Outbreaks of high consequence and emerging pathogens, such as Brucella species and Middle respiratory syndrome coronavirus (MERS-CoV), do not stop at national borders and require international cooperation. For many years, such cooperation has facilitated efforts to contain outbreaks that may impact public health and security. We have, in a number of instances, been engaged to implement science that includes cooperative biological research, activities in biosafety and security, quality management, and the development and implementation of multi-faceted training strategies in Kazakhstan and West Africa. Such training programs facilitate the ability of host countries to prepare and respond to the next disease outbreak. There are, however, limitations to the existing comprehensive programs. They are not always customized to address the specific circumstances of individual host country laboratories and resource-limited countries are unable to sustain some detection and diagnostic technologies, such as multiplex RT-qPCR and Next-Generation Sequencing. Our team has developed a Capacity Building Pathway (CBP) aimed at cost effective training and knowledge acquisition. The system of blended learning, documentation, and quality processes that can be co-developed with the host nation culminates in a knowledge transfer process that is adopted, maintained, and sustained by the host nation to train future generations. The program utilizes a web-based platform that will provide a forum for continued communication between the partner country and international participants. We have begun to utilize virtual reality and augmented reality in our latest training to introduce and help in retention of knowledge sharing. As capacities grow, the program will work towards supporting a regional network of “communities of practice” whereby in-country partner laboratories can effectively share information and coordinate their efforts. The proposed workflow is adaptable to various types of training including: biosafety, biosecurity, sample management, research projects, standard operating procedure development, and proficiency testing. Moreover, critical components can be migrated to other users that may need the knowledge generated. As one moves through the Capacity Building Pathway, ownership of the process increases for the host nation until they have the ability to independently manage it.

A disease outbreak caused by a high-consequence pathogen in a low income country generally requires an international incident response that includes national public health agencies, the World Health Organization, and private organizations such as MSF (Doctors without Borders). This is challenging because in 2017 the World Bank listed 31 low and 52 lower-middle income countries. If the disease outbreak is caused by an unknown pathogen, then even well resourced countries need international help through universities, national research laboratories (NIH, CDC) and often military research resources. In the case of the MERS outbreak in Saudi Arabia, which was first identified as an acute respiratory disease in June 2012, the international response was rapid and identification of a novel viral agent with sequencing was achieved within several months [1]. In the case of Brucella species, which are well understood bacterial pathogens, outbreaks often occur in locations where disease surveillance and diagnostic capability is not adequate so the infections keep recurring and international response is continually required especially when human cases are reported [2].