

Investigating opportunistic dengue virus NS1 antigen rapid diagnostic testing using sentinel febrile illness surveillance and integrated molecular diagnostics in Papua New Guinea

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Background: Dengue virus (DENV) has been detected in Papua New Guinea (PNG) for more than two decades however there is limited data on DENV epidemiology and circulation. DENV NS1 antigen rapid diagnostic tests (NS1 Ag RDT) are available in some primary health settings and testing is opportunistic. STRIVE PNG is an implementation research project that pilots a molecular-informed integrated sentinel surveillance system for febrile illness that targets detection of malaria and arboviruses at eight health facilities in PNG.

Methods: Where available, a subset of febrile illness patients testing negative for malaria rapid-diagnostic test (mRDT) were opportunistically screened for DENV NS1 antigen RDT at sentinel surveillance sites. Dried blood spot samples were collected from these cases and sent to a central laboratory in Port Moresby for PCR analysis. Descriptive analysis was performed on this subset with RDT and PCR results available.

Results: From 8569 febrile illness cases reported, 242 mRDT negative cases were opportunistically screened for DENV NS1 antigen RDT, with 21 positive results recorded. The mean number of days since fever onset was 3.9 (IQR 2.0-4.0). 17% (n=41) of NS1 Ag RDT screened cases were tested using DENV 3'NC PCR assay to confirm infection. Of 7 NS1 Ag RDT positive cases tested with PCR, 71% (n=5) were positive. Of 34 NS1 Ag RDT negative cases tested with PCR 18% (n=6) were positive for DENV.

Conclusion: Opportunistic screening of non-malaria febrile illness using NS1 Ag RDTs detected the presence of PCR confirmed DENV in sentinel surveillance data. Molecular testing was also able to detect DENV in samples not positive to the NS1 Ag RDT. Dengue presents an emerging threat in PNG, the use of NS1Ag RDTs in sentinel surveillance systems with integrated molecular diagnosis could provide initial early warning signals for dengue outbreaks in PNG until routine surveillance methods are established.

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