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Paper Poster Session

Travel medicine and international health

The eHISS algorithm: designing a mobile phone-based algorithm for symptom related health advice

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Background: Timely diagnosis and treatment of diseases are life-saving, yet the access to health care is limited in many areas of sub-Saharan Africa (sSA). Innovative approaches are needed to reach those with limited access to the health care system and the ubiquity of mobile phones offers great potential for mHealth applications to provide health advice to the population. The aim of this study in Ghana was to develop a clinical algorithm integrated to an Interactive Voice Response (IVR) System that correctly identifies symptoms of common childhood diseases and provides corresponding advice. The study was part of the “electronic Health Information and Surveillance System” project (eHISS) that was initiated to deliver health information and obtain disease surveillance data simultaneously.

Material/methods: The automated algorithm was based on the WHO Guidelines for the Integrated Management of Childhood Illness (IMCI) to assess a child's condition using a 3-level classification system of disease severity. Symptoms to be identified were fever, cough, diarrhoea and vomiting. Disease severity was assessed and resulted in recommendations to either seek care immediately (A1), seek care within 24 hours (A2) or to remain home and treat and monitor symptoms (A3). The algorithm was evaluated in an Outpatient department and resulting symptoms, diagnoses and advice was compared to subsequent results from a consultation with a physician. The Kappa Value, sensitivity, specificity, as well as negative and positive predictive value were calculated.

Results: In total 237 participants contributed data to this analysis. Good agreement between the algorithm's and the physicians' findings was observed for cough (82.3%, kappa=0.61, p<0.001), fever (83.5%, kappa=0.59, p<0.001) and diarrhoea (84.4%, kappa=0.57, p<0.001). Emesis was diagnosed with fair agreement (76.4%, kappa=0.42, p<0.001). Of the 48 cases that were assessed as A1 by the physician, 42 (87.5%) were assessed as A1 by the algorithm and the remaining 6 (12.5%) were assessed as A2. Out of the 175 cases assessed as A2 by the physician, 121 were assessed as A1, 47

(26.9%) as A2 and 7 (5.6%) were labelled as A3 by the algorithm. Among 14 A3 cases, the algorithm diagnosed 4 correctly, 2 were declared as A2 and 8 as A1. Agreement between specific diagnoses was poor.

Conclusions: The automated IVR based algorithm performed well to identify symptoms correctly and sufficiently to assess disease severity and give according advice. Most importantly disease severity was not underestimated. Yet the identification of symptom complexes and diseases was not possible.