

The development of a machine learning-driven clinical decision support tool for the management of dengue in Vietnam

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Seasonal dengue epidemics exert significant pressure on healthcare settings worldwide. Clinical decision-making is a dynamic process and central to patient outcomes. However existing tools and guidelines tend to be static, and focus mainly on early management. The adoption of appropriate clinical decision-support systems (CDSS) at patient point-of-care could improve the quality and consistency of care delivery. We present work in the development of a CDSS intended for use by clinicians managing dengue in Vietnam. This work is done in the context of a multi-disciplinary collaboration in the application of technological innovations in low- and middle-income country settings. We performed process mapping, task analysis and semi-structured interviews at the Hospital for Tropical Diseases (HTD), Ho Chi Minh City, Vietnam in order to understand and characterise clinician needs for the management of acute febrile illnesses. In parallel, clinical data from 4,131 patients admitted with dengue were used to train a set of machine learning models to predict clinical outcomes. Workshops and focus groups adopting human-centred design principles informed the development of CDSS prototypes. We identified potential areas in the patient pathway at the HTD where CDSS introduction could be impactful. Clinical decision-making for acute infection is complex and variation in approaches to patient management and risk assessment are described. The optimal functions for the CDSS were identified and prioritised in small group sessions – a system emphasising usability, ease of access to guidelines, dashboard summary functions and risk prediction for shock have been chosen for incorporated into a web-based CDSS, accessible through desktop and mobile devices. Translation of these findings into a CDSS is currently underway and usability testing in end-users in Vietnam planned for Q3 2022.