

PREPARING SOCIETY AGAINST FUTURE PANDEMICS

Policy Perspectives from the Innovative
Biopharmaceutical Industry



Contents

Introduction	3
Aiming for effective and safe pandemic products within 100 days	5
• Pre-emptive Research & Development	6
• Regulatory convergence and reliance	6
• Immediate sharing of pathogens with epidemic and pandemic potential, and associated information	8
• Global clinical trial infrastructure	10
Equitable access to pandemic products for people worldwide	11
• Effective pandemic procurement	12
• Sustaining manufacturing capacity	14
• Strengthening health systems planning and delivery	17
• Improving global surveillance capabilities	19
References	20

Introduction

Despite the many laudable actions in response to COVID-19 by individuals, institutions, governments and companies around the world, the pandemic has taken an immense toll on lives and livelihoods. With more than 4.5 million reported deaths and 222 million infections worldwide,¹ and economic costs estimated at over US\$4 trillion of lost output,² this is the greatest public health crisis in a century. We can be certain that there will be future pandemics, fanned by both climate change and globalization. There is wide agreement that the world needs to be much better prepared for the next pandemic. Learning and applying the lessons from the continuing COVID-19 pandemic, as well as from other recent infectious disease outbreaks and epidemics, will be pivotal to this work.

Improving preparedness for future disease outbreaks with epidemic and pandemic potential is not a new idea; significant debate followed previous outbreaks such as the H1N1 influenza A virus, SARS (Severe Acute Respiratory Syndrome), Ebola and Zika. While some concrete actions were taken, it became clear during the COVID-19 pandemic that few were prepared for the scope and scale of response required. Governments, healthcare systems, multilateral organizations, regulators and other stakeholders have had to take unprecedented action to catch up with the pandemic and have been hindered in most cases by the lack of robust or adequately tested plans, pre-established structures, resources or processes, including at the global level. Despite the current strong political consensus to take action now, establishing the long-term, comprehensive and sustainable system needed to address an array of potential disease threats is a daunting challenge entailing substantial cost. The overall public financial investment required has been recently estimated at US\$15 billion a year.³

The biopharmaceutical industry is playing a vital role in the management of the COVID-19 pandemic. Together with numerous partners and the broader scientific community – and in certain situations risk sharing provided by external investment – the biopharmaceutical industry worked at record speed to develop multiple tools to address the COVID-19 pandemic, whilst helping to ensure continued supply of other important medicines to patients around the world. Thankfully, the industry already had many of the necessary building blocks in place. Investments over decades in cutting-edge medical technologies, underpinned by strong IP protection, enabled its swift response to COVID-19. Mobilization of large-scale at-risk investment from companies and governments in early 2020 led to unprecedented achievements in R&D, expansion of manufacturing capacity and production, at the same time safeguarding global supply

of other essential vaccines, diagnostics and medicines. These efforts have resulted in multiple safe and effective vaccines, the first being approved 326 days from the moment the threat was first identified.⁴ The industry learned and is still learning much from our successes, as well as from the inevitable challenges along the way, and will use this newly acquired knowledge to contribute to future plans.

While the world is still grappling with COVID-19, the global community also needs to look ahead to how we can be better prepared for the next pandemic. We need to develop bold but sustainable pandemic plans and make the necessary long-term commitments now in order to protect society in the future. Effective pandemic preparedness will require sustained political leadership, political will, global coordination, regulatory alignment, public-private partnerships, solidarity, and commensurate up-front and continuing financing.

The biopharmaceutical industry is committed to playing its part in further improving pandemic preparedness. Our vision for future pandemic preparedness is based on two ambitious objectives:

- 1 Aim to develop effective and safe pandemic products within 100 days of a new pandemic declaration.
- 2 Collaborate with governments, multilateral organizations, regulators, and other companies and sectors to ensure equitable access to those products for people worldwide.

