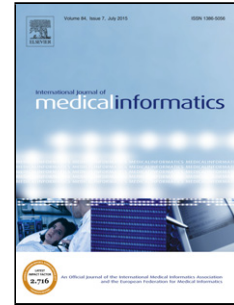


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Feasibility and Usability of an Ontology-based Mobile Intervention for Patients with Hypertension

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Abstract

Background: Lifestyle changes and the adoption of healthy behaviours are well established recommendations for the management of hypertension—a risk factor for cardiovascular and kidney disease. Mobile health interventions offer unique advantages and novel approaches to helping individuals make and maintain such behaviour changes; however, current interventions often lack theoretical and scientific grounding.

Objective: The goal of this study is to effectively model the knowledge, concepts and relationships relevant to the management of a chronic illness like hypertension, and to implement this knowledge model within a mobile self-management application that can be used by patients.

Methods: A behaviour modification approach based on COM-B (capability, opportunity, motivation, behaviour) Model and the associated Behaviour Change Wheel was developed. An ontology-based knowledge model was implemented to formally conceptualise relevant knowledge in hypertension clinical practice guidelines, behaviour change models and associated behaviour change strategies. A hypertension management decision support framework was designed and implemented as a proof-of-concept mobile phone application (*EmpowerBP*) using the aforementioned model. The usability of this pilot application was tested using think-aloud protocol by eight individuals with hypertension while performing predefined tasks. Thematic analysis with inductive thematic coding was performed to identify specific feedback and areas for improvement.

Results: The most common positive feedback included participants finding application resources interesting or helpful and liking the user interface. The most common negative feedback was finding the included salt calculator confusing or laborious to use and finding the profile creation questionnaire too long. The derived themes were: features, profile creation, resources, scenario, usability, user interface.

Conclusions: The ontology knowledge model formalises variables, properties, and relationships such that they can be used for problem solving. By integrating and computerising complex knowledge from clinical practice guidelines, behaviour change theories, and associated behaviour change strategies, it is possible to model existing information about the management of hypertension as an ontology. This proof-of-concept application creates clinical and behavioural profiles of a user to provide them with personalised management strategies, rooted in established behaviour change theory, that will engage and empower them to manage their

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