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# **Resilience in Action:**

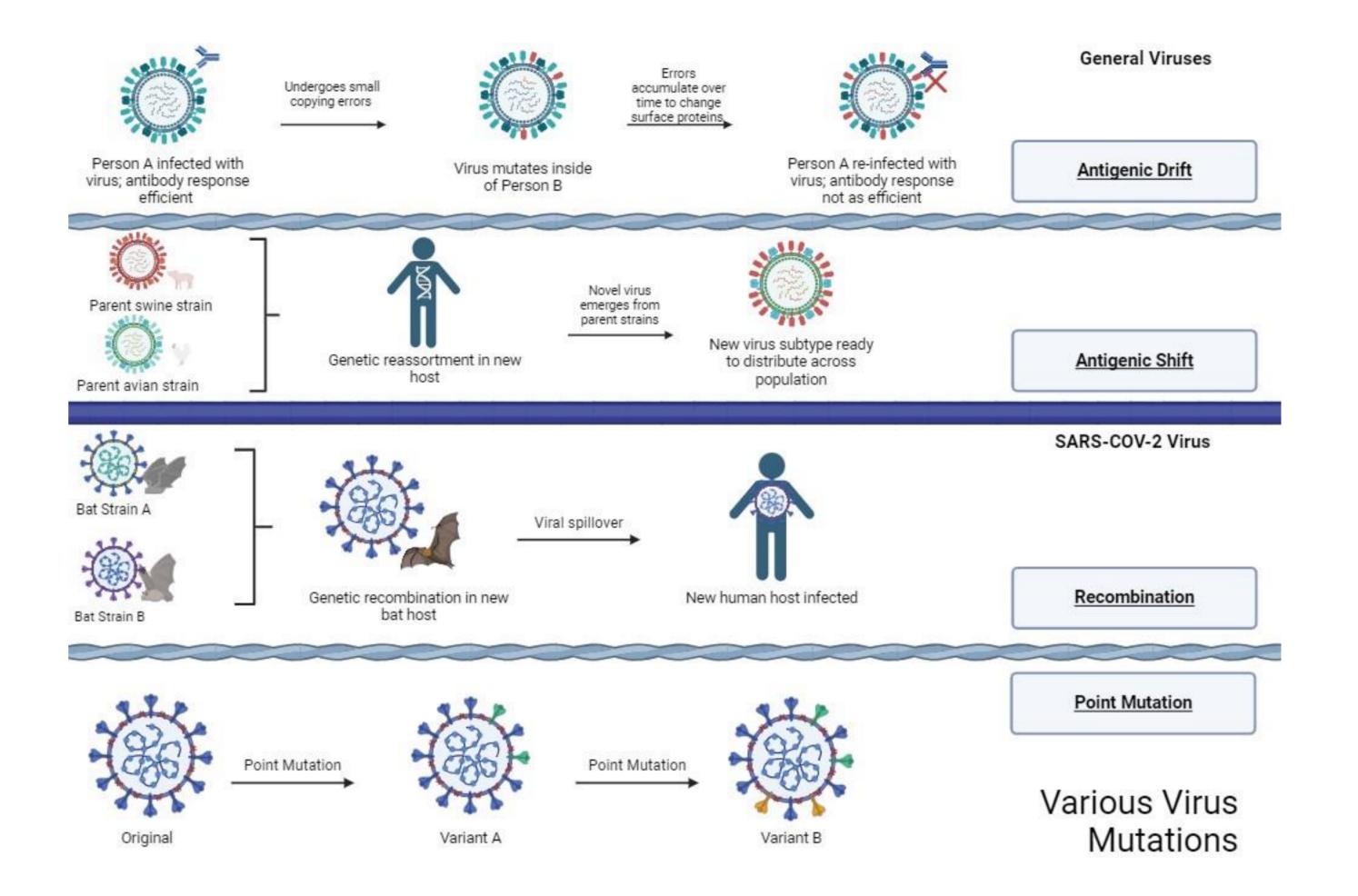
## **Lessons Learned to Action Plans for the Next Global Pandemic**

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### Introduction

Pathology laboratories are now significantly better equipped to handle future pandemics, thanks to the investments made during the COVID-19 pandemic. The acquisition of advanced diagnostic equipment, such as high-throughput PCR machines has enhanced their capacity to conduct large-scale testing swiftly and accurately. The adoption of digital pathology solutions and robust data management systems has streamlined workflows and improved the efficiency of diagnostic services. These improvements, coupled with enhanced laboratory infrastructure and increased staff training, ensure that the laboratories are well-prepared to respond rapidly and effectively to any emerging infectious disease threats.



### **Future Pandemics**

According to the World Health Organization (WHO), the next top 5 potential pandemics and threats to global health that the world needs to be prepared for include:

#### **Disease X**

Disease X refers to a hypothetical, unknown pathogen that could cause a future pandemic. It represents the unpredictable nature of emerging infectious diseases, like how COVID-19 emerged unexpectedly. Disease X highlights the global threat posed by pathogens that may arise from zoonotic transmission, antibioticresistant bacteria, or other novel infectious agents. The concern is that Disease X could spread rapidly, with no existing vaccines or treatments, leading to widespread illness and mortality. Preparing for Disease X means investing in surveillance, rapid diagnostics, and vaccine development for unknown pathogens.

