Nursing Informatics 2016
W. Sermeus et al. (Eds.)

doi:10.3233/978-1-61499-658-3-242

Discovering eHealth Technology: An Innovative Interprofessional Graduate Student Learning Experience

Krista ESTES[a,1], Eric GILLIAM [b], Sarah KNAPFEL[a], Chanmi LEE[a], Diane SKIBA[a]
[a] *University of Colorado College of Nursing, Aurora, Colorado USA*
[b] *University of Colorado Skaggs School of Pharmacy and Pharmaceutical Sciences, Aurora, Colorado USA*

Abstract. The use of eHealth has grown in recent years and is projected to continue to increase exponentially. In order to empower and prepare advanced practice providers to integrate eHealth into their clinical practice, curricular changes need to occur. The iTEAM grant provides a unique opportunity to prepare advanced practice disciplines to provide collaborative care using eHealth. Through the integration of a simulated telehealth using a standardized patient, Doctor of Pharmacy and Advanced