

## Evaluation of the sensitivity of a pLDH-based and an aldolase-based Rapid Diagnostic Test for the diagnosis of uncomplicated and severe malaria caused by PCR-confirmed *Plasmodium knowlesi*, *Plasmodium falciparum* and *Plasmodium vivax*

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### ABSTRACT

**Background:** *Plasmodium knowlesi* can cause severe and fatal human malaria in South-East Asia. Rapid diagnosis of all *Plasmodium* species is essential for initiation of effective treatment. Rapid Diagnostic Tests (RDTs) are sensitive for detection of uncomplicated and severe *falciparum* malaria, but have not been systematically evaluated in *knowlesi* malaria.

**Methods:** At a tertiary-referral hospital in Sabah, we prospectively evaluated the sensitivity of two combination RDTs for the diagnosis of uncomplicated and severe malaria from all three potentially-fatal *Plasmodium* species, using a pan-*Plasmodium* lactate dehydrogenase (pLDH)-*P. falciparum* histidine-rich-protein2 (PfHRP2) RDT (First Response™) and a pan-*Plasmodium* aldolase-PfHRP2 RDT (ParaHIT™).

**Results:** Among 293 hospitalized adults with PCR-confirmed *Plasmodium* mono-infection, the sensitivity of the pLDH component of the pLDH-PfHRP2 RDT was 74% (95/129; 95% CI 65 – 80%), 91% (110/121; 95% CI 84 – 95%) and 95% (41/43; 95% CI 85 – 99%) for PCR-confirmed *P. knowlesi*, *P. falciparum* and *P. vivax* respectively, and 88% (30/34; 73 – 95%), 90% (38/42; 95% CI 78 – 96%) and 100% (12/12; 95% CI 76 – 100%) among patients tested before commencing antimalarial treatment. Sensitivity in severe malaria was 95% (36/38; 95% CI 83 - 99), 100% (13/13; 95% CI 77 - 100) and 100% (7/7; 95% CI 65 – 100%) respectively. The aldolase component of the aldolase-PfHRP2 RDT performed poorly in all *Plasmodium* species.

**Conclusions:** The pLDH-based RDT was highly sensitive for the diagnosis of severe malaria from all species; however, neither the pLDH- or aldolase-based RDT demonstrated sufficiently high overall sensitivity for *P. knowlesi*. More sensitive RDTs are needed in *knowlesi*-endemic regions.