Editorial

Pandemic-Risk Pathogens

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Parasites, fungi, bacteria and viruses cause significant impact on the community health. Of these the simplest are the viruses that can be highly transmissible, and even can be generated from synthetic DNA. Viruses can trigger outbreaks. The 1918 influenza pandemic killed 17 million people [1]. Small pox and measles have also been major killers. Prior to effective eradication program, small pox caused more than 2 million fatalities a year [2]. Before the initiation of widespread vaccination, measles was also a big killer. Advances in virology has led to the development of vaccines and therapeutic agents that have enabled a drastic reduction in disease burdens caused by influenza, COVID-19, poliomyelitis, hepatitis C, HIV/AIDS etc. Recently development of COVID-19 vaccines within a period of one year is a remarkable example. The rapid development and deployment of these vaccines prevented 14-20 million deaths worldwide [3].

Virology research, with its great potential of healing mankind, is fraught with pitfalls and dangers. Researchers can become infected while collecting specimens or performing research in the laboratory [4]. Between 1979 to 2015, more than 2300 laboratory-acquired infections were reported [5]. Though over the last two decades the numbers have gone down with better practices and containment, still 300 laboratory-induced infections and 8 deaths were reported [6]. The risk to the researcher, immediate community and the world at large remains. Though most outbreaks have been accidental, malicious intent is not non-existent. The access to technology to individuals outside research institutions lack of biosecurity norms, possibility of pathogens being stolen, research insiders going rogue, and knowledge accessibility by AI are all matters of concern [7]. Fractured inter-personal relationships, economic and emotional triggers and cult acts have been reported. Breach of Biological Weapons Convention and allegations of deliberate programs by some countries have been reported [8, 9].

Recent advances have enabled rapid identification and sequencing of genomes of new viruses. Moreover, these can be synthesized, modified and manipulated [10]. These can potentially be made more lethal by manipulation [11]. Another concern is availability of knowledge to outsiders via AI and ChatGPT [12].

Though the benefits of pathogen research are enormous, there are ethical obligations to make research with pandemic risk more safe, secure, and responsible. The ethical bodies must ensure that i) it addresses a public health issue and is likely to be beneficial ii) least risky research pathway is selected iii) to make sure the positive outcomes are fairly and across-board shared iv) it does not flout any local or international research norms and values. Research on bio risk management to make work with pandemic risk more safe, secure, and responsible is imperative [13]. Strict and verifiable mechanisms need to evolve to ensure biosafety management and security.

Although research on pandemic risk pathogens is crucial for humanity, yet due to the potential errors, risks and security vulnerability, the need for local, national and international monitoring cannot be over-emphasized.

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Use of AI-Assisted Technologies

The authors declare that no generative artificial intelligence (AI) or AI-assisted technologies were utilized in the writing of this manuscript, or in any other aspect of its preparation.

REFERENCES

[1] Spreeuwenberg PM, Paget K J. Reassessing the global mortality burden of the 1918 influenza pandemic. Am J Epidemiol 2018; 187(12): 2561-7.

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[2] Fenner F. Smallpox: Emergence, global spread, and eradication. Hist Philos Life Sci 1993; 15 (3): 397-420.

[3] Watson OJ, Barnsley G, Toor J, Hogan AB, Winskill P, Ghani AC. Global impact of the first year of COVID-19 vaccination: A mathematical modelling study. Lancet Infect Dis 2022; 22(9): 1293-302.

[4] Amman BR, Albariño CG, Bird BH, Nyakarahuka L, Sealy TK, Balinandi S, *et al.* A recently discovered pathogenic paramyxovirus, sosuga virus, is present in rousettus aegyptiacus fruit bats at multiple locations in Uganda. J Wildlife Dis 2015; 51(3): 774-9.

[5] Byers KB, Harding AL. Laboratory associated Infections. In: Wooley DP, Byers KB, Eds. Biological Safety: Principles and Practices. 5th ed. USA: ASM Press 2006; pp. 59-94.

[6] Blacksell SD, Dhawan S, Kusumoto M, Le KK, Summermatter K, O'Keefe J, *et al.* Laboratory-acquired infections and pathogen escapes worldwide between 2000 and 2021: A scoping review. Lancet Microbe 2024; 5(2): e194-e202.

[7] Jackson SS, Sumner LE, Garnier CH, Basham C, Sun LT, Simone PL, *et al.* The accelerating pace of biotech democratization. Nat Biotechnol 2019; 37: 1403-8.

[8] Lentzos F, Ed. Biological Threats in the 21st Century: The Politics, People, Science and Historical Roots. UK: Imperial College Press 2016.

[9] Lentzos F, Jakob U. Chemical, biological and health security threats. In: SIPRI Yearbook 2023: Armaments, Disarmament and International Security. UK: Oxford University Press 2023.

[10] Cello J, Paul AV, Wimmer E. Chemical synthesis of poliovirus cDNA: Generation of infectious virus in the absence of natural template. Science 2002; 297(5538): 1016-18.

[11] Fink GR, Atlas R, Barkley WE, Collier RJ, Cozzens SE, Faden DR, *et al.* Biotechnology Research in an Age of Terrorism. Washington, DC: The National Academies Press 2004.

[12] Sandbrink JB. Artificial intelligence and biological misuse: Differentiating risks of language models and biological design tools. ARXIV 2023; 1-9. Available at: https://arxiv.org/pdf/2306.13952.

[13] Koblentz GD, Earnhardt B, Rodgers J, Lentzos F, Ameneiros M, Houser R, *et al.* Global BioLabs Report 2023. London: King's College London and SCHARR School of Policy and Government George Mason University 2023; Available at: https://www.kcl.ac.uk/warstudies/assets/global-biolabs-report-2023.pdf