

Point-of-Care Speech-Recognition Based mHealth Solution to Facilitate Physicians' Daily Work

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Abstract. We developed and implemented a smartphone-based mobile application that uses speech recognition for the point-of-care ordering of radiological examinations. 21 out of 30 physicians completed a usability questionnaire including the Short version of the User Experience Questionnaire (UEQ-S) and the Unified Theory of Acceptance and Use of Technology (UTAUT). The mobile application showed high user acceptance and superior user experience when compared to the conventional workflow. Due to the high usability of our mHealth solution, it might help to facilitate the physician's daily work.

Keywords. mHealth, speech recognition, usability

1. Introduction

The administrative burden for physicians in the hospital is high and can distract the focus from a physician's genuine clinical work, i.e. patient care [1]. We developed and implemented a smartphone-based (iOS) mobile application (MA) that has access to the electronic health records (EHR) of our patients and uses speech recognition (*Dragon Medical*, Nuance Communications, Burlington, USA) for the point-of-care ordering of radiological examinations. The MA is embedded into our clinical information system *i.s.h.med* (Cerner Health Services Deutschland GmbH, Berlin, Germany). Recently, we could show that the new MA workflow is faster than the conventional desktop application (DA) and physicians can therefore spend more time on clinical work [2]. However, the usability, as well as drivers/barriers to the use of our MA, are unclear.

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2. Methods

All physicians at the Department of Trauma and Plastic Surgery at the University Hospital Würzburg, Germany, were invited to participate in a usability survey including the short version of the User Experience Questionnaire (UEQ-S) and the Unified Theory of Acceptance and Use of Technology (UTAUT). For the data analysis, we used a two-sided dependent sample t-test and regression analysis.

3. Results

Twenty-one out of 30 physicians (mean age 34 ± 8 years, 62% male) completed the questionnaire. Compared to the conventional *DA* workflow, the new *MA* showed superior overall attractiveness (mean difference $+2.15\pm 1.33$), pragmatic quality (mean difference $+1.90\pm 1.16$), and hedonic quality (mean difference 2.41 ± 1.62 ; all $p < .001$). In contrast to the *DA*, the *MA* was perceived as supportive, helpful, easy to use, inventive and leading edge. The user acceptance measured by the UTAUT (mean 4.49, SD 0.41; min. 1, max. 5) was also high. Performance expectancy ($\beta = 0.57$, $p = .02$) and effort expectancy ($\beta = 0.36$, $p = .04$) were identified as predictors of acceptance explaining 65.4% of its variance.

4. Discussion

To the best of our knowledge, this is the first study that investigated user experience and user acceptance of a smartphone-based in-hospital mHealth application, which offers diagnostic imaging management via speech recognition. Our *MA* seems to adequately address the physicians' pragmatic and hedonic needs. The high behavioral intention to use the *MA* (i.e. user acceptance) was explained by high performance expectancy and its user-friendliness (effort expectancy). However, generalizability is limited due to the small sample size.

5. Conclusions

Point-of-care mHealth solutions using innovative technology such as speech-recognition seem to address the users' needs and depict higher usability in comparison to conventional technology. Implementation of innovative user-centered mHealth innovations might therefore help to facilitate physicians' daily work.

References

- [1] Sinsky C, Colligan L, Li L, Prgomet M, Reynolds S, Goeders L, Westbrook J, Tutty M, Blike G. Allocation of physician time in ambulatory practice: a time and motion study in 4 specialties. *Annals of internal medicine*. 2016 Dec 6;165(11):753-60.
- [2] Fuchs KF, et al. Die Patientenakte in der Kitteltasche - Einführung eines Smartphone-basierten Zugriffes auf ein Krankenhausinformationssystem. 98. Jahrestagung Vereinigung der Bayerischen Chirurgen e.V, 2021