Fundamental to achieving both objectives is sufficient, sustained public funding and human capital to support the continuum from discovery and development to deployment at scale. Effective governance and clear institutional roles and responsibilities remain of paramount importance.

We describe below some of the critical lessons we have learned so far in tackling COVID-19 and make a series of proposals for steps the industry and other stakeholders need to take for future pandemic preparedness. We look forward to working closely with all concerned stakeholders to protect the world against future pandemics.



Aiming for effective and safe pandemic products within 100 days

Society's ability to address emerging health threats depends on its capacity to innovate, create and scale up appropriate solutions quickly. The biopharmaceutical industry supports the ambition of the 100 Day Mission – set by stakeholders including the G7 group of countries, US and UK leaders, the Coalition for Epidemic Preparedness Innovations (CEPI), the World Health Organization (WHO), Gavi – the Vaccine Alliance, the Global Fund and others⁵ – to have safe and effective vaccines, therapeutics and diagnostics developed and available within 100 days of a new pandemic declaration. All stakeholders recognize the magnitude of this ambition and that, even if all the necessary building blocks described below are implemented perfectly, there is no guarantee of success. But industry is committed to playing its part alongside the other key stakeholders to be as well prepared as we can be.

Pre-emptive Research & Development

Lessons learned

COVID-19 saw unprecedented mobilization of the innovation ecosystem, which resulted in the delivery of several new vaccines, as well as therapeutics and diagnostics, in record time. The private and public sectors both invested substantial funds and actively pursued flexible collaborations that proved integral to the response. The rapid response also reflected many years of investment and scientific discovery in academia and within biotechnology and biopharmaceutical companies. This contributed significant experience with coronaviruses as well as powerful new technology platforms such as genomics, protein structural analysis, viral vector and mRNA vaccines, and therapeutic monoclonal antibodies.

Industry role

We are committed to investing in R&D on pathogens with epidemic and pandemic potential. We support evidence-based prioritization of target pathogens to build a portfolio of candidate vaccines, treatments and technologies, based on established as well as novel and promising technologies. We collaborate with researchers and experts from across the public and private sectors to support development through to manufacturing scale-up and distribution to facilitate a global response.

Asks to stakeholders

There needs to be global alignment on target pathogens and technologies. Continued robust IP protection, sustainable ‘push and pull’ incentives, and effective industrial policies are critical to fostering a life sciences ecosystem that delivers innovation for pandemics while continuing to pursue innovations for other unmet medical needs. Risk-sharing models, including advanced purchase commitments, have been shown to accelerate investment in preparing for pandemics where societal needs outpace the dynamics of normal market forces. A robust and transparent tracking mechanism for relevant progress and investment can identify gaps and guide corrective action.

Regulatory convergence and reliance

Lessons learned

During an outbreak, stringent regulatory processes remain essential to ensure the safety, quality and effectiveness of treatments and vaccines. National/Regional Regulatory Authorities (NRAs) have played a vital role. In addition, on a one-to-one basis and collectively, they have actively collaborated with industry to accelerate the development and delivery of safe and effective tools to combat COVID-19. Still, divergent data requirements and other non-uniform requirements such as labelling, packaging and dynamic expiry dates have increased the regulatory burden for manufacturers and their supply chains.

Industry role

We are committed to prioritizing patient safety and product quality at all times, including during public health emergencies, by adhering to the strictest scientific standards and highest ethical standards in product development and manufacturing. We will work in partnership and collaboration with NRAs to define the best science-based regulatory strategies for ensuring the availability of medicines and vaccines.

