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Facilitating pandemic preparedness in the Asia Pacific through technology transfer initiatives

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Hilleman Laboratories, CEO, Dr Raman Rao explains how training LMICs through the Developing Countries Vaccine Manufacturers Network (DCVMN), a voluntary public health-driven alliance of vaccine manufacturers is engaged in research, development, manufacturing, and supply of high-quality vaccines and biologics



Asia Pacific is home to more than half of the world's population and bears a significant burden of infectious disease, particularly in the low-and-middle-income countries (LMICs). Prevalent infections such as dengue, rotavirus, cholera, pneumococcal and meningococcal diseases continue to threaten LMICs in the region. At the same time, the frequency of new epidemics and pandemics such as coronavirus, Zika, Nipah etc are on the rise.

The threat of infectious diseases in Asia Pacific

The COVID-19 pandemic had undoubtedly exposed limitations in healthcare systems' ability to rapidly scale up capacity and respond to infectious outbreaks, which suggests a need for countries to strengthen public health efforts and pandemic preparedness as a first line of defence against infectious disease outbreaks. When COVID-19 first hit, healthcare services around the world were under enormous pressure. Overcrowded hospitals, global shortages of protective personal equipment, and exhausted doctors and nurses battling to save lives with scarce resources were evidence of the insufficient ability of healthcare systems to deal with the outbreak.

Building resilient health systems requires an integrated approach and an ecosystem of diverse stakeholders to address a broad range of challenges. Pharmaceutical companies around the world recognise the importance of pandemic preparedness and supply chain resilience. Some have set up vaccine manufacturing plants in the region to develop timely, novel, and

affordable vaccines and biologics for infectious diseases while others have put aside funding for vaccine research to prepare for *Disease X*.

Hilleman Laboratories' mission is to develop innovative and affordable vaccines and biologics against infectious diseases, especially those in LMICs. We recognise the integral role that technology transfer training programmes play in enabling vaccine manufacturers in LMICs to acquire the knowledge and capabilities required to successfully produce vaccines and biologics while ensuring sustainable vaccine supply in the long run.

Building Resilient Health Systems: Technology Transfer Training Programmes

The COVID-19 crisis has shone a spotlight on onshoring manufacturing capabilities to reduce the amount of time it takes to get vaccines to populations and to build resilience for future health emergencies. In efforts to support pandemic preparedness, countries around the world are working to increase their vaccine development and manufacturing capacity so that they are well-equipped to ramp up vaccine supplies and distribution in a timely manner, thereby also increasing vaccine access. However, vaccine development and manufacturing are both expensive and complex. This is where technology access and transfer play a major role in bridging the time and expense gap. As such, technology transfer is widely used at transitional stages and product life cycle interfaces to facilitate rapid scale-up of production. This increased production capacity ensures that medicines remain accessible to as many patients as possible.

The goal of technology transfer is to enable a receiving site to manufacture a product successfully. This is achieved by the transfer of product and process knowledge from one source to the other; for example, between development and manufacturing, and within or between manufacturing sites to achieve product realization. This knowledge transfer not only helps developing countries to manufacture vaccines successfully; it ensures that life-saving vaccines and biologics can be subsequently reproduced by them. This will lead to a sustainable supply of vaccines in the long run.

Technology transfers benefit companies that are in the pre-clinical and clinical phases but lack the expertise required for vaccine manufacturing. During these phases, companies usually liaise with a contract manufacturing organization for drug manufacturing. Once they receive positive results from their clinical trials, the companies can execute the technology transfer.

This year, Hilleman Laboratories is rolling out a training programme for LMICs through the Developing Countries Vaccine Manufacturers Network (DCVMN), which is a voluntary public health-driven alliance of vaccine manufacturers engaged in research, development, manufacturing, and supply of high-quality vaccines and biologics that are accessible to protect people against known and emerging infectious diseases globally.

This training programme is the first of its kind in Singapore to be held on an international scale for participants from multiple countries. In partnership with DCVMN and subject matter experts from other like-minded companies as well as Singapore's health regulatory agency, the nine-day programme offers essential professional exposure and guidance on technical mastery which are crucial during process optimization, development, and transfer. It has been structured as an immersive learning experience, with daily lectures alongside hands-on laboratory sessions. Trainees will also design and present a proposal for a technology transfer case study.

The training programme is a significant milestone as it realises our goals for more effective vaccine delivery in LMICs. In establishing a structured and tailored training programme with support from local ecosystem partners in Singapore, we hope to close gaps in communication and delivery. It is also our first major contribution to widening medical access in developing countries following the set-up of our global headquarters in Singapore.

This effort will go a long way in enhancing Singapore's regional leadership as a vaccine development and training hub, while highlighting her role in contributing to the skill preparedness of vaccine manufacturing arms in LMICs. It will also enhance and level up skillsets in these countries to improve the quality of their vaccines, which will increase the likelihood of meeting regulatory approval standards when resupplied to high-income countries such as Singapore and South Korea. Overall, it supports the formation of a long-term partnership with DCVMN, which could facilitate Singapore's direct access to vaccine manufacturers and bolster vaccine security for future pandemics.

An Integrated Approach Towards Pandemic Preparedness

Technology transfer programmes are one of the ways pharmaceutical companies can play a role in charting a path toward pandemic preparedness. However, they need to be adapted to be relevant to the specific regions. Subject matter experts including Hilleman Laboratories and our partners need to have a good understanding of the contextual differences between developed and developing countries and create training materials that are relevant for specific markets.

Additionally, technology transfer programmes require consistent upskilling so that countries in both developed and developing markets are trained to work with new technologies. Trainers and trainees will need to work hand-in-hand to track learning progress so that LMICs can fully benefit from these programmes.

Last but not least, technology transfer remains a challenging process due to its complexity, involvement of a large team of experts, time investment, and the right regulatory registrations—all of which need to be set against the highest quality standards as required of vaccine products.

Professional institutions such as the International Society of Pharmaceutical Engineering (ISPE), organisations such as the Global Alliance for Vaccines and Immunisations (GAVI), Coalition for Epidemic Preparedness Innovations (CEPI), or Parenteral Drug Association (PDA) are best placed to lead collaborative efforts, but pharmaceutical players can also proactively build long-term partnerships with like-minded organisations that are part of the larger ecosystem, working to develop and produce new and improved vaccines to positively impact global public health.