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One Health's Readiness For The Upcoming Pandemic

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Abstract:

Animals are the source of most newly discovered infectious diseases. Routine surveillance currently focuses on known diseases and clinical syndromes, but the growing probability of new disease outbreaks highlights how crucial it is to identify unusual illnesses or pathogen circulation early on, before human disease manifests. The necessity of early warning surveillance at the interface of humans, animals, and the environment is the main focus of this viewpoint. The scale of pathogen genome sequencing has been revolutionized by the COVID-
19 pandemic, and if we avoid the mistake of developing them exclusively for the case at hand, the current investments in global genomic surveillance offer great potential for a novel, truly integrated Disease X (with epidemic or pandemic potential) surveillance arm. Instead of detection and sequencing protocols that concentrate on what we already know, generic tools use metagenomic sequencing as a catch-all method. Although it is technically difficult, creating agnostic or more focused metagenomic sequencing to evaluate uncommon diseases in humans and animals in conjunction with random environmental sample sampling to record pathogen circulation could offer a real early warning system. A true step forward would be to apply the lessons learned and introduce new vital partnerships in a One Health approach to preparedness, as opposed to reestablishing and strengthening the pre-existing silos.

Keywords: Health, pandemic, COVID-1G.

Introduction:

The ongoing COVID-19 pandemic has brought to light our society's extreme vulnerability to unanticipated infectious disease events.

Following the WHO R&D blueprint program's 2016 call for action on a list of potential pandemic threats, large-scale vaccine development initiatives supported by the Coalition for Emerging Disease Preparedness Innovations were initiated.
The reasoning behind this was that most newly discovered diseases originate in animals and are initially identified in areas with adequate health system infrastructure to enable etiology diagnosis before human disease outbreaks occur. With the changing risks of global spread, the timeliness of early detection is becoming a serious factor in our ability to detect outbreaks at the stage when they still can be contained. A second important component of readiness is the use of vaccines and/or non-medical interventions. This was demonstrated by a successful vaccine trial that was part of the outbreak response towards the end of the Ebola Zaire outbreak in West Africa, despite the extremely difficult circumstances of setting up a trial during an outbreak.Although community acceptance is not guaranteed, vaccination of at-risk populations was carried out as part of the response to subsequent outbreaks in the Democratic Republic of the Congo with some success, according to the trial results (Dos S Ribeiro C, 2018; Henao, 2017). Programs for early warning surveillance are required in order to detect uncommon disease syndromes early on and to quickly identify reservoirs and pre-diagnostic transmission after the causative agent or agents have been identified. Such monitoring is a difficult but essential part of being ready for the future. This is even more important for illnesses that have long incubation times or complications that appear months after the initial infection. Examples include the effects of Zika virus or Schmallenberg virus infection on fetal development in humans and animals during pregnancy, which were discovered long after the disease was first introduced and spread in the Americas and Europe, respectively (Shu Y, 2017).

One Health definition:

There are many definitions of the OneHealth concept, and the need for a comprehensive approach to infectious diseases has long been acknowledged. After decades of concentrating primarily on human medicine, this was revived in the early years of the twenty-first century, most notably during a meeting held in 2004 by the three international institutes that focus on food and the environment, animal health, and human health, respectively (WHO, FAO, and OIE). Using new approaches (e.g., syndromic surveillance), new tools (e.g., geographic information systems, remote sensing data, and molecular epidemiology), and bringing together various sectors and disciplines (e.g., medical, veterinary, population biology, information technology, economics, social science, and diagnostics), the parties convened a global think tank that came to the conclusion that the threat posed by EIDs was growing, that there were deficiencies in the organization of surveillance, and that new mechanisms of surveillance and response were needed. It is evident that the early detection of zoonotic diseases was the main focus of this definition. Based on an economic analysis of the net benefits of prevention, a World Bank report also argued for One Health surveillance (Timme RE, 2019).

The development of genomic surveillance:

Genomic pathogen surveillance was gradually finding its way into clinical diagnostics and public health prior to the pandemic. Perhaps the most advanced of these was bacterial food safety, where several nations have adopted next-generation sequencing and near-real-time data sharing between food, veterinary, and human clinical diagnostic microbiology (Bordier , 2020; Walldorf, 2017).

Early identification:

The success of such programs depends on the participation of citizens, caregivers, veterinarians, farmers, and others in the collection of vital samples, whether the program is risk-targeted monitoring, syndromic surveillance, or clinical diagnostic evaluation. Research has unequivocally demonstrated that capacity building only occurs when those who require the development of a new capacity also believe they are making a contribution and have something valuable to offer (Zinsstag , 2011).

Giving frontline settings the ability to analyze their own data and contribute to findings and/or publications before making them public could be one way to encourage this. For instance, we can concentrate resources on open science, non-commercial web-based solutions that will enable relatively inexperienced scientists working on the clinical and veterinary frontlines to perform basic data analyses and participate in global research rather than just witnessing their data being misused. Moreover, global clinical trial networks established to quickly address emerging infections can also enhance cooperation. An adaptive platform trial called REMAP-CAP, for example, is assessing possible COVID-19 treatments at 321 clinical sites across five continents (Hoffmann, 2012; Machalaba, 2017).

In order to determine how this methodology could be used to cease, cease to exist, as in stop existing, the VEO project is sampling the virome in major cities with the goal of developing intelligent surveillance strategies.

The necessity of One Health monitoring:

When putting new surveillance techniques into practice, health equity must be taken into account. Several examples of strategies that could be employed to promote health equity were found in this overview because they target populations that conventional surveillance might overlook.Future catch-all infrastructure would need to enhance data generation and access from other sources in addition to surveillance based on human clinical cases. Livestock clinical diagnostics are essentially the responsibility of the farmers, whereas human clinical diagnostics in many countries have been either fully funded or supported by government funding or significant investment from large international funding organizations. Although there is greater control over the spread of disease among livestock than among humans, host jumps between livestock are still possible. In addition to affecting livestock production, the emergence of new diseases in livestock could serve as a reservoir for diseases that could spread to humans (Faria NR, 2017).

Recommendations:

We must now, in the midst of the ongoing COVID-19 pandemic, determine how to apply the lessons learned to upcoming outbreaks and pandemics. Since animal reservoirs account for the majority of EID, information about the ecology of reservoir hosts and the factors that contribute to outbreak emergence should be part of risk-targeted surveillance.
enhance wildlife, the environment, and vector surveillance as well. There are examples of regional projects and initiatives that target mosquitoes and ticks for surveillance of particular vector-borne diseases, and some countries already have sentinel surveillance of wild birds for avian flu as part of an informal international collaboration. Such programs could be extended to detect a variety of important infectious agents and agnostic metagenomics, rather than just one disease.

Conclusion:

Infectious diseases could arise as a result of the intimate relationships that exist between people, animals, and the environment, and this possibility is growing. Therefore, understanding the intricacy of the relationships between people, animals, and the environment, the various farming systems and their biosecurity levels, preventing the introduction of disease for example, through vaccinations—and quickly controlling outbreaks through containment measures are all crucial components of preparing for future epidemics and pandemics. Collaboration beyond "normal" infrastructures, networks, and disciplines is crucial, as the pandemic has demonstrated. This also holds true for the use of open data infrastructures and genomics. If we don't make the same old mistake of developing them just for the case at hand, the current investments in global genomic surveillance offer great potential. A true step forward would be to bring these new vital partnerships together rather than rebuilding and strengthening the pre- existing silos.

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