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India must build a permanent, pathogen-agnostic preparedness ecosystem: Experts

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Discussion repeatedly returned to the central role of diagnostics and surveillance systems in pandemic response at the National Diagnostics Conclave



At the first National Diagnostics Conclave hosted by Centre for Cellular and Molecular Platforms (C-CAMP) in Bengaluru, the panel discussion titled *“From Risk to Readiness: Enabling Pathogen Prioritisation and Pandemic Preparedness for India and Beyond”* brought together leading voices from public health, academia, government, philanthropy, global finance, and industry to deliberate on India's evolving preparedness strategy for future pandemics.

The session was moderated by Dr Ravi Kumar Banda, Advisor Committee Member, C-CAMP InDx, who opened the discussion by urging participants to rethink pandemic preparedness beyond crisis management and view it as an opportunity to build stronger and more resilient healthcare systems. He stressed that while countries prepare for future outbreaks, they must also not overlook the everyday health burdens that continue to cause millions of preventable deaths, particularly among vulnerable populations.

The panel featured eminent experts including Dr Asha Mary Abraham, Senior Professor, Department of Virology, CMC Vellore; Dr Chitra Pattabiraman, Program Officer – Diagnostics, Infectious Diseases, Gates Foundation; Dr Guru Rajesh Jammy, Senior Health Specialist, World Bank Group; Dr Swetavalli Raghavan, Advisor – Antimicrobial Resistance (AMR), Government of Karnataka; Dr Dhanasekaran Shanmugam, Senior Principal Scientist, CSIR-National Chemical Laboratory (NCL), Pune; Rupam Chaudary, Global Segment Head – Medical & Pharma, L&T Technology Services; and Jakob Williams Ørberg, Senior Scientific Lead, Novo Nordisk Foundation.

Together, the panel explored scientific, technological, policy, and societal dimensions of pandemic readiness and emphasised the need for long-term, coordinated preparedness mechanisms rather than temporary emergency responses.

Opening the scientific discussion, Dr Asha Mary Abraham observed that future pandemics are most likely to emerge from respiratory and zoonotic pathogens, particularly influenza and avian influenza strains crossing into human populations. However, she cautioned that pandemic preparedness should not focus solely on hypothetical future threats while ignoring the present burden of infectious diseases already affecting communities. She highlighted the growing impact of climate-sensitive vector-borne diseases such as dengue, chikungunya, and West Nile virus, as well as bacterial infections, parasitic diseases, and antimicrobial resistance. Drawing from her work in virology and diagnostics, she emphasised the importance of multiplex testing systems capable of simultaneously detecting multiple pathogens associated with similar clinical syndromes. She explained how advanced molecular surveillance and metagenomic sequencing could help identify unusual pathogen activity at an early stage, potentially enabling health systems to detect emerging outbreaks before they escalate into epidemics or pandemics.

Providing the public health governance perspective, Dr Swetavalli Raghavan stated that pandemic preparedness should become a routine operational function embedded within governance systems rather than an emergency-only response mechanism. She remarked that preparedness should become as routine as everyday life, where systems automatically function without requiring extraordinary mobilisation during crises. She revealed that the Government of Karnataka is currently working on developing a state-level pathogen priority list to better guide surveillance and response planning. Importantly, she argued that the biggest “pathogens” often hindering preparedness are systemic and administrative in nature, including bureaucratic inertia, fragmented leadership, funding constraints, weak logistics, and lack of accountability. According to her, solving these structural issues is equally critical as addressing biological threats.

The discussion repeatedly returned to the central role of diagnostics and surveillance systems in pandemic response. Dr Chitra Pattabiraman emphasised that future preparedness depends on rapid diagnostics platforms capable of being deployed within days of identifying a new pathogen. Reflecting on lessons from COVID-19 and monkeypox outbreaks, she discussed how automation, robotics, liquid-handling systems, artificial intelligence, and scalable assay optimisation could dramatically reduce the time required for diagnostic development. She highlighted that future systems should be capable of reducing diagnostic deployment timelines from months to less than two weeks. She also stressed the importance of maintaining readiness through advance preparation of reagents, master mixes, and platform technologies so that developers are not forced to rebuild infrastructure during emergencies. Additionally, she pointed out the importance of rapidly analysing genomic mutations and variants to ensure that diagnostic kits remain effective as pathogens evolve.

