# Perfusion Index as an Indicator for Mortality in Children with *Plasmodium falciparum* Severe Malaria

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*Background:* Severe malaria (SM) remains a major global health problem causing ~275,000 pediatric deaths annually, worldwide. Continuous, non-invasive monitoring of peripheral perfusion can help detect abnormalities in systemic circulation, a common problem in critically ill patients, and can improve outcomes in children hospitalized with SM. Perfusion index (PI), an indicator of peripheral perfusion measured using a point-of-care pulse oximeter, is the ratio of pulsatile blood flow to static blood in peripheral tissue.

*Objective:* To investigate the role of PI as an indicator of adverse outcomes including mortality in children hospitalized with SM.

*Methods:* We measured PI in a prospective cohort study of 600 children <5 years of age with 5 different clinical manifestations of SM, and 120 healthy community children (CC) at two hospitals in Uganda. PI was measured at 6-hr intervals during hospitalization using a Masimo Rad 57 pulse oximeter.

*Results:* Children with SM had significantly lower admission PI values (1.2 [IQR: 0.58, 2.2] compared to CC (2.8 [1.7, 4.3], p<0.001). Children with SM manifesting as respiratory distress syndrome or severe malarial anemia had lower median PI compared to other manifestations including cerebral malaria, the deadliest form of SM in children. In children with SM, a log decrease in admission PI was associated with 2.7 higher odds of in-hospital mortality (p=0.01). A log reduction in PI was also associated with in-hospital clinical complications associated with SM, including circulatory shock, deep acidotic breathing and acidosis, hypoglycemia, and severe anemia (all P<0.03). In survivors of SM, there were no significant associations between PI and cognitive outcomes at 12-month follow-up.

*Conclusion:* The role of PI as an indicator of mortality in children with SM and the use of point-of-care tools for continuous monitoring of PI warrants further investigation in the management of SM to prevent or reduce the incidence of adverse outcomes.