CHAPTER 2

Mobile Human-Computer Interaction in Healthcare

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2.1 INTRODUCTION

Human-Computer Interaction (HCI) is becoming more significant for physicians and patients. Physicians can significantly benefit from the constant use of IT in various tasks, such as collecting real-time patient information or simulating surgeries to improve their abilities. Patients, on the other hand, can be considerably helped by IT. For example, providing patients with virtual environments can be more pleasant or less tedious during rehabilitation and indirectly encourage them to complete their rehabilitation processes as quickly as possible (D'Auria et al., 2016).

Healthcare institutions began integrating patient-related applications in their computer systems as early as the 1960s. As technological usage seemed sparse in the 1960s, it is now a daily aspect of healthcare and is at the forefront of the industry. In addition, computers are employed for various purposes nowadays, from monitoring patient applications to analysing data. In addition, employing intelligent technologies involving the Internet of Things (IoT) and cloud computing facilitates the development of healthcare systems. As a result, it can significantly enhance healthcare quality and outcomes (Hassanalieragh et al., 2015).

However, like numerous technological advancements, integrating these technologies further loads patients and Healthcare Providers (HCPs), requiring them to acquire new knowledge and cognitive skills. The design of HCI is focused on addressing these concerns. Additionally, HCI is crucial in analysing data and distributing services through mobile health (mHealth) devices. It works as the intermediary between the devices, patients, and HCPs.

This topic provides a review of mobile HCI in healthcare. The study aims to determine the HCI design principles in the healthcare sector, including the current HCI healthcare systems. Furthermore, future mobile HCI for healthcare is discussed to identify the issues regarding mobile HCI in healthcare significantly improved.

2.2 HCI DESIGN PRINCIPLES FOR HEALTHCARE

The development of human-computer interfaces for smart healthcare devices has challenges due to the requirement for a wide range of interaction modes that can accommodate various user roles, tasks, and procedures. Furthermore, it is essential to consider crucial characteristics of a smart healthcare environment and the operation necessary for the collection, transmission, storage, and display of multi-threaded, dynamic physiological data. These operations should be conducted to ensure protection time capabilities while still adhering to established healthcare standards. Finally, designers must balance providing a stable data acquisition platform and delivering client-side mobile services. As a result, smart healthcare devices demand unique HCI design principles.

2.2.1 Secure and User-Friendly

The security of smart healthcare devices is essential. Usability is a concept that relates to the effectiveness, efficiency, and satisfaction of a design to enhance its convenience of use. The efficiency of use is a criterion for heuristic evaluation. The efficiency or convenience of medical devices may compromise their safety. Convenience allows used signals to minimize cognitive stress and respond quickly or automatically, allowing "response chaining" and "muscle memory" without stringent activity monitoring. Medical device security may not like the behaviour. Patients died or were severely injured by the Therac-25 radiation treatment machines, which exposed them to hundreds of times the permissible dosages. Users trying to speed up their operations might overcome the redundant design forcing them to input control settings twice in the latest version (Leveson & Turner, 1993).

Its critical character magnifies the negative results of safety and security threats, mitigated through HCI design. Data validation and automated checks may increase device safety and alert users to reconsider their actions. Limiting the usage of unsecured wireless networks and cloud storage may help prevent the cyber theft of personal health record data. Password protection may keep unauthorized users from crucial control settings, slow usage, and generate login fatigue. Software procedures that identify potentially harmful settings or input data may help avoid irreversible errors but also cause alert fatigue.

Furthermore, there can be a demand for additional authorization and notification procedures to support required tasks and processes. For instance, a nurse needs