#### **Zoonotic Infections**

Zoonotic infections, play a critical role in the emergence of new pandemics. Many recent pandemics, including SARS-CoV-2, Ebola, and the H1N1 flu, originated from animal reservoirs. Emerging zoonotic threats include the Nipah virus, which is transmitted from bats to humans resulting in neurological symptoms, and the H5N1 avian influenza, both of which have pandemic potential due to their ability to cause severe illness and adapt to human hosts. The increasing interaction between humans and animals, driven by deforestation and wildlife trade, heightens the risk of such outbreaks.

### **Future Preparedness**

The COVID-19 pandemic has significantly improved global preparedness for future pandemics, highlighting the importance of rapid diagnostics, healthcare infrastructure, and global cooperation. One major advancement is the widespread availability of PCR testing. Additionally, the development of testing tools like the SIGMA MM<sup>™</sup> inactivation medium by MWE has enhanced safe specimen collection. Its design minimizes contamination and risk of exposure during testing, ensuring safer, more reliable diagnostics for healthcare workers.

The use of SIGMA MM<sup>™</sup> during Covid-19 allowed for point of care PCR testing eliminating the need for laboratory infrastructure and allowing for a more rapid management of patients. SIGMA MM<sup>™</sup> has been shown to be effective in the inactivation of bacteria and viruses including TB, Covid-19, Mpox and MRSA while allowing for PCR testing without the risk of infection to healthcare workers. These innovations, combined with improved vaccine development processes and global response frameworks, leave us better equipped to manage future outbreaks.

#### Marburg Virus

Marburg virus is a highly dangerous pathogen that poses significant pandemic potential due to its high mortality rate and transmission methods. A member of the same family as Ebola, It is transmitted through direct contact with infected bodily fluids, contaminated surfaces, or materials, making it highly contagious. Several haemorrhagic viruses are considered potential candidates for causing the next global pandemic due to their high mortality rates, ease of transmission, and limited treatment options. These include; Ebola Virus, Lassa virus and Crimean-Congo Haemorrhagic Fever (CCHF).

#### Antimicrobial Resistance (AMR)

AMR poses a serious threat to global health and could lead to the next pandemic by rendering common infections untreatable with evolving resistance to antibiotics and other antimicrobial treatments, diseases that were once easily managed, such as Tuberculosis, Gonorrhoea and E. coli infections, become harder or impossible to treat. Resistant strains like Methicillin-resistant Staphylococcus aureus (MRSA) and drug-resistant Klebsiella pneumoniae have already caused outbreaks in healthcare settings. The global spread of AMR could result in a rise of uncontrollable infections, overwhelming healthcare systems, and leading to significant mortality.

### Strategy

To combat the next pandemic, several strategies must be implemented, many of which have been improved due to the experiences gained from COVID-19:

1. **Strengthened Global Surveillance and Diagnostics:** The COVID-19 pandemic emphasised the need for robust disease monitoring and rapid diagnostics such as PCR testing.

2. Vaccine Development and Distribution: Investment in mRNA vaccine platforms, which were used successfully during COVID-19, is crucial to quickly develop vaccines against novel pathogens.

3. **Personal Protective Equipment (PPE) and Medical Supply Chain Resilience**: Stockpiling critical PPE and medical supplies like ventilators and ensuring a resilient global supply chain will prevent shortages during future pandemics.

4. **Enhanced Public Health Infrastructure**: Investing in healthcare infrastructure, including ICU capacities and telemedicine, has been prioritised following the COVID-19 pandemic.

#### Influenza

Influenza remains a top pandemic threat due to its high mutation rates and ability to spread globally. The flu virus can undergo antigenic drift, involving small genetic mutations over time, which leads to new strains that evade immunity. More concerning is antigenic shift, a major genetic reassortment that can result in a novel virus capable of infecting humans with no pre-existing immunity, potentially triggering a pandemic which is thought to be the case during 1918 and 2009. With its history of causing previous pandemics, influenza remains one of the most closely monitored pathogens. 5. Global Cooperation and Data Sharing: Organisations like the WHO and other international bodies are critical for coordinating responses and ensuring that countries have equal access to essential resources.
6. Safe Specimen Collection and Testing: Tools like the SIGMA MM<sup>™</sup> inactivation medium from MWE, developed during the COVID-19 pandemic, have improved the safety and reliability of diagnostic testing.

### Conclusion

The COVID-19 pandemic has significantly improved global preparedness for future pandemics, highlighting the importance of rapid diagnostics, healthcare infrastructure, and global cooperation. One major advancement is the widespread availability of PCR testing. The development of testing tools like the SIGMA MM<sup>™</sup> inactivation medium by MWE has enhanced safe specimen collection. Its design minimises contamination and risk of exposure during testing, ensuring safer, more reliable diagnostics for healthcare workers. These innovations, combined with improved vaccine development processes and global response frameworks, leave us better equipped to manage future outbreaks.