Expanding on surveillance challenges, Dr Dhanasekaran Shanmugam discussed how wastewater surveillance and community-based monitoring systems are generating enormous amounts of epidemiological data, but there remains uncertainty about how this information should translate into policy action. He described situations where wastewater systems showed viral spikes larger than those seen during the Delta wave of COVID-19, despite minimal clinical cases being reported in hospitals. This raised important questions regarding interpretation, response thresholds, and stakeholder responsibilities. He noted that researchers often generate critical data through surveillance and diagnostics projects, but challenges remain in determining who ultimately uses the information and how it informs decision-making. He emphasised that data-sharing frameworks, coordination between institutions, and clear public health action pathways are necessary for surveillance systems

to achieve their intended impact.

From an international health systems and financing perspective, Dr Guru Rajesh Jammy advocated for the creation of a pathogen-agnostic health ecosystem capable of responding to any infectious threat rather than preparing separately for individual diseases. He outlined a strategic framework based on four pillars — “Connect, Detect, Protect, and Treat” — designed to strengthen overall health-system resilience. He explained that preparedness extends beyond merely identifying pathogens; it also includes ensuring healthcare delivery systems, regulatory mechanisms, financing structures, and innovation ecosystems are capable of functioning rapidly during crises. He stressed the need for stronger collaboration between governments, regulatory agencies, innovators, and financial institutions to create pathways that support rapid product development and market deployment. He also proposed the idea of a “100-day diagnostic rollout,” similar to global efforts aimed at developing vaccines within 100 days of outbreak emergence.

Addressing the broader societal dimension of preparedness, Jakob Williams Ørberg described pandemic preparedness as a question of “societal resilience.” He explained that resilience depends on interconnected scientific systems, effective collaboration between governments and research institutions, and the ability to translate scientific innovation into real-world public health interventions. Reflecting on collaborations initiated during the COVID-19 pandemic, he highlighted how partnerships between governments, foundations, and research organisations enabled rapid expansion of healthcare infrastructure and diagnostics support systems. He further explained that the Novo Nordisk Foundation is currently supporting programmes related to antimicrobial resistance diagnostics and integrated innovation ecosystems in India, particularly through coordinated initiatives involving the Principal Scientific Advisor’s office and national action plans.

Industry participation added a critical operational and engineering perspective to the discussion. Rupam Chaudary reflected on how the COVID-19 pandemic transformed industrial readiness and digital infrastructure capabilities. He recounted how engineering teams rapidly shifted to remote operations, adapted manufacturing systems, sourced critical medical equipment components globally, and supported ventilator and diagnostics development under extremely constrained conditions. He explained that industries today possess significantly stronger remote operational capabilities, digital infrastructure, supply-chain intelligence, and engineering expertise than they did prior to the pandemic. He also emphasised that engineering and technology companies can now play an active role in supporting healthcare innovators, entrepreneurs, diagnostics manufacturers, and public health agencies during future emergencies.

The discussion also highlighted the importance of ensuring equitable access to diagnostics and healthcare technologies. Several panellists stressed that sophisticated laboratory systems deployed only in metropolitan cities are insufficient for effective public health preparedness. Instead, there is a need for decentralised and point-of-care diagnostics that can be deployed in rural and resource-limited settings. The panel agreed that preparedness must ultimately be community-centred, inclusive, and accessible if it is to succeed at a national scale.

Overall, the panel concluded that pandemic preparedness can no longer be viewed as a temporary emergency response exercise but must evolve into a permanent, integrated ecosystem combining diagnostics, genomics, engineering, digital health, governance reform, financing, regulatory agility, and societal resilience. The discussion underscored India’s growing strengths in diagnostics innovation, genomic surveillance, engineering capability, and public-private collaboration, while also recognising that sustained coordination, data-sharing, and institutional readiness will be essential for effectively responding to future public health emergencies.