Life Sciences
SUPERMIND

Public Health Preparedness, Sciences, & Technologies

Create A New Field of Public Health Technology

The coronavirus pandemic revealed multiple weaknesses in public health infrastructure, including the dearth of technology leadership and expertise in the design of public health programs, products, and initiatives. The pandemic has sparked innovative partnerships between technology, design, medical and public health professionals to develop solutions addressing COVID-19. Collaborations generated from addressing the pandemic can serve as a model for how public health and technology experts can and must work together to respond to this global emergency as well as to future health challenges, such as the chronic disease pandemic and the effects of the climate crisis on health. These approaches can also be applied to create a more affordable, inclusive, and equitable healthcare future. To achieve these goals, a new field of public health technology should be established with a certificate/degree program to train a generation of interdisciplinary leaders who can serve in the public and private sectors to accelerate the modernization of 21st century public health infrastructure.

Deploy Advance Warning and Surveillance Systems for Infectious Disease

Early detection of infectious disease outbreaks for both existing and new pathogens is critical for public health resiliency. Through mass screening and surveillance testing, communities can catch outbreaks before they happen rather than being behind the curve and reacting to patients with symptoms. Inexpensive, consumer-friendly virus detectors should be developed for homes and offices. Labs and regulatory bodies should shift from traditional diagnostic testing paradigms to large-scale mass screening and surveillance testing. Wastewater testing should be integrated with public health strategies to trigger pooled community testing and rapid individual testing. Specific attention should be paid to emerging pathogens that acquire concerning properties. Population immunity could also be monitored to assess vulnerability to outbreaks. Empowered citizens and community researchers familiar with local environments can act as "citizen sensors" to monitor environmental and societal factors important to public health.

Develop New Technologies for Diagnostics and Transmission Control

A variety of novel technologies should be developed and deployed to benefit public health. High quality, comfortable and fashionable KF94-level masks with high-filtration (>99% of submicron particles blocked), should be designed and mass produced at low cost for widespread public use. Label-free sensing technologies, for example, utilized in a hand-held bioelectronic system, could be used for the rapid, high-sensitivity detection of diagnostic markers for non-invasive screening tests in saliva or breath.

A host of low-cost, open source technologies should be developed and deployed including: at-home, saliva-based molecular diagnostic tests; pulse-dose oxygen saving devices; full-face "snorkel" masks based on reusable PPE; and other associated mask technologies like cotton-candy machines for N95 mask filter materials and low-cost particle filtration efficiency test systems.

Implement Effective Test, Trace, and Quarantine Approaches

During infectious disease outbreaks, identifying and sequestering infected patients is a critical strategy for mitigating disease spread. Ubiquitous testing, even in resource constrained areas, can be aided by utilizing open-source protocols for testing. Fixed kits can be prone to supply chain disruptions and price increases, while robust, open source testing protocols can allow for reagents to be substituted if supply chains are compromised. During a pandemic, better incentive systems, for example a "Global Rewards" program, should be adopted to reward those who exhibit responsible public health behavior. Contact tracing capabilities at the state and local level should be augmented with funding to flexibly expand as outbreaks occur. While hundreds of exposure notification applications have been developed for contact tracing, these applications should be rigorously analyzed for efficacy and piloted for real world use.

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