

Research Brief

Performance of Alere™ ultra sensitive rapid diagnostic test for *P.falciparum* malaria in asymptomatic pregnant women in Timika, Indonesia

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Background: The diagnostic sensitivity of current malaria rapid diagnostic tests (mRDTs) are inadequate for detecting low-density, asymptomatic infections, such as those that occur during pregnancy. These asymptomatic infections in pregnancy has been associated with detrimental effects including maternal anaemia, low birth weight and premature births¹. In addition, low-density infections act as silent reservoir and contribute towards ongoing transmission². With countries progressing towards malaria elimination, sensitive diagnostic tools able to detect low density asymptomatic infections are urgently needed. Diagnosis and treatment of malaria infections during pregnancy would help prevent disease in individuals,

improve birth outcomes and control transmission by reducing the parasite reservoir.

Existing lateral flow mRDTs are simple, easy to use point of care tests widely used in screening and testing malaria in pregnancy control programmes in countries such as in Indonesia. The only molecular methods or nucleic acid amplification tests (NAATs) such as Polymerase Chain Reaction (PCR) and Loop mediated isothermal amplification (LAMP) are sufficiently sensitivity to detect low-density infections. However, these methods are limited to well-equipped laboratory settings due to their inherent complexity and need for laboratory equipment.

Recently, the new Alere™ Ultra-sensitive Malaria Ag *P. falciparum* RDT (uRDT) was developed with the aim of bridging the gap between high-sensitivity and field-ready diagnostics³. The commercially available uRDT produced by Alere has shown promising results in asymptomatic populations in Uganda, Myanmar and Ethiopia^{4,5}. Together with laboratory investigations and a cross-sectional study in Papua New Guinea⁶ the uRDT showed improved sensitivity in comparison to widely SD Bionline RDTs, as well as a log-fold lower limit of detection (LOD) for the HRP2 antigen (80 ng/ml). To date the only study in pregnant women comes from Colombia and a notable difference between the uRDT and existing SD Bionline RDTs was not observed⁷.

Objective : To compare the performance of the uRDT with the CareStart™ Malaria HRP2/pLDH VOM Combo RDT (csRDT) in asymptomatic pregnant women in a low-transmission setting in Indonesia.

How was the study done: A subset of 270 stored red blood cell pellets and plasma samples collected as part of a larger malaria in pregnancy trial in Timika (ISRCTN34010937) were used in this study. These included 158 *P.falciparum* positive samples and 112 *P.falciparum* negative samples. Using a composite molecular reference standard comprising LAMP, qPCR and nPCR, we compared the diagnostic performance of both RDTs.

Results: The uRDT detected 31 (19.6%) infections confirmed by the reference standard, of which 23 (74.0%) were detected by the csRDT (figure 1). The level of agreement with either RDT with the reference standard was poor (figure 2, kappa values). The overall sensitivity of the uRDT and Carestart for *P.falciparum* was comparably poor, and the specificity was high (>96.0%). However, there was no statistically significant difference (p=0.169) in the performance of each test.

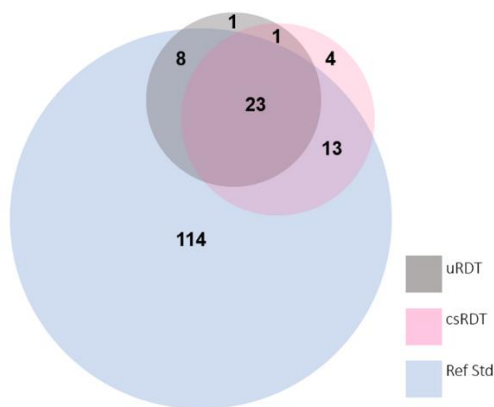


Figure 1. Venn diagram showing the number of *P. falciparum* positive samples detected by each test. Positivity by uRDT (grey), csRDT (pink) and the composite molecular reference test (blue) in 270 samples from asymptomatic pregnant women. n= 158 *P. falciparum* positive samples confirmed by the reference standard. uRDT= ultra-sensitive *P falciparum* RDT, csRDT= CareSart RDT, Ref Std= Reference Standard

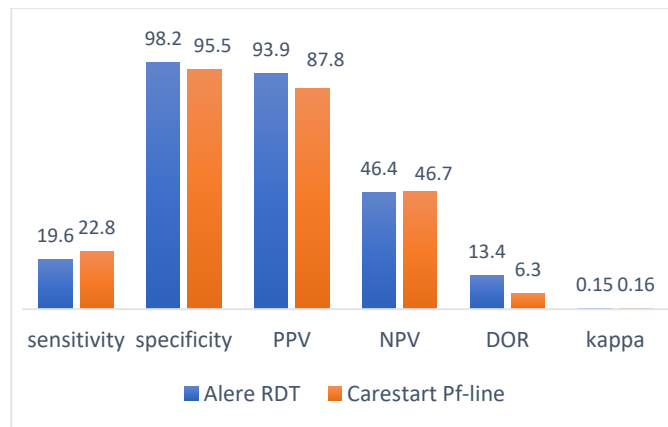


Figure 2: Diagnostic performance of Carestart RDT pf-line and the uRDT. Values above the bar graphs are percentages.

Conclusion: in comparison to the composite reference test, the uRDT offered no significant improvement from Carestart in detecting malaria in asymptomatic pregnant women in Indonesia. Alternative diagnostic tests that could be suitable for malaria in pregnancy control programmes in low transmission settings are urgently needed.

References and further reading

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