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Letter to the Editor

Dengue rapid antigen tests enable prompt outbreak detection and a rapid public health response in the remote Torres Strait, Australia

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We write in supplement of the early 2024 outbreak of dengue on Mer Island in the Torres Strait which was reported in Volume 48 of *Communicable Disease Intelligence*.[1] Dengue is a mosquito-borne virus transmitted primarily by *Aedes aegypti* and *Aedes Albopictus* mosquitoes. The disease is caused by the dengue virus and can clinically manifest as a febrile illness, headache, myalgia, nausea, vomiting and/or rash.[2] Although most infections are self-limiting, some cause dengue shock syndrome and can be fatal. Dengue typically occurs in tropical and sub-tropical climates. There are an estimated 96 million clinical cases of dengue reported globally each year.[3] In Australia during 2012–2022, of the 13,343 dengue cases reported, 94.2% were imported; cases largely reflected the epidemiology in endemic countries to which Australians travelled.[4]

Ethics exemption for this letter was obtained from the Far North Queensland Human Research Ethics Committee (1900AB).

The Torres Strait is a remote archipelago in Far North Queensland, home to Torres Strait Islander people. Torres Strait residents have family and cultural ties with neighbouring Papua New Guinea (PNG) under the Torres Strait Treaty allowing movement throughout the treaty zone between Australia and PNG for cultural events and trade.[5] There have been at least four dengue outbreaks in the Torres Strait in the last ten years, with all likely seeded by imported cases from PNG.

We reported a total of 74 confirmed, probable, and possible dengue cases associated with the Mer Island outbreak, with case onset between January and June 2024.

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The delay in detecting the outbreak prompted the supply of dengue rapid tests to Queensland Health remote primary healthcare clinics across the Torres Strait. These point-of-care rapid tests detect dengue virus non-structural protein 1 (NS1) antigen, immunoglobulin G (IgG) and immunoglobulin M (IgM) from a capillary or venous blood sample and report a sensitivity of 92.4% and specificity of 98.4% for NS1, with a result available in 15 minutes.[6] The dengue NS1 antigen, which can be used to confirm a case, is generally only detected during the first week of infection. While formal pathology is recommended for all presentations with a clinical compatible illness, specimens are processed over one thousand kilometres away, so transport and processing of specimens can take up to a week. This can hinder the prompt detection and early public health management of outbreaks.

During a three-day period in November 2024, four residents presented to the Masig (Yorke) Island Primary Healthcare Centre in the Torres Strait with fever, myalgia, and headache. None reported any recent overseas travel. The Torres and Cape Public Health Unit recommended testing with the point-of-care tests; all four patients returned positive dengue rapid tests (three NS1 reactive, one IgM and IgG reactive). Confirmatory pathology was collected for laboratory testing. A local dengue outbreak was declared, and a public health response immediately initiated. Consultation took place with local First Nations Masig leaders and community, and a public health team, comprising vector control, nursing, medical and data staff, travelled to Masig Island within 48 hours of the positive rapid tests.

As with prior dengue outbreaks in the region, the public health response included harbourage spraying, active case finding and health promotion. Vector control included residual insecticide harbourage spraying, which is effective for several weeks and which reduces the risk of new mosquitoes surviving long enough to become infectious. Door-to-door active case finding identified four additional cases, for a total of eight cases (seven confirmed and one probable) associated with the outbreak. Formal laboratory test results confirming the first four dengue diagnoses were available five days after the positive rapid tests, and midway through the week-long public health response.

It should be noted that despite the manufacturer's excellent reported sensitivity and specificity of these rapid diagnostic tests, real-world studies in endemic regions have found the tests to be less sensitive than laboratory assays; so, while positive results are helpful, infection cannot be excluded with a negative result and follow up testing should always be pursued (even if less timely).[7] In addition, as there have now been two recent outbreaks of dengue in the Torres Strait, there will likely be a population with a history of previous dengue infection. The shorter duration of NS1 and IgM in a second dengue infection (in which detectability can be as short as 1–3 days) makes the timing of testing relative to symptoms critical and may result in dengue-infected people with negative rapid diagnostic test.[8] The index of suspicion should be higher in those known to have had dengue before if the rapid diagnostic test is negative.

The dengue rapid antigen tests proved reliable, acceptable, and easy-to-use. Their use enabled prompt outbreak detection and facilitated a swift public health response in this remote setting where there is an ongoing risk of dengue outbreaks. We recommend the use of rapid point-of-care tests in remote settings at risk of infectious disease outbreaks.

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