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Investigating the need for clinicians to use tablet computers with a newly envisioned electronic health record

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ABSTRACT

Objective: The Veterans Health Administration (VHA) has deployed a large number of tablet computers in the last several years. However, little is known about how clinicians may use these devices with a newly planned Web-based electronic health record (EHR), as well as other clinical tools. The objective of this study was to understand the types of use that can be expected of tablet computers versus desktops.

Methods: Semi-structured interviews were conducted with 24 clinicians at a Veterans Health Administration (VHA) Medical Center.

Results: An inductive qualitative analysis resulted in findings organized around recurrent themes of: (1) Barriers, (2) Facilitators, (3) Current Use, (4) Anticipated Use, (5) Patient Interaction, and (6) Connection.

Conclusions: Our study generated several recommendations for the use of tablet computers with new health information technology tools being developed. Continuous connectivity for the mobile device is essential to avoid interruptions and clinician frustration. Also, making a physical keyboard available as an option for the tablet was a clear desire from the clinicians. Larger tablets (e.g., regular size iPad as compared to an iPad mini) were preferred. Being able to use secure messaging tools with the tablet computer was another consistent finding. Finally, more simplicity is needed for accessing patient data on mobile devices, while balancing the important need for adequate security.

1. Introduction

Handheld computers have for a long time held tremendous potential for improving communication, facilitating information access, and enhancing clinical workflow [1,2]. More recently, handheld computers, such as tablets, have become much more accessible in clinical care settings within urban and rural healthcare organizations [3]. A recent survey found that more than half of providers perceive the use of a tablet computer as having a positive effect on the following: patient communications, patient education, patient's perception of the provider, time spent interacting with patients, provider productivity, process of care, satisfaction with the electronic health record (EHR) when used together with the device, and patient care in general [4]. A study in the emergency department setting found that clinical use of a tablet computer was associated with a reduction in the number of times physicians logged into and used the EHR via a desktop computer workstation [5]. Another study focused on outpatient settings revealed that the use of tablet computers in the exam room was perceived positively by most patients [6]. On the inpatient side, one study found that implementation of iPads was associated with improvements in perceived and actual efficiency for resident physicians [7]. Another study showed that despite having read-only access on iPads, physicians were generally satisfied using iPads on ward rounds as a tool to access patient information [8]. Given the positive potential of tablet computers in clinical care settings, the Veterans Health Administration (VHA) recently deployed iPads at several VHA Medical Centers as part of a program known as the Mobile Health Provider Program.

The VHA's Mobile Health Provider Program is designed to equip VHA health care teams with mobile technology to enhance the way they deliver health care to Veterans. The program includes iPads, which enable care team members to access critical information whether they are at a clinic, in the local community, at a patient's home, or working remotely. Since being launched in 2014, VHA has issued iPads to more than 12,000 care team members at more than 60 VA sites. Anecdotally

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reported barriers and limitations to date have included: (1) lack of released VA-developed apps; (2) issues with typing on the iPad due to not having a physical keyboard; (3) using a small screen size to work in the EHR; and (4) the EHR frequently logging out and forcing the user to log in several times. The VHA is releasing a series of internally developed mobile apps that are designed to allow for access to real-time EHR data to inform clinical decisions. Other internally developed apps are designed to enable care teams to write progress notes, enter orders and support specific workflows. Examples of apps include: (1) Image Viewing Solution (diagnostic medical image viewing capabilities); (2) Patient Viewer (accessing read-only data from the patient's EHR); and (3) Scheduling Manager (sending messages about appointments and scheduling to patients who are using a corresponding app).

Use of the iPads through this program, however, has been limited to date due to a lack of currently available and clinically relevant VHA applications built specifically for the iPad's iOS platform and the requirement to go through the Citrix Access Gateway (CAG) to access the VHA's EHR. One purpose of this study was to better understand why there was a low rate of iPad adoption, including barriers to use. However, our main objective was to understand expected variations in use among tablet computers and desktops when relevant mobile applications and a single sign-on portal are fully implemented.

2. Methods

We conducted an investigation at one of the VHA Medical Centers where iPads had been deployed. We used semi-structured interview technique to explore the current and anticipated use of tablet computers with a sample of clinicians across multiple care settings. The legacy EHR, Computerized Patient Record System (CPRS), is still currently in use at all VHA Medical Centers, including the one in this study, with plans to transition to a new EHR.

