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Development and psychometric testing of the Readiness to Engage with Patient-Facing Health Information Technology Tools (RE-PHIT) scale

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ABSTRACT

Objective: With the proliferation of patient-facing health information technology (HIT) tools, nurses are in a position to support the technology needs of both patients and families. The purpose of this study was to develop and examine the psychometric properties of the Readiness to Engage with Patient-Facing Health Information Technology (RE-PHIT) instrument intended to measure nurse readiness to support patient and family use of HIT tools.

Materials and methods: Content for the 10-item instrument was derived from the literature, notably from Hibbard's Patient Activation Measure and from expert nurse informaticists. Instrument validation was achieved through an expert panel approach for assessing content validity, exploratory factor analysis for assessing the construct validity and Cronbach's alpha were used to estimate the internal consistency reliability.

Results: Content validity produced indices ranging from 0.86 to 1.00 for all items. Exploratory factor analysis yielded a one-factor solution consisting of 10 items that explained 62.6% of the total variance and internal consistency reliability was high with a $\alpha = 0.93$.

Discussion: Findings support the validity and reliability of a new instrument, RE-PHIT, which can be used to measure nurses' readiness to engage with patients and families with HIT tools. Future testing of this instrument should be conducted in additional care settings with different types of nursing clinical workflows and HIT tools.

Conclusion: A 10-item instrument, RE-PHIT, was developed to measure nurse readiness to support patient and family use of HIT tools. Results of the psychometric testing confirmed that the RE-PHIT scale is a valid and reliable tool.

1. Introduction

Patient portals, personal health records and patient-facing mobile health or mHealth applications are a new focus for healthcare organizations intended to engage patients and improve patient centered care [1,2]. Healthcare organizations are making large investments in patient engagement programs utilizing health information technology (HIT) tools for telehealth, remote patient monitoring, personal health management and disease prevention [3]. This is in part due to the United States government incentive programs encouraging the adoption of portal technology by hospitals and physician practices [4]. A variety of solutions are being piloted and deployed in various care settings to enhance patient-provider communication and to drive patient self-management and promote shared-decision making [1,5]. In order for patient portals to achieve the desired outcomes, the acceptance and encouragement of use by healthcare providers is essential [6]. Healthcare professionals across the care continuum play critical roles in partnering with patients and families in the uptake of HIT for managing their health [7]. However, little work has been done to understand and measure provider perspective regarding the level of preparedness for the added workload of helping patients with HIT tools [8,9].

1.1. Background and significance

Historically, nurses are seen as the consummate patient advocates and patient educators to promote wellness and improve health outcomes [10]. Nurses provide empathy, promote dignity and encourage healthy behaviors [11]. In an age where electronic information is readily available, nurses are faced with questions from patients regarding health 'facts' found in online searches. More and more, nurses

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have the opportunity to explain how certain behaviors will benefit a patient and promote empowerment [12]. There is little evidence to show that nurses are formally trained or adequately prepared to support patients with the use of new and emerging patient-facing technologies.

However, work is currently underway to prepare nurses to effectively engage patients and families using HIT tools. For example, in 2017, the HIMSS TIGER (Technology Informatics Guiding Education Reform) Committee began activities to compile competencies on the integration of technology into practice and education and crafted a report outlining "Patient Access & Engagement/PHRs" as an area of competency [13]. In 2016, the 13th International Congress in Nursing Informatics entitled its post- conference proceedings "Forecasting Informatics Competencies for Nurses in the Future of Connected Health" to help forecast and define the informatics competencies for a future in which practice and technology are interconnected [14]. A survey of Alliance for Nursing Informatics members in February 2014 reported that new competencies are needed to support patient advocacy for a variety of consumer eHealth Tools. In response, Alliance for Nursing Informatics created and continues to maintain a Consumer eHealth Toolkit to support nursing organizations in this effort [15].

Equipping nurses with the attitudes, skills and knowledge to engage patients using HIT is critical to the success of patient engagement programs [16]. Since nurses hold a central role in supporting patient engagement [17], understanding how nurses are engaging with patients using HIT tools has become increasingly relevant. From the literature, the timing for engaging with patients using HIT tools is unclear [17]. Anecdotally, some nurses prefer to answer patient questions on admission and some would rather discuss with patients and families at the time of discharge along with other patient education materials. Prior to implementation of patient facing HIT tools, it would be beneficial to assess the nurses' preparedness and perception of workflow fit with a validated tool. If deficiencies or discomforts are noted, there is an opportunity to provide education or additional workflow support to ensure implementation success. Currently, most organizations lack a complete understanding of the preparedness level of their nursing staff [18] and a validated tool to measure nurses' level of preparedness is not currently available. This gap in the literature encouraged the development of the Readiness to Engage with Patient-Facing Health Information Technology (RE-PHIT) instrument so that organizations can perform an assessment of their nursing workforce.

