

Dengue diagnostic test use to identify *Aedes*-borne disease hotspots

We were very interested to read the discussion of Felipe Dzul-Manzanilla and colleagues¹ on the importance of identifying hotspots of *Aedes* mosquito-borne virus transmission for establishing efficient disease control. Identification of high risk transmission areas is based on the spatiotemporal epidemiology of patients with confirmed dengue virus, chikungunya virus, and Zika virus infection over a substantial period of time. However, much of the global rural population live in areas beyond surveillance, with hotspots of data focused around research institutions and urban areas and vast areas of the world that are surveillance *terra incognita*. With the enormous infrastructural and financial challenges for building appropriate formal laboratory systems in rural Africa, Asia, and the Americas, innovation is needed to build ASSURED (Affordable, Sensitive, Specific, User-friendly, Rapid and robust, Equipment-free and Deliverable to end-users) surveillance systems to collect reliable data on *Aedes*-borne disease transmission. Effective widespread planetary expansion of formal laboratory systems will take decades and, in the meantime, one potential method would be to add diagnostic value to rapid diagnostic tests (RDTs) as substrates for detection of pathogens presenting with similar clinical syndromes and epidemiology.

Dengue immunoglobulin (Ig)M and IgG and non-structural protein 1 RDTs are widely used for dengue surveillance in Asia, but there are no equivalent tests for Zika virus and chikungunya virus. We have shown that in Laos, dengue virus, Zika virus, and chikungunya virus RNA can be simply extracted from dengue RDTs up to 2 months after use, for doing RT-PCR for all three viruses.²⁻⁴ In pilot work, extracts from

RDTs could also be used for dengue virus serotyping and amplification of the envelope gene. Although filter paper blood spots would also give this information for less expense, antigen and antibody rapid diagnostic testing has the additional advantage of permitting point of care diagnosis of dengue virus infection.

Broadening the spectrum of add-on uses of RDTs as useful, inexpensive, and transportable matrices for enhancing cost-effective patient diagnosis and surveillance is a neglected opportunity.⁵

The shipping of used dengue RDTs to a central laboratory for rapid differential diagnosis using PCR assays of pathogens presenting with similar clinical syndromes holds promise as a practical and cost-effective solution for doing surveillance in the world's vast remote areas with cocirculation of dengue virus, Zika virus, and chikungunya virus. This approach could enhance field tri-viral surveillance and identify hotspots, and hence enable implementation of targeted preventive interventions.

We declare no competing interests.

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