https://doi.org/10.35845/kmuj.2024.23685

EDITORIAL

Biosafety challenges and the future landscape in Pakistan

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THIS ARTICLE MAY BE CITED AS: Sherin A. Biosafety challenges and the future landscape in Pakistan. Khyber Med Univ J 2024;16(2):83-4. https://doi.org/10.35845/kmuj.2024.23685

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Sepsis is a major threat to global health, as highlighted by the Global Burden of Disease Study, which recorded an estimated 48.9 million cases of sepsis globally, resulting in 11.0 million sepsis-related deaths, accounting for 19.7% of all global deaths in 2017. The incidence and mortality rates of sepsis are particularly high in sub-Saharan Africa, Oceania and South Asia.[1] In developing countries, the increasing incidence of sepsis poses a significant challenge, emphasizing the imperative need to prioritize biosafety measures for public health protection. Ensuring biosafety is crucial for the safe handling of biological materials, safeguarding researchers, laboratory personnel, animals and the environment from infectious agents and toxins. In Pakistan, this critical need highlights the urgent requirement for robust biosafety frameworks, where establishing and maintaining these practices remains a formidable challenge.[2]

Pakistan has demonstrated its commitment to biosafety as a responsible state by being a party to the Cartagena Protocol on Biosafety (CPB) under the Convention on Biological Diversity (CBD).[3] The Ministry of Climate Change, in coordination with National Food Security and Research and National Health Services Regulations and Coordination, is responsible for implementing the CPB.[4] Additionally, under the Pakistan Environmental Protection Act 1997, the Pakistan Environmental Protection Agency (Pak-EPA) enacted the Pakistan Biosafety Rules in April 2005 to regulate Genetically Modified Organisms (GMOs).[5] To facilitate compliance with these rules, the National Biosafety Guidelines were issued in October 2005.[6] In April 2006, the National Biosafety Centre was established within the Pak-EPA to further strengthen the biosafety regulatory framework.[7] Risk assessment standards and procedures are set by the National Biosafety Committee to ensure the safe handling and regulation of GMOs in Pakistan.[8]

However, despite these steps in the right direction, many laboratories across Pakistan, even in major cities, exhibit significant gaps in biosafety practices, including inadequate emphasis on laboratory biosecurity, absence of occupational health programs, and ineffective risk assessment strategies.[9,10] A situational analysis by the national laboratory working group revealed key issues in national laboratory biosafety and biosecurity management, such as the absence of a centralized Biosafety and Biosecurity Management System, inadequate staff training and competency assessments, poor maintenance of protective equipment, improper waste disposal management, and insufficient fire prevention measures.[11]

In recent years, there has been positive progress in biosafety practices in Pakistan, significantly accelerated by the COVID-19 pandemic. The pandemic has catalyzed substantial improvements through heightened awareness, stringent protocols, infrastructure upgrades, strengthened regulatory frameworks, enhanced diagnostic capabilities, and increased collaboration. These advancements have led to better waste management, improved safety behaviors and comprehensive biosafety and biosecurity measures. Additionally, significant strides have been made in training programs and the provision of safety and health services.[9,12] Nevertheless, despite dedicated efforts by Pakistan's science and policy leaders, Pakistan is facing challenges in biosafety and biosecurity like inadequate risk assessment frameworks, insufficient monitoring tools, lack of data on biosecurity hazards, integration difficulties with limited resources, and poor stakeholder coordination.[13] To sustain and enhance these biosafety measures, ongoing efforts and investments are necessary.

Looking ahead, the landscape of biosafety in Pakistan is poised for further advancements, driven by the invaluable lessons derived from the COVID-19 pandemic. Sustained investments in infrastructure, regulatory enhancements, and training initiatives will be crucial in elevating biosafety standards. Integration of advanced technologies like digital tracking systems and automated safety protocols, along with intensified international collaborations, will further strengthen biosafety practices. Additionally, fostering a culture of safety, ongoing education, and public awareness campaigns will be indispensable in ensuring the effective implementation and longevity of biosafety measures nationwide.

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CONFLICT OF INTEREST

Author declared no conflict of interest, whether financial or otherwise, that could influence the integrity, objectivity, or validity of their research work.

GRANT SUPPORT AND FINANCIAL DISCLOSURE

Author declared no specific grant from any funding agency in the public, commercial or non-profit sectors

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