The purpose of this paper is to report on the development and psychometric testing of a self-report instrument to measure nurses' level of preparedness and their perceptions of how tasks related to engaging patients using HIT tools match current workflows. The goal of this study was to apply exploratory factor analytic methodology to examine the underlying latent variables, known as factors, in a survey instrument measuring nurse preparedness for HIT tools.

2. Methods

2.1. Scale development

Items for the RE-PHIT instrument were generated from a critical review of the literature by the authors and with consultation of experts in the field. Combined, the authors themselves have 75+ years of experience in the patient experience domain. To serve as the starting point for the scale, nine items related to the concepts of perception and preparedness were utilized from the 22 item Patient Activation Measure (PAM) scale, a widely used, previously validated instrument to measure patient activation [19,20]. Adaptations to the scale consisted of inserting wording to reflect nursing workflows and replacing phrases regarding self-engagement with wording to assess nurses' engagement with patients and families.

2.1.1. Content validity

Following established methods for scale development, seven experts were asked via email to rate the degree to which each of the nine items related to the construct of measuring Nurses' Perceptions of the Use of Health Information and Communication Technology tools for patient engagement. The seven experts were identified from Alliance for Nursing Informatics as researchers and specialists in patient engagement with at least 10 years working as a nurse informaticist. A four-point scale was used to rate each item: (1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, 4 = highly relevant). For ratings less than 4, suggestions were solicited for improvement of the item. Comments and suggestions from the experts on the first version were incorporated into a subsequent final version. Both versions were assessed for item-level content validity indices (I-CVI).

2.1.2. Item development and validation

Nine items were scored by all seven content experts. Suggestions were made to align the wording to cover all aspects of nursing workflows and recommendations were put forth to add one additional question to capture the baseline knowledge of HIT tools. In the second version, a tenth question (Q10. In general, it is easy to engage patients and families in their healthcare using health IT tools) was added to account for the expert recommendations from version one, and recommendations to reorder the survey questions were incorporated. The final RE-PHIT instrument consisted of 10 items (Table 1) rated on a 5-point Likert scale with values ranging from 1 = "Strongly Disagree" to 5 = "Strongly Agree". Content validity of the 10-item instrument was established by the panel of experts with I-CVI ranging from 0.86 to 1.00 and an average I-CVI of 0.933.

2.2. Procedures

The RE-PHIT instrument was uploaded to *Tonic*, a web-based survey tool. This tool was used since a relationship with the *Tonic* vendor was already in place with the sponsoring organization. The software offered appealing visuals and a method to easily monitor and download survey responses. A link to the survey instrument along with instructions was distributed to eligible participants via email. An announcement regarding the opportunity was also posted on associated internal websites and via flyers. As an incentive for participation, the academic medical center respondents could voluntarily enter a raffle for a *Fitbit*. Since the Alliance for Nursing Informatics respondents may or may not get surveyed on a regular basis, no compensation for time to complete the survey was provided. The survey tool included language to indicate implied consent for those completing the surveys. The Columbia

Table 1
The 10 items of the Readiness to Engage with Patient-Facing Health Information Technology Instrument (RE-PHIT).

Survey Questions (Items scored on a 5-point Likert scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree or Disagree, 4 = Agree, 5= Strongly Agree)
Q1. One goal of this hospital's PHR is to assist patients and families in becoming more involved in their healthcare.
Q2. I assess patient and family readiness to use a PHR on admission.
Q3. I encourage patients and families to view their health information electronically.
Q4. I encourage patients and families to use health IT tools such as mobile applications or online support forums.
Q5. I use this hospital's PHR to engage patients and families in their healthcare.
Q6. Using the hospital's PHR to interact with patients and families fits into my current workflow.
Q7. I provide information to patients and families on how to access the PHR on admission.
Q8. I provide information to patients and families on how to access the PHR as part of the discharge process.
Q9. I am confident that I can answer patient and family questions regarding the use of specific health IT tools such as PHRs.
Q10. In general, it is easy to engage patients and families in their healthcare using health IT tools.