

Comments from team:

It is reasonable to call for a better and safer approach to handling research into high consequence pathogens. I was left wondering whether any of the things they call for happen already, or perhaps they feel it is not done systematically enough? It seems self evident to call for research to be conducted safely, more importantly is the question of how to ensure this happens.

Title: We need a global framework for promoting safe handling of high consequence pathogens

Authors: Erik Albert Karlsson¹ , Stuart Dean Blacksell², Dennis Carroll³, David Ross. Harper⁴, Subash Morzaria⁵, Filip Claes⁶

Affiliations:

¹[Deputy Head of Virology Unit](#), Institut Pasteur du Cambodge, Phnom Penh, Cambodia

²Centre for Tropical Medicine & Global Health, Nuffield Department of Medicine, University of Oxford, Oxford, United Kingdom

³University Research Co., Bethesda, Maryland, United States of America

⁴ The Royal Institute of International Affairs, Chatham House, London, United Kingdom.

⁵ Institute of Infectious Animal Diseases, Texas A&M University, Texas, USA.

⁶ Emergency Center for Transboundary Animal Diseases, Food and Agriculture Organization of the United Nations, Regional Office for Asia-Pacific, Bangkok, Thailand

Address for Correspondence: Erik Albert Karlsson, Virology Unit, Institut Pasteur du Cambodge, Phnom Penh, Cambodia. Email: ekarlsson@pasteur-kh.org

Competing interests:

| The ~~eovid~~COVID-19 pandemic has highlighted ongoing concerns regarding biosafety and biosecurity procedures in global pathogen research. This includes questions about any possible role of field and laboratory research into the emergence of the SARS-COV-2 virus¹. The \$125 million USAID-funded DEEP VZN program researching new zoonotic viruses was recently cancelled² partly due to these concerns. This has raised broader discussion about the risks and benefits of viral surveillance and research. Limiting funds for pathogen surveillance and research compromises long-term preparedness for pandemics and leaves pathogen spillover threats unmonitored. Rather than restrict scientific surveillance and research, we urge the development of a global safety governance framework that spans the entire pathogen value chain. This must cover the life cycle of pathogen research, including the collection, transportation, and laboratory handling.

Many safety concerns surrounding pathogen research arise from the possibility of viral spillover due to poor biosafety and biosecurity practices in field collection and research laboratories³. These practices are precautions aiming to prevent the introduction or spread of disease causing

pathogens to humans. A more strategic and comprehensive approach identifying risks across the entire pathogen value chain should improve the safety and security at every stage including: collection and testing of samples in the field, transportation, handling in the laboratory, waste disposal, and management of bio-repositories. The pathogen value chain poses inherent risks and requires careful assessment and robust mitigation strategies to prevent spillover⁴. Improving oversight and biosafety and biosecurity measures across the value chain requires innovative approaches, including robust protocols, global cooperation and collaboration, transparency, and governance.

We cannot ignore the rapid increase in emerging and re-emerging infectious diseases worldwide⁵. Proactive research including surveillance, isolation, and characterisation of pathogens is critical for better preparedness and response to infectious disease outbreaks. Research on pathogens has some inherent risks, but they are minimal compared to the massive costs of allowing high-consequence pathogens to go undetected⁶. With rigorous biosecurity and safety protocols and training and the necessary governance and oversight, researchers should be able to manage these risks properly and gather the necessary intelligence to contribute towards global efforts to prevent pandemics⁷

Biosafety and security measures during field collection and testing, including training and competency in using personal protective equipment and animal handling precautions, as well as contingency plans and personnel monitoring, provide protection to the research workforce. Continued investment in biocontainment engineering, standardised operating procedures, and quality audits can strengthen frontline defenses.

Sample transportation also requires renewed attention. Some regions with high pathogen burden lack adequate transportation networks. Even within robust networks, vulnerabilities can

arise from leakage, theft, and documentation errors during transit, despite regulations that might exist. Expansion of tamper-proof tracking, remote monitoring, and integrated communication systems can bolster security of the pathogen supply chain. Back-up cold storage depots, controlled staff access, and routine audits can improve the safeguarding of archived samples in biobanks. These biobanks are essential for better understanding of the origins of infectious diseases and for mitigating the risks of future pandemics.

Once samples reach the laboratory, institutional oversight bodies are essential to provide independent assessment of protocols with consideration of risks and benefits⁸. Mandatory training in biosafety and security procedures and demonstrated competency, including emergency response drills and facility monitoring, instill an instinctive safety culture in the workforce. Containment procedures, disinfection routines, secured access, and inventory controls provide additional layers of protection. Any proposals to modify or enhance pathogens using gain-of-function techniques or synthetic biology demand rigorous scrutiny and regulatory approvals, not prohibition.

Throughout the pathogen value chain, infectious waste management remains an ongoing concern, as improper disposal increases the risk of breaching biocontainment. Comprehensive segregation, packaging, treatment, validation, and disposal protocols for pathogens mitigates risks.

Overall, we must embrace a proactive approach to safe pathogen handling and avoid our historically reactive stance that responds to threats only after they emerge. An early understanding of microbial threats enables interventions to mitigate the risk of future pandemics. Attempting to eliminate risk by abandoning promising pathogen research can create new vulnerabilities.

We propose the following call to action: for the scientific community to prioritise safety and open communication, for policymakers to guide research with responsible oversight, and for the public to engage constructively with scientists while maintaining safety demands. Funding bodies should support improvements in biosafety and biosecurity, scrutinise research risks, and invest in downstream pandemic preparedness, ensuring discoveries lead to lifesaving solutions. Journals and publishers should mandate protocol approval declarations for [surveillance research](#) with potential human or animal impact, [ensuring transparency in safety protocols and risk assessment in line with established ethical standards similar to those for ethical standards for human or animal study involvement](#).

[Renewing our commitment to prudent and ethical scientific practices is essential to ensuring the continued success of the pathogen value chain in driving breakthroughs to benefit humanity globally. While individual countries have made strides towards safer sample collection and handling, these efforts remain uncoordinated and are not part of a globally comprehensive strategy. Universal and comprehensive measures across the entire pathogen value chain must be systematically implemented and globally enforced to effectively manage the risks associated with handling potentially dangerous microbes. Renewing our shared pact around prudent, ethical science and pragmatic precaution ensures the pathogen value chain can continue driving breakthroughs to benefit humanity.](#)

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