

## Interfaces and “Silver Bullets”: Technologies and Policies

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**Abstract** *This paper discusses the understanding of complex health events, such as the pandemics involving SARS-CoV-2. It supports that simplifying the issue to the point of considering it just a consequence of contact between a pathogen and a susceptible human being overly weakens the effectiveness of the mitigation strategies. It sustains the need to emphasize the interfaces underpinning the construction of the pandemic complexity and considers them as central elements in its coping. It understands these interfaces as structuring elements of the process and relativizes the simplification strategies expressed in “silver bullets” – usually an industrial health product. Finally, it circumscribes this viewpoint by examining the interface between industrial health technologies and political variables that modulate people’s access to them.*

**Key words** *Policies, Health Planning and Management, Science Technology and Society, Epidemiology, Collective Health*

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In 1970, as part of the medical school curriculum, I attended the discipline that addressed respiratory diseases: “Tisiology and Pneumology”. While honored under this discipline, one of the first classes solemnly declared that ‘Tuberculosis was no longer a public health problem’, and that the emphasis of the course would be lung cancer. The ‘overcoming’ of tuberculosis was based on the discovery of effective drugs against it and the implantation in Brazil, in the 1950s, of the double regimen (streptomycin and PAS) and then the triple regimen, with the addition of isoniazid, which were the “silver bullets” that would defeat the disease. As for lung cancer, the growing interest stemmed from the spectacular results of pioneering British epidemiological studies (Doll and Bradford-Hill), also in the early 1950s, which associated smoking with this type of cancer. Once the ‘risk factor’ was identified, the path to control was open, giving rise to yet another “silver bullet”.

My teachers were utterly off-target. In the case of tuberculosis, the emergence of multidrug-resistant strains resulting from the early abandonment of treatment, followed by the outbreak of the HIV/AIDS epidemic in the 1980s, led to a further explosion of the disease, which was compounded by the deteriorated living conditions in various places on the planet and the environmental disaster. As for cancer, the overdetermination of the economic interests of the large tobacco industry and global communication networks (TV) was not taken into account. These were the great allies of the disease that made its indicators only improve in this century and, even so, leaving a good part of the world of poverty out of it.

My masters’ misconception lay in underestimating the complicated dynamics of the two diseases, and this should be expanded to all mass diseases, especially those spreading worldwide. More recently, this intricacy brought about five epidemics (SARS/Corona, MERS Corona, EBOLA, H1N1 Influenza, and COVID-19) at the beginning of this century, and the last two were pandemics. Another threat did not fully materialize, called “AvianFlu” (influenza H5N1). Among us, mention should also be made of the periodic outbreaks of arboviruses transmitted by vector *Aedes aegypti* (which had been eradicated from the country in 1955) and the poorly explained recent outbreak of wild-type yellow fever invading urban populations.

I understand that if we consider that the COVID-19 pandemic dynamics can be subsumed to the interaction between a pathogen and a susceptible human, not only will we not be able

to have a favorable result in its mitigation, but we will also be subject to other “surprises” soon. These episodes are highly complex, and examining the interfaces between the countless variables involved in determining these episodes is essential for an adequate approach to COVID-19.

In this regard, metonymically, I imagined the pandemic as a soccer ball, a sphere in which the underpinning “buds” are joined by seams that knit them tightly together and tension them. Much more than a juxtaposition, the unveiling of the interfaces and the intervention on them are structuring parts of the organization of the understanding of a health problem and the formulation of strategies to overcome it. In other words, interfaces are spaces of tension and interaction between the different dimensions of the problem, essential elements in its dynamics, and the results of its confrontation. Going back to the ball, its seams-interfaces are structural elements, as important as the buds. Without them, the ball would be impossible. Without intervening on the interfaces, addressing COVID-19 is doomed to failure, at least in the sense of avoided suffering and death. A generalized theoretical development of the particular case exposed here has been the object of a study by Naomar de Almeida Filho, who, in a recent paper, explains concepts related to complexity, hierarchy of variables, and interfaces in the epidemiological field<sup>1</sup>.

In this text, my task is to discuss the technological-political interface in the COVID-19 dynamics. Several manifestations are out there, and I would like to start with the first and, perhaps, more widespread, which concerns technological-productive choices in global drug, vaccine, equipment, and test manufacturing companies required in health. These choices rarely employ scientific-epidemiological criteria of magnitude, severity, and social relevance. In most cases, they adhere exclusively to financial profitability criteria. This type of calculation governs most global health care industry decisions regarding what to research, develop, and produce. In some cases, this profitability is not immediately expressed in direct commercial returns (sales), but in marketing operations that project the company in the global scenario. A striking and current example of this last modality is being operated by several companies advertising products that do not yet exist during COVID-19, and that, in many cases and for several reasons, will not enter the market. The scarcity of new releases of antibiotics required to eliminate bacterial strains increasingly resistant to those currently available is an exam-

ple. A similar situation is that which causes the discontinuation of essential, traditional low-cost drug production lines due to their low profitability, which was the case of the recent global shortage of benzathine penicillin, essential for the treatment of syphilis, whose prevalence has been increasing worldwide. More recently (06/2019), we could mention another example: Enbrel is the trade name of Etanercept, a drug marketed by American multinational Pfizer, which is very effective in controlling rheumatoid arthritis. It is no longer protected by a patent, and generics are sold in the market. A few years ago, the company had some evidence that the drug could help control the progression of Alzheimer's disease, but gave up clinical trials and hid the evidence, under the argument that drugs would be costly. They did not want to continue because as Enbrel is no longer protected by patents, it would have to share the market with the existing generics if the evidence was confirmed<sup>2</sup>.

This type of tension at the technological-political interface is the result of how companies are structured in this long global financialization situation. As a rule, they are publicly traded companies with shares traded on stock exchanges. Their shareholders are investors from several sectors whose control of the company's decisions has no connection with the health sector. These investors choose the companies' executive directors, who are replaced if they do not achieve the expected financial results.

It is essential to point out that a severe ethical problem usually underlies this interface, which is to abandon the fundamental concept that all lives are equal. This is because production is directed primarily to national or regional markets whose populations have enough income to consume these products, usually in countries housing the companies – remember that the global health industry is oligopolized. In the case of pharmaceutical companies, the 10 largest companies control 40% of the world market. There are currently six Americans, two Swiss, one British, and one French. We should also remember that, currently, most vaccine manufacturing companies have been bought by giant pharmaceutical companies, absorbing their culture, which has led the then CEO of Novartis, Daniel Vasella, in 2009, to refuse to donate the H1N1 flu vaccine to impoverished countries, a request made by the then Director-General of WHO, Margaret Chan, under the claim that it was necessary to ensure financial income to cover investments made in the development and production of the vaccine<sup>3</sup>.

Drugs and vaccines against COVID-19 are bound to be launched at some point in the current pandemic situation, and tensions in this interface will likely be exacerbated. Despite the WHO's efforts to build a policy of establishing patent pools and voluntary licensing of drugs and vaccines against COVID-19 for emerging countries, middle-income countries like Brazil will likely find a hard time to be part of this list. Maker of drug Remdesivir, Gilead Sciences has voluntarily licensed patents for the drug to six Indian and Pakistani generic companies to produce and market their product at more affordable prices for 127 countries, and, unfortunately, Brazil is not on that list<sup>4</sup>. In vaccines, besides the difficulties posed by patents, another hardship is related to the production capacity of one or more vaccines, for a substantial global target population. Choices will be made concerning priorities for countries that will receive vaccines and, within each country, target populations segmented by epidemiological risk.

Another type of tension in this technological-political interface in health will be better characterized as technological-geopolitical and directly linked to the current pandemic. It concerns the rupture of what economists call global production chains. This term has been developed throughout the economic-financial-commercial globalization process. It means that the components of an industrial product can originate anywhere in the world and are integrated (assembled and finished) in the country authoring the project, which earns the highest revenue. Over the past 40 years, technology-based products increasingly integrate these global networks of component suppliers. It turns out that with the deteriorated global geopolitical situation (China-USA) and the pandemic outbreak, commercial frontiers were closed or, even when they remained open, gave preference to their nationals in a booming demand environment – respirators, PPEs, pharmaceuticals for local production of medicines, among others. This situation was observed, for example, in medicines manufactured in Brazil, essential for the treatment of severe cases in ICUs (e.g., Midazolam, Fentanyl), due to the difficulty of importing active ingredients for their formulation. It is not sure that this situation will return to the pre-pandemic situation due to trade tensions, and this should change our understanding and policies regarding the concept of national sovereignty.

Finally, I address another tension in the technological-political interface, in this case, linked to a public policy that plays a vital role in peo-

ple's access to technological-based industrial products. I refer to the intellectual property policy (IP), implemented in Brazil by the National Institute of Intellectual Property (INPI). In 1994, the newly created World Trade Organization promoted a global harmonization of IP rules (TRIPS agreements) broadly favorable to the interests of patent-holding countries – USA, EU, and Japan – which, in short, reoriented the original meaning of IP as an inducer of innovation, transforming it into a commercial policy tool for patent holders, restricting access to these products – drugs and vaccines in particular – in developing countries. While this attunement provides countries with a long period of adaptation to the new rules (up to 10 years), just two years later, Brazil enacted a patent law that embraced all the provisions of TRIPS and went even further in some aspects.

India, for example, used that entire period before joining. Within COVID-19, that reorientation threatens our population's access to future medicines and vaccines developed to combat it.

These four topics related to the technological-political interface involved in coping with COVID-19 are far from exhausting the interactions between technologies and policies, including partisan, public, or business policies. Just to illustrate, the entire chapter of the interface related to social technology-derived interactions intrinsic and closely linked to health policies was left out of the text. I take, as an example, the technology of the Family Health Strategy and the technological strategies linked to the national vaccine campaigns, both complex and permanently exposed to interactions with policies external to them.

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