Asks to stakeholders

Pivotal NRAs should reach pre-pandemic agreement on the regulatory agilities to be used in a pandemic setting, such as pandemic preparedness/influenza mock-up approvals or approval of common elements of manufacturing platforms, with pathogen-specific data being reviewed at the time of the pandemic. This would allow manufacturers to make informed and streamlined decisions around clinical trial designs and data packages, dossier submissions and product packaging and labelling, as well as risk-appropriate changes to facilities and manufacturing processes to better ensure an adequate supply of quality medicines and vaccines. Continued international facilitation through the *International Coalition of Medicines Regulatory Authorities* (ICMRA), and networks such as the Association of Southeast Asian Nations (ASEAN), is also important.

Broader and transparent use of mutual recognition of approvals, reliance on the approvals work of other NRAs and work sharing between NRAs would reduce complexity, lighten the regulatory burden throughout the supply chain, and promote convergence of regulatory requirements and expectations. In turn this would increase regulatory effectiveness, further accelerate regulatory decision making and enhance the efficiency of global supply chains. Simplification of packaging requirements, acceptance of e-leaflets and more efficient global batch-release processes are also important.

As vaccines and medicines are deployed globally, the ability to review the benefit-risk profile of products as new data become available requires both global and national functional pharmacovigilance systems. The timely and accurate flow of safety data between health authorities, NRAs and developers/manufacturers enables early signal detection and prompt implementation of risk management strategies. According to WHO, these systems are not in place in many low- and middle-income countries (LMICs). This gap needs to be addressed and will have important population health benefits that go well beyond pandemic safety.



Immediate sharing of pathogens with epidemic and pandemic potential, and associated information

Lessons learned

The starting point for developing safe and effective medical countermeasures is the identification and sharing of the pathogen with epidemic and pandemic potential, and/or its genetic sequence data. Any delay in this process directly impacts the delivery times for new vaccines, therapeutics and diagnostics. Once the genetic sequence of COVID-19 was published in GISAID, vaccine candidates were produced within 48 hours, clinical trials started within 63 days and the first vaccine was authorized for emergency use in 326 days.

Industry role

We are committed to ensuring the highest safety protocols for our laboratories and only to use shared samples and genetic sequence data for global health research purposes and for the production of vaccines in the event of epidemics and pandemics.

Asks to stakeholders

A comprehensive multilateral commitment is needed to support the rapid sharing of pathogens and associated information and avoid delays. Only on this basis can we make sure that diagnostics, vaccines and therapeutics are well-matched to circulating strains or variants, have the highest possible effectiveness, and are rapidly manufactured and supplied. The national implementation of the Nagoya Protocol and its associated access and benefit-sharing (ABS) provisions under the Convention on Biological Diversity (CBD) is proving counterproductive for timely access to pathogens in many countries. It has already resulted in delays in the sharing of both genetic

sequence data and physical samples for a number of pathogens including influenza, Zika and Ebola. Proposals to bring digital sequence information into the scope of the Nagoya Protocol will significantly increase the risk of delays. Mechanisms that require commercial negotiations before access is granted, such as those proposed for the new ‘Biohub’, could also cause unnecessary delays and provide a significant disincentive for biopharmaceutical companies. We request that all countries applying the Nagoya Protocol or other national ABS requirements to human pathogens reconsider their position, exempt them from the scope of any relevant legislation and associated bilateral negotiations, and commit to facilitating fast and predictable access to pathogen samples and their related sequence information.

Society’s ability to address emerging health threats depends on its capacity to innovate, create and scale up appropriate solutions quickly. The biopharmaceutical industry supports the ambition of the 100 Day Mission – set by stakeholders including the G7 group of countries, US and UK leaders, the Coalition for Epidemic Preparedness Innovations (CEPI), the World Health Organization (WHO), Gavi – the Vaccine Alliance, the Global Fund and others – to have safe and effective vaccines, therapeutics and diagnostics developed and available within 100 days of a new pandemic declaration.

Global clinical trial infrastructure

Lessons learned

Several clinical trial networks and platform trials implemented during COVID-19 delivered rapid and important results. They enabled speedy recruitment of large numbers of COVID-19 patients and supported clinical studies to test the quality, safety and efficacy of multiple repurposed medicines. However, many small, inadequately conducted trials were also initiated in COVID-19 patients that were incapable of delivering meaningful results. Evaluation of these trials put additional strain on already stretched clinical research and regulatory authority review resources.

