opt out from the existing government-managed schemes. The disability insurance system was also privatised. Insurees could opt out of government-managed health insurance systems (Fondo Nacional de Salud [FONASA]) and join private health insurance plans (Instituciones de Salud Previsional [ISAPRE]). The creation of a two-tier system was the end of the national health-care system created in the early 1950s.

In Chile, 17–18% of the population opts for private coverage.¹ FONASA has open enrolment policies and is funded by mandatory contributions. ISAPRE charges risk-rated premiums and can reject applicants with pre-existing medical conditions.² Premiums are highly restrictive for people who earn a low income. In 2015, the average premium was equivalent to 45% of the minimum wage. The health system

institutional design leads to population risk and income segmentation: FONASA covers women and those who are poorer, older, and sicker; whereas ISAPRE covers those who are richer, younger, and healthier. ISAPRE spends 1.35 times more per insuree than FONASA, although they cover people with a favourable risk profile.³ ISAPRE administrative spending is large, 12.67 times higher per insuree than FONASA,⁴ with most of it being spent on marketing to attract insurees at low risk.

In addition, most Chilean doctors work in the private health-care sector and provide care to the small proportion of the population who are privately insured, for greater financial incentives. Only 44% of physicians have contracts (several on a part-time basis) with public providers.⁵ The public sector is underfunded and ill-equipped to provide care for most of the population. As a result, inequality for those who are chronically ill, older, and poor is of alarming concern. Waiting lists for specialist consultations and surgery are common in public hospitals⁶ and emergency rooms are crowded.

The legacy of the dictatorship is pervasive. The result of the broken neoliberal social contract is an unfair distribution of resources and a 40-year period of social disintegration and inequality. Chile must decide if the time has come for a profound structural change, based on a different set of political and ethical principles.

We declare no competing interests.

Francisca Crispi, Avi Cherla, Ennio A Vivaldi, *Elias Mossialos e.a.mossialos@lse.ac.uk

School of Public Health (FC), University of Chile, Santiago, Chile (EAV); and Department of Health Policy, London School of Economics and Political Science, London WC2A 2AE, UK (AC, EM)

- 1 Organisation for Economic Co-operation and Development. OECD reviews of public health. Chile: a healthier tomorrow. Paris: OECD, 2019.
- 2 Roman-Urrestarazu A, Yang JC, Ettelt S, Thalmann I, Seguel Ravest V, Brayne C. Private health insurance in Germany and Chile: two stories of co-existence, segmentation and conflict. *Int J Equity Health* 2018; **17**: 112.

- 3 Castillo-Laborde C, Aguilera-Sanhueza X, Hirmas-Adaury M, et al. Health insurance scheme performance and effects on health and health inequalities in Chile. *MEDICC Rev* 2017; **19**: 57–64.
- 4 Gallegos Castillo EA, Muñoz Vergara A. Eficiencia de los seguros de salud en Chile un análisis desde la perspectiva de la protección financiera. Santiago: Universidad de Chile, 2016.
- 5 Ministerio de Salud. Informe sobre brechas de personal de salud por servicio de salud. Santiago. 2017. <https://www.minsal.cl/wp-content/uploads/2015/08/Informe-Brechas-RHS-en-Sector-P%C3%BAblico-Abril2017.pdf> (accessed Nov 1, 2019).
- 6 Bossert TJ, Leisewitz T. Innovation and change in the Chilean health system. *N Engl J Med* 2016; **374**: 1–5.

Malnutrition needs prioritisation and public resources

Malnutrition is indeed a global emergency, and courageous and timely actions are needed from governments, media outlets, non-governmental organisations, and civil society.¹ Nevertheless, I believe that a reduction in malnutrition is only possible if there is political will, economic stability, and a prioritisation of malnutrition as public policy and a developmental issue by governments, especially in developing countries. In Pakistan, public health is a conundrum as the country is facing challenges such as high rates of teenage pregnancies, early child marriages, undernourished mothers, and less-spaced pregnancies (<24 months between pregnancies). These challenges lead to a vicious cycle of high morbidity and high mortality and, thus, adverse child health outcomes.²

Unfortunately, malnutrition is not a public priority in many developing countries including Pakistan due to the lack of essential resources (eg, low tax-to-gross domestic product ratio or adverse balance of payment situation) and expertise (eg, human resources, technology, and a general understanding of the issue). Furthermore, in most developing countries, obesity is not a topic of public debate. For example, in Pakistan, it was only in 2012 that data