

The Expanding Role of Mobile Laboratories in Global Health Crises



Explore the highlights from a side session organised by the EU-funded MOBILISE project at the ESCAIDE 2024 conference, where four initiatives shared examples of mobile laboratories operating in diverse climates and across multiple continents."

What You Should Know

As weather patterns shift, the spread of arthropod vectors such as mosquitoes and ticks is expanding, leading to a rise in cases of Crimean-Congo haemorrhagic fever, West Nile virus, Rift Valley fever, and dengue.

Rapid detection and containment of such outbreaks require flexible diagnostic capabilities directly in the field, which is why mobile laboratories are becoming increasingly important worldwide.

The EU-funded MOBILISE project focuses on developing and testing a novel and environmentally friendly mobile One Health laboratory solution to improve detection and response to infectious disease outbreaks, while safely handling high-risk pathogens from risk groups 3 and 4.

The laboratory can receive human, animal, and environmental samples, perform molecular diagnostics, serology, microbiology, and host a whole genome sequencing platform for pathogen discovery and epidemiological analysis.

Highlights from the ESCAIDE 2024 Side-Session on Mobile Laboratories

Experiences shared at ESCAIDE 2024 from Europe and other regions underscore the value of mobile laboratories for outbreak response and point to key gaps that require attention when it comes to decision-making.

- Muna Affara (Research Scientist at the Bernhard-Nocht-Institute for Tropical Medicine (BNITM), East African Community (EAC)) highlighted the growing frequency and magnitude of epidemics in East Africa, combined with limited diagnostic capacity in peripheral areas, demonstrates the need for mobile laboratories to successfully block transmission and accelerate diagnostics. Their mobile laboratories were implemented in three phases: Phase I includes modular box-based mobile laboratories for viral haemorrhagic fevers, whereas phase II uses container-based AMR BSL-3 laboratories. To move towards an integrated One Health approach, phase III laboratories are able to examine animal samples.
- Laurence Flevaud (Diagnostic advisor at the Médecins Sans

Frontières – Operational Centre Barcelona and Athens (MSF-OCBA)) reported an example from the Central African Republic, where identifying the causative agent of an outbreak took several months, with delays leading to inadequate or late responses. Mobile laboratories helped overcome this issue, especially due to the possibility of multi-disease diagnostics. Together with rapid diagnostic turnaround times, this leads to faster outbreak responses.

- Kym Antonation (Chief of the Bioforensics Assay Development and Diagnostics (BADD) section,

Public Health Agency of Canada) further highlighted the need for adaptability of such facilities, noting that their laboratories in Canada must at times operate under extreme climatic conditions ranging from -40°C to $+40^{\circ}\text{C}$. Depending on the necessity, they implemented different mobile laboratory variants: a mobile level 3 laboratory, which is applied when the period of use takes up to 2-3 months. For faster deployment, the shipping container on wheels was invented. However, due to the lack of a shower area, it does not count as a BSL-3 laboratory.

Session Takeaways – Future Mobile Laboratories

The session highlighted several key considerations for the future development of mobile laboratories:

1. Mobile and ready: Immediate diagnostics and prevention of further transmission
2. Advanced safety features (BSL-3): Equipped to handle high-risk pathogens safely, strengthening public health resilience and biosafety
3. Broad diagnostic capacity: Testing of multiple pathogens, enhancing decision-making
4. Eco-friendly laboratory: Contributes to achieving the EU's sustainability goals
5. Adaption to climate conditions: Broader operational range
6. Holistic training program: Increasing overall efficiency and safety

Conclusion

Mobile laboratories are a key element in responding to global health crises due to their ability for rapid detection and treatment. The fast deployment in challenging and versatile environments is essential for timely response. By accepting samples from humans, animals, and the environment, they provide a complete One Health perspective - crucial for addressing future threats that require a holistic approach to detection and response.

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