Industry role

We are committed to producing high-quality evidence supporting the efficacy and safety of our products, both prior to and during pandemic conditions, and maintaining the highest levels of quality and ethical standards, transparency and accountability in conducting clinical research, taking into account the specific situation. We conduct our studies in all relevant regions and populations of the world and rapidly publish the results.

Asks to stakeholders

Networks of clinical sites and trained clinicians capable of rapidly conducting high-quality studies around the world should be established, taking into account the evolving standard of care during future pandemics. Clinical trials must be better coordinated in the future to improve efficiency, prevent duplication and provide globally relevant results while avoiding bureaucracy and delays. Standardized protocols should be developed that can be rapidly and uniformly deployed to speed up knowledge generation. The need for clinical trials should be evaluated based on the data that already exist for different pathogens, recognizing the importance of good-quality real-world data.



Equitable access to pandemic products for people worldwide

The case for global solidarity during a pandemic could not be stronger. “No-one is safe until everyone is safe” captures the reality of the unpredictable and rapid spread of an infectious pathogen capable of generating further waves of disease.

Hence the establishment of the Access to COVID-19 Tools (ACT) Accelerator, a global collaboration designed to accelerate the development and production of, and equitable access to, COVID-19 tests, treatments and vaccines. COVAX is the vaccines pillar of the ACT Accelerator, providing a platform to support the research, development and large-scale manufacture of a wide range of COVID-19 vaccine candidates and negotiate their pricing.⁶

Effective global governance remains a critical component of effective pandemic preparedness and response to ensure that the capabilities and competencies of each relevant stakeholder are utilized, coordinated and integrated around agreed shared objectives.

However, while the production of COVID-19 vaccines increased in just a few months from zero to more than 7 billion doses by the end of September 2021, and with an astounding estimate of over 12 billion doses by year-end, they are not reaching priority populations worldwide equally.⁷ Immunization systems have had to be rapidly adapted to build surge capacity and to orient vaccination programs towards adults. Elsewhere, despite company commitments to supply doses to LMICs, insufficient uptake has exposed weaknesses in infrastructure and health systems. Many routine health services have been halted or postponed, resulting in increased risk from other infectious disease outbreaks and treatment delays. Countries lacking robust primary care services or universal health coverage (UHC) or with high levels of chronic disease have been particularly hard hit. Vaccine misinformation and hesitancy amongst the public, including healthcare professionals, continues to limit global recovery from COVID-19. It is imperative that the world prepares better to ensure that all people have an equal and fair chance to receive pandemic products, even when supplies are limited.

Effective pandemic procurement

Lessons learned

Equitable and early access to personal protective equipment (PPE), diagnostics, surveillance tools, treatments and vaccines globally to prioritize those most at risk is a critical challenge during any pandemic. The establishment of the COVAX Facility for COVID-19 vaccines was a big step towards equitable access for lower-income countries, with Ghana and Côte d'Ivoire being the first countries to receive the delivery of hundreds of thousands of doses in February 2021. Speed of procurement was critical but, despite rapid mobilization, the COVAX Facility was not sufficiently funded or set up in time to secure advance purchase agreements for doses on a par with high-income country (HIC) procurers. While sharing of excess doses between countries has helped to advance COVID-19 vaccine equity, it is not a reliable and predictable solution to ensure lower-income countries are not left behind in the future. HICs had earlier access to vaccines not because of their ability to produce them, but because they had the financial capacity to procure vaccines at volume and the infrastructure to implement a vaccine program for age groups beyond infancy.

Industry role

As we scale up production, we will continue to work closely with national and regional authorities and global initiatives to make as many doses available as fast and as safely as possible to meet the global demand.

