

Usability Evaluation of a Body Surface Potential Map Visualization System

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Although the Body Surface Potential Map (BSPM) is more sensitive for detecting cardiac abnormalities when compared to the 12-lead electrocardiogram (ECG), it has not been adopted partly due to a lack of clinician-friendly tools for visualizing BSPM data. To address this problem, a BSPM viewer has been enhanced and its usability evaluated. Usability is important because badly designed interfaces can result in fatal medical errors.

Given the specialized nature of the BSPM, the viewer was evaluated at the 2010 International Conference on Computing in Cardiology. Seven delegates (7 males, mean age: 39 ± 11) were recruited, each completing a pre-test questionnaire, seven representative tasks whilst thinking-aloud and a post-test questionnaire. Screen recording software and a microphone was used to record the participants feedback and interactions. The think-aloud protocol was used to gain insight into the users working memory.

From 3.5 hours of audio and video recordings, 41 use errors were found and given a severity rating, i.e. 1 (Cosmetic), 2 (Medium), 3 (Serious) and 4 (Critical). The average rating was $2.24 (\pm 1.09)$. Efficiency was measured using task completion rates and times derived from time-stamps. All participants without assistance completed all four elaborate tasks. Participants rated the responsiveness of the viewer (mode: 4/5, mean: 4.28) on a five-point scale (1= low, 5= high). They rated how useful the viewer would be in the clinical domain (mode: 4, mean: 4). All participants said the viewer will help further research and six participants said it would be useful for education. They rated the learnability of the viewer (mode:3/4, mean:3.7) and five participants said they could learn all features within a period of hours. Finally, participants rated its look and feel (mode:5, mean:3.85) and six participants said the interface was intuitive.

In conclusion, a usability test was successfully carried out in a conference setting to evaluate and improve the interface of a BSPM viewer. A usable viewer may help streamline the BSPM into clinical practice.