Exploring nurses' confirmed expectations regarding health IT: A phenomenological study

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ABSTRACT

Health information technology (IT) benefits both patients and providers with respect to health care quality and perceived usefulness. Although existing research provides a preliminary understanding of nurses' perception of health IT, perceptions do not guide actions. This phenomenological study explored nurses' perceptions regarding electronic health records and bar code medication administration four months post implementation on a medical–surgical unit in an academic medical center. Ten staff nurses (8 females and 2 males) participated. We categorized the results into five themes from personal-level to organizational-level confirmed expectations: (1) nurses' interaction with computer, (2) nursing performance regarding task accomplishment, (3) unit-specific teamwork, (4) interdisciplinary teamwork, and (5) quality of care. We discovered that effective health IT must be congruent with nursing expectations. IT professionals, nursing and organizational leaders may use findings to structure an environment supportive of effective health IT in nursing practice.

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1. Introduction

Health information technology (IT) is defined as "the application of information processing involving both computer hardware and software that deals with the storage, retrieval, sharing, and use of health care information, data, and knowledge for communication and decision making" [41]. Applications are systems used by clinicians or patients, such as electronic health records (EHR), nursing information systems, electronic prescribing systems, and bar code medication administration systems (BCMA). EHR documentation benefits health care quality by increased adherence to guideline-based care, improved patient monitoring, and decreased medication errors [1]. In addition to improved quality, hospitals benefit from EHRs through financial incentives offered by the Centers for Medicare and Medicaid Services (CMS) for "meaningful use" of certified electronic health record technology. Despite these benefits, in 2009, only 1.5% of U.S. hospitals had implemented a comprehensive EHR across all major clinical units, and 7.6% had implemented a basic system with physician notes and nursing assessments in at least one unit [2].

In addition to the slow adoption of this technology, health IT may also introduce unintended, negative consequences, such as increased errors during entry and retrieval [3], problems with communication and/or coordination of care [3], and even increased mortality from delayed treatment [4]. Workarounds are another potential concern, potentiated by rigid, inflexible systems [5] and exhausted clinicians [6]. The implementation of health IT significantly transforms the

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clinical working environment, particularly with respect to Registered Nurses. In the United States, there are over 2.5 million people employed as Registered Nurses, the largest among all health care occupations [7]. Nursing assessments and the work associated with EHR implementation increases the demand for nurses' hours per patient day by 15–26% [8]. Therefore, it is important to assess nurses' perceptions and expectations of EHR and its impact on workflow, satisfaction and quality of care.

1.1. Existing theoretical frameworks related to technology acceptance

A variety of theoretical models explain information technology (IT) acceptance, such as the Technology Acceptance Model (TAM), TAM 2, Unified Theory of Acceptance and Use of Technology (UTAUT), Theory of Planned Behavior (TPB), Expectation–Disconfirmation Theory (EDT) and Expectation-Confirmation Model (ECM). Holden and Karsh (2010) conducted a methodological review of TAM use in health care and found that the relationship between perceived usefulness and intention to use or actual use of health IT was significant in 16 analyzed data sets. Measurement of perceived usefulness by researchers, however, has been inconsistent and conducted in a variety of ways, such as usefulness for a task, increased productivity, and enhanced job effectiveness, leading to dissimilar results. Lack of standardization across TAM studies in health care has been problematic [9]. One recommendation for future research is to conduct elicitation studies to discover health IT beliefs for a study population, i.e. patients, clinicians [9]. Beliefs serve as the basis for expectations. When present health IT perceptions are congruent with what users anticipated (prior to implementation), then the expectations are confirmed (confirmed expectations). Confirmed expectations and perceived usefulness affect satisfaction. If the technology meets or exceeds expectations, users are satisfied [10].

1.2. Nurses' perceptions related to EHR and BCMA

Usability of health IT determines the extent to which nurses use the EHR/BCMA to achieve goals with effectiveness, efficiency and satisfaction in a specific context, such as a hospital [11]. Effectiveness reflects accuracy and completeness of nurses' achieving goals related to quality indicators and error rates [12]. The EHR has to be compatible with nurses' activities and the way they think, because usability is a fundamental dimension of patient safety [13]. Optimal health IT usability depends upon understanding how the system functions within a practical work environment, for which a qualitative research approach is ideal [14].

Existing research provides a preliminary understanding of nurses' perception of health IT. Nurses perceive EHRs positively due to improved readmission communication [15], access [16,17], accuracy [17], timeliness and legibility [15], quality of care [18,19] and safety of the patient [18]. Conversely, negative nurses' perceptions relate to navigation issues due to poor system layout [20], documentation time [15,18,20–22], less time for direct patient care [17,20–22], reduced accuracy and validity of information [15], inferior emergency

management [20], and unanticipated or unresolved information from other team members [17]. Nurses also perceive the EHR increases the cost of care [18]. Lastly, some nurses report being less optimistic regarding the overall safety of patient care and the ability to avoid errors by alerting staff to potential errors [18].

Nurses expect that BCMA will decrease medication errors [23]. However, results from a systematic review of six studies suggest that there is limited evidence regarding the effectiveness of BCMA in reducing the overall medication error rate [24]. New computerized and automated devices (such as BCMA) also create burdens and complexities for individuals and teams responsible for managing these systems [25]. One case study found a two-fold increase in nursing workflow procedures following BCMA one year after implementation [26]. BCMA may also introduce negative side effects such as confusion, degraded coordination, and nurses dropping activities during busy workload, leading to a potential increase in adverse drug events [27]. System functionality, usability, and positive or negative impact on nursing practice relate to nursing satisfaction with BCMA [28]. For example, results from a case–control study showed that nurses reported dissatisfaction due to inability to see both the medications and previously administered medications [29].

These findings summarize nurses' perceptions toward health IT. However, what is not known is to what extent nurses' perceptions guide their acceptance of new health IT and subsequent actions related to integrating this new technology. For example, can we use confirmed expectations to inform decision making regarding health IT redesign, policy management or user training? In October 2011, an academic medical center underwent a major health IT implementation, including both an EHR and BCMA. The specific aim of this study was to gain an understanding regarding EHR and BCMA implementation process and strategies, and to evaluate the impact on patient care from the staff nurses' perspective. We used this opportunity to explore nurses' perceptions regarding health IT and identify performance, teamwork, patient safety and quality of care expectations.

2. Methods

We used a phenomenological approach for this qualitative study. Phenomenological approaches are used to understand phenomena from the perspective of those who experience the phenomena, with understanding achieved primarily through interpersonal interviews [30]. Our goal was to understand the nurses' experience of the newly implemented EHR and BCMA in nursing practice. We emphasized understanding this change from the nurses' perspective. We chose an inductive approach to develop a theory rather than test an existing one.

Sample and setting: We used purposive sampling to recruit staff nurses who worked on a medical–surgical unit in an academic center that had experience with both the EMR and BCMA, and had a minimum of two years of working experience in the organization. We invited eligible RNs from this unit to participate and conducted private, face-to-face interviews in a location away from the clinical area to ensure privacy and avoid disruption. The health care