We commit to support the allocation principles agreed by multilateral organizations and country leaders to enable equitable access for future pandemic vaccines and treatments at the supranational and national levels. We will work with governments and funders/payers to facilitate the timely availability of affordable pandemic-related products when they are approved. Individual companies will independently develop a tailored approach including not-for-profit supply, tiered pricing, voluntary licensing and donations.

We will also work with potential purchasers to draft conditions of future procurement contracts so that contracts can be executed rapidly.

Asks to stakeholders

When a pandemic is declared, sufficient, dedicated and sustainable financing and technical assistance must be available immediately to countries with limited or no capacity to finance their own pandemic purchases and deployment activities. This will support early procurement and country readiness to absorb and deploy diagnostics, treatments and vaccines. Encouraging regional country groupings to facilitate procurement would also add value, where experience from COVID-19 can be deployed to avoid unnecessary delays. These measures should also ensure uninterrupted supply for existing essential medicines and vaccines to protect public health and avoid an additional burden on healthcare systems.

We are encouraged by proposals from the global community for one or more centralized procurers for LICs in pandemics, with clear mandates and geographic responsibilities, and a clear funding and allocation mechanism. A commitment to permit pandemic health-product-related exports and imports is also critical, especially at times when demand exceeds supplies.

Stakeholders need to develop draft contract provisions that detail their respective responsibilities. This should involve sufficient visibility and clarity on volume requirements, procurement timelines and processes, and anti-corruption measures. The draft provisions may also include advance market commitments and/or responsible stockpiling. No-fault compensation systems and liability protections are also essential prerequisites for rapid procurement and deployment under emergency conditions.



Sustaining manufacturing capacity

Lessons learned

The global demand for products proven to help in the fight against a pandemic is enormous and immediate. The COVID-19 pandemic has seen supply chains stressed to extreme levels, especially for PPE, diagnostics and vaccines. From the outset, biopharmaceutical companies accelerated manufacturing scale-up of treatments and vaccines. While scientists worked in the laboratories, manufacturing and supply-chain experts worked in parallel to ensure manufacturing capacity was available once the products were shown to be effective and safe.

Vaccine manufacturers have invested billions to increase capacity at unprecedented speed, by scaling up their own facilities and through more than 300 partnering agreements. This substantial effort is rapidly increasing global production of COVID-19 vaccines month on month, from about 100 million doses in January 2021 to more than 12 billion doses forecast in December 2021.⁸ Annual capacity of over 20 billion doses of COVID-19 vaccines is expected in 2022, which is more than enough to cover the world's population. As more therapeutics are approved, manufacturers are working to ensure that supply is sufficient to meet the rapidly changing patterns of global demand.

However, even under optimal conditions, there is a minimum time lag of 6-18 months or more for new manufacturing capacity to be readied, tested, certified by regulators and brought online – a significant lag during an acute pandemic. Export and trade restrictions on vaccines and their complex input components (a vaccine may have over 250 different inputs) have also limited the global capacity for COVID-19 vaccine manufacture and supply. Indeed, upstream supplier capacity for components and starting/raw materials has been a limiting factor for vaccine production, reinforcing the

need for robust supply chains, economically viable stockpiling of raw materials and the rapid, free flow of these materials across borders.

Furthermore, while supplying pandemic vaccines and therapies is critical, it is also important to ensure an uninterrupted supply of non-pandemic vaccines and therapies that are relied upon by patients and public health programs around the world. After initial concerns, the supply of non-COVID-19 related medicines and vaccines has held up during the pandemic but continues to be under significant strain.

Despite this progress in ramping up supply, the slow vaccine delivery to lower-income countries has led to calls for yet more manufacturing knowhow and capacity to be created, with a focus on underserved regions such as Africa.

Industry role

Individual companies are committed to working with governments on new initiatives to ensure the necessary global manufacturing knowhow and capacity to vaccinate the world's population in the fastest possible timeframe during a pandemic. Many companies are already working to expand current manufacturing capacity through voluntary partnerships and innovative approaches to the design of facilities. In the longer term, a coordinated strategy to locate new capacity across all regions of the world, supported by increased roll-out of vaccination programs against current diseases, would also facilitate effective scale-up for future pandemic vaccines.

We will also look to standardize upstream supply components and processes where possible, to simplify manufacturing and to increase interoperability of facilities between vaccines and technologies in compliance with applicable regulatory and legal restrictions.

Given the complexity and global reach of vaccine supply chains, including for inputs, manufacturing scale-up also needs underpinning by open trade policies. During the COVID-19 pandemic, industry experienced first-hand the challenges presented by trade barriers including export controls, national prioritization mechanisms and inefficient border procedures. Furthermore, tariffs on many critical medical goods, including inputs, remain too high, serving neither patients nor those wanting to scale up manufacturing.

We are therefore committed to advocating for the free movement of vaccines and therapeutics, including the crucial ingredients, manufacturing components and skilled workers to make them, all of which come from around the world.

Asks to stakeholders

A holistic and strategic vision and roadmap for flexible, sustainable global manufacturing capacity needs to be developed with relevant stakeholders from the private and public sector. The jointly developed roadmap should propose how the extensive upstream and downstream COVID-19 vaccine capacity should be utilized in

the future and include provisions for strengthening national preparedness capabilities, trade and regulatory policies, human resource training, and support for manufacturing of upstream components, raw materials and consumables. The goal should be to achieve a healthy market dynamic over time, including in inter-pandemic periods, that provides appropriate incentives to balance global access and innovation.

Pandemics are likely to require significant surge capacity that generally does not exist without stopping the production of other products. Planning the construction of any new vaccine or medicine capacity is a complex and potentially costly undertaking that will require defined public health needs, policy goals, technological and geographical ambitions, as well as close collaboration between the public and private sectors. Building the necessary capabilities will need sufficient long-term funding and realistic timescales.⁹ Additionally, to create reserve/surge capacity beyond routine commercial requirements, industry would need incentives to install and validate it; normal business practice is to optimize production capacity for efficiency and reliability by aligning to expected demand. Long-term considerations should include a sustainable supply/demand picture to fund the ongoing operation of the facilities and maintain readiness of surge capacity. There will need to be a strategy for running them routinely to ensure well-maintained and productive facilities while retaining qualified personnel.

Countries must ensure coordinated and coherent open trade policies, including in times of a pandemic, to allow the expeditious movement of key goods and avoid arbitrary export bans, restrictions and disruption for all pandemic-related technologies, associated ingredients, manufacturing components and skilled workers.

Planning the construction of any new vaccine or medicine capacity is a complex and potentially costly undertaking that will require defined public health needs, policy goals, technological and geographical ambitions, as well as close collaboration between the public and private sectors. Building the necessary capabilities will need sufficient long-term funding and realistic timescales.



Strengthening health systems planning and delivery

Lessons learned

There is a strong interdependency between robust health systems and global health security. Countries with robust and resilient health systems as well as comprehensive, practical pandemic preparedness and response plans have generally fared better against COVID-19. Patients with non-communicable diseases (NCDs) have had worse outcomes from COVID-19 than healthy patients. Strong health systems which have the mass immunization structures in place for vaccination for all age-groups will be better prepared in the event of outbreaks and thereby help prevent them becoming pandemics.

Delivering billions of doses of vaccines and immense quantities of diagnostics, PPE and novel treatments has tested supply chains for downstream delivery around the world during COVID-19. In some countries, the infrastructure and capability to distribute and administer a surging volume of COVID-19 health products to the population became or will be a limiting factor, especially outside urban centers.

Industry role

We are committed to providing our on-the-ground experience and expertise to support the actions of governments and other stakeholders to improve health systems and pandemic preparedness, as well as in building joint planning systems with purchasers and the downstream delivery chain to help manage surges in demand during future pandemics. We will work to secure continuity of supply for all essential medicines, vaccines and diagnostics for patients with other life-threatening diseases.

Where possible, we will seek to develop appropriate pandemic products that require uncomplicated global transportation, storage and administration.

Asks to stakeholders

We urge governments to implement policies and decisions to achieve the United Nations 2030 targets for Universal Health Coverage (UHC) and related Sustainable Development Goals (SDGs) and address other health threats and issues including antimicrobial resistance (AMR).

Within the context of UHC and SDG implementation, pandemic preparedness and response plans should be developed to cover systemic infrastructure needs such as scaled-up intensive care unit (ICU) capacity, continuity of care for non-pandemic patients, and measures to tackle high sickness rates in the healthcare workforce. Specific tools and capabilities need to be built up, including mass diagnostic screening, robust track and trace systems, as well as stocks of PPE, medical devices such as ventilators and medical supplies such as oxygen. Regular data-driven consultations between manufacturers, distributors and health authorities are vital to getting products to the right place at the right time in the right quantity. Plans also need to enable the rapid delivery of population-wide vaccination programs and ensure post-licensure safety monitoring and information sharing. Reliable, well-maintained and cost-effective cold-chain equipment is vital to ensure adequate, sustainable vaccine storage for current and planned routine vaccines, and to reduce maintenance requirements and running costs. A greater focus on non-pandemic routine immunization would expand vaccine delivery channels and strengthen the resilience of the health system.

The development and implementation of effective community engagement strategies will be critical, especially to communicate the value of vaccination for public health and economic recovery, overcome vaccine hesitancy and mitigate the impact of misinformation related to the virus and the vaccines.

A comprehensive system of liability protection for the public and all parties working to deliver and administer an effective pandemic response is essential to reassure the public and maintain confidence in immunization programs, particularly through the provision of no-fault, no-delay vaccine injury compensation programs and legislative protections from unwarranted, lengthy and costly litigation.

Isolated examples of fake treatments and vaccines for COVID-19 are of concern. Enforcement of laws and local regulations, including training of stakeholders to identify fakes and clamp down on those supplying them, is essential.

Improving global surveillance capabilities

Lessons learned

The COVID-19 pandemic has demonstrated the risk of disease spillover from animals to humans and the need for robust global surveillance systems that can detect disease outbreaks before they can spread widely.

Industry role

We are committed to the rapid sharing of relevant data and information that may provide insights into emerging diseases and their control, arising from our monitoring, clinical trials and other activities. This includes supporting monitoring systems such as WHO's well-established Global Influenza Surveillance and Response System (GISRS).

Asks to stakeholders

We need a greater understanding of the risks from interlinkages between human and animal health (i.e. the 'One Health' approach) and from unknown viruses by conducting comprehensive viral mapping projects.

All countries should have in place core capacities for early-warning disease surveillance systems that ensure timely and clear information sharing and systematic collection, analysis, interpretation and dissemination of health data, pathogen samples and digital sequence information, as required by the International Health Regulations. Robust surveillance systems are not only important for the detection of emerging pathogens pre-pandemic but also for the identification of emerging variants during a pandemic. This is needed to inform treatment/vaccine development and national vaccination policies as well as global deployment strategies. Priority should be given to multilateral support for use of artificial intelligence/modelling to compensate the current absence of interoperability across databases. Strengthened control measures to stop zoonotic transmission of disease are essential in parallel with building global and local preparedness measures to counter pandemic threats.

Additionally, we request collaboration to develop harmonized approaches to surveillance of disease in humans to help inform clinical development programs, target product profiles, regulatory planning and safety monitoring, for example. Such an approach could include standardized reporting of transmissibility, case numbers, severity of disease, deaths and identification of risk groups.

References

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