



The Early Bird Catches the Worm: Why Routine Diagnostic Testing is Vital for Pandemic Preparedness

With the COVID-19 pandemic unfolding rapidly and measures becoming more drastic by the day, we should humbly accept that each outbreak catches us 'by surprise'. Even in countries with relatively good healthcare systems there are shortages of vaccines, protective equipment, specific treatments, and rapid diagnostic tests. These need to be handled once the disease has emerged, resulting in a response that appears to be continuously overtaken by events. Why aren't we better prepared? Can we be, and if so: how? The answer: our approach towards diagnostics needs to be revolutionized.

The crucial role of diagnostics

Diagnostic testing should not be restricted to determining who is infected or who should be quarantined. It should be a serious effort to map what pathogens are circulating within the population, enabling timely production of vaccines and drugs, and improving outbreak preparedness. This crucial monitoring role of diagnostics has often been neglected: Only a couple of years ago the international community agreed on an essential list of diagnostics to be developed, while a similar list for essential medicines has existed for over 40 years.

Routine diagnostic testing allows to identify the pathogens causing coughing, fever, and diarrhea across the globe. This allows the study of (families of) prevalent pathogens and ideally stimulates the

development of a long-term proactive, as opposed to reactive, research agenda. At the same time, it induces a more constant demand for products and opens new possibilities for standardization. This should improve the incentive for companies to develop and store the kind of products that the world needs in order to deal with outbreaks. This way, we can at the very least ensure that our therapeutic arsenal is in place when an outbreak occurs.

"The cost-effectiveness of point-of-care and syndromic diagnostics should be put much higher on the research agenda."

At the moment, however, the development of respiratory virus-related diagnostics and drugs are in a 'self-sustaining' deadlock: few respiratory viruses are 'actionable' via antiviral drugs and hence diagnosis is 'not useful', yet at the same time few drugs are developed because there are few diagnostic tests. This deadlock is mostly due to the fact that we only come into action when the disease already poses a significant threat, and as soon as the threat is gone, we lose interest. In short, we remain reactive, instead of being proactive. Policy and decision makers should, and unfortunately often fail to, acknowledge that the development of a proper response takes time. Pharmaceuticals and companies producing diagnostics are incentivized to follow demand instead of anticipating on it.

Routine diagnostic testing: Is it possible?

The development of efficient routine surveillance systems is challenging but not impossible. Imagine, for example, a network of drones responsible for specimen retrieval and delivery, or a network of autonomous mobile labs equipped with advanced diagnostic tools sharing real-time data to efficiently mitigate a disease outbreak. These types of systems are by no means futuristic, in fact many are already operational or in advanced piloting phases. New technology allows for faster diagnosis (e.g., quicker specimen transport) on a larger scale by facilitating testing in, for example, rural areas. Furthermore, they allow for sophisticated data collection. As such, they can play a vital role in the early detection and subsequent confinement of infectious diseases and routine mapping of pathogens in the population.

The key question is how to leverage new technological advancements to most effectively achieve routine surveillance. How, for example, can each system be operated in a cost-effective manner? How can different systems be combined most effectively? Should ownership of a system be private or governmental? Operations management can, and should, play an important role in answering these business model questions.

Achieving routine surveillance, however, is not merely a question of suitable business models and optimizing operations. Its success will fundamentally depend on appropriate funding mechanisms and governance structures. To develop a global surveillance system, funding streams should be adapted accordingly. This implies that more funding should go to low- and middle-income countries. Furthermore, funding should be allocated to avoid an outbreak, rather than respond to one. Strong global and local governance, combined with capacity building efforts, should assure that resources are distributed appropriately and equitably, in-country expertise is adequate, and knowledge sharing improves among countries.

Finally, the role of private industry should be taken into account: Manufacturers cannot be expected to sit idle while anticipating a future outbreak, especially if after the outbreak there is little or no market incentive to keep production operational or to maintain substantial levels of inventories. As a result, emerging infectious diseases are perceived as unattractive markets by companies. Maintaining a semi-constant level of demand (e.g., by global stockpiling) is a way to avoid this.

Will things change?

The current pandemic is yet another warning that the world can no longer shy away from the continuously increasing threat of infectious pathogens to individuals, global health, economy and security. As a society, we need to invest in routine diagnostic testing for infectious diseases, particularly those with outbreak potential. Understanding what pathogen is really at cause of a patient infection is not only important to administer treatment at the individual level, it is also important for public health. We will have to cleverly leverage new technology in combination with appropriate funding mechanisms, governance structures, and new incentive models for the industry, to realize a true and lasting impact on the preparedness and response to outbreaks and pandemics. *"Knowing is not enough, we must apply. Willing is not enough, we must do"* - Goethe.

This article is written by Dr. Rudi Pauwels, Founder & President of Praesens and the INSEAD Humanitarian Research Group (see <https://www.praesensfoundation.org/> and <https://www.insead.edu/centres/humanitarian-research-group> for more information). Dr. Rudi Pauwels is a pharmacologist, virologist and serial entrepreneur. He co-founded Tibotec and Biocartis, companies specialized in biotech products for infectious diseases. Praesens aims to provide access to health programs across the patient journey, from prevention to care, to communities in hard-to-reach regions and resource-limited settings. The INSEAD Humanitarian Research Group works closely with Praesens to help the development of a strong diagnostic system capable of serving routine health system needs.