2.1. Participants

Twenty-four (24) clinicians participated in the study. They had an average of nine years of experience with the Department of Veterans Affairs (VA). Their clinical backgrounds were: eight physicians, three nurse practitioners (NPs), three pharmacists, six registered nurses (RNs), two licensed practical nurses (LPNs), one medical assistant (MA), and one social worker. They represented the following services: eleven from primary care, two from home-based primary care, five from inpatient care, two from telehealth, one from rehabilitation, one from surgery, one from mental health, and one clinician who was part of administration/risk management.

2.2. Semi-structured interviews

The purpose of the semi-structured interviews was to formally interview as many clinicians as possible from different services to understand expectations for mobile device use in care settings. The development of the semi-structured interview guide (Table 1), including the prompts, were informed by relevant literature on mobile technology use in other hospital settings, where clinically relevant tasks were currently executed with mobile devices [7–11]. The semi-structured interviews provided the flexibility for the interviewer (JS) to ask related, follow-up questions on particular topics of interest, while also providing the same set of core questions for each participant. All interviews were audio recorded and transcribed for analysis.

2.3. Analysis

Data analysis for the interview data followed an established process of upward abstraction of qualitative field data [12,13], where the data are represented at a higher level of abstraction such that the data can be integrated across participants to show recurrent patterns related to the objectives of the study. An inductive coding strategy was used by the first author (JS), (i.e., allowing codes to emerge from the data rather than using a pre-determined coding scheme) with an independent audit of all coding by a co-author (JH). This type of auditing procedure by a second analysist is considered an acceptable alternative to using independent coders for ensuring validity of the analysis [14]. Coding included a primary code and secondary code to further categorize each data point. A series of consensus calls to review the coding were held by two authors (JS and JH) to resolve questions raised by the coding audit. After the coding of all data from each of the 24 participants was finalized, the first author performed a secondary analysis of sorted subcodes for each primary code. In other words, for the primary code 'Barrier', the first author then summarized the different types of barriers as sub-codes under this primary code.

3. Results

Findings are organized around the following recurrent themes: (1) Barriers, (2) Facilitators, (3) Current Use, (4) Anticipated Use, (5) Patient Interaction, and (6) Connection.

3.1. Barriers

Barriers included connectivity, time to access CPRS, typing/keyboard, and screen navigation/screen size. Each one is described in detail.

3.1.1. Connectivity

Fourteen (14) data points related to connectivity issues when using mobile devices. Participants described experiences where the Citrix Access Gateway (CAG) connection needed for the iPad to access CPRS often dropped or timed out. In addition, participants noted loss of Wi-Fi signal or insufficient Wi-Fi, such as "dead zones" within the hospital. The amount of time needed to stay signed into CAG is not consistent with actual clinical work. For example, clinicians may sign into CAG to view patient data before seeing the patient and then engage in a patient interview. However, by the time the patient interview has concluded, the CAG connection has timed out. This slows the clinicians down and makes their tasks more arduous, having to sign back in to complete their clinical work, or in some cases to start over because their work was lost.

3.1.2. Time to access CPRS

Sixteen (16) data points related to time to access patient data in CPRS. The need for multiple sign-ons, Personal Identity Verification (PIV) card requirement, and MobilePASS all contributed to frustration with the time required to access patient data during patient care tasks. The VA now requires a two-factor authentication for logging in. This two-factor authentication requirement is not standardized in the healthcare community, although it is considered to be a best practice for protecting information. Assuming two-factor authentication becomes a healthcare standard, other healthcare organizations may experience similar frustrations from clinicians with regard to the time to access patient information.

3.1.3. Typing/keyboard

Twenty (20) data points related to typing or using the keyboard with a tablet computer. Clinicians expressed that a virtual keyboard with the iPad is insufficient; a real, physical keyboard is needed for clinical documentation. Clinicians cited having a physical keyboard as a major advantage to using a laptop instead of a tablet. The lack of a physical keyboard prohibited any type of substantial clinical documentation for most users. However, some noted that an iPad was useful for looking up patient information and checking email. One participant bought a case for his VA-issued iPad mini with an integrated keyboard using his personal funds. When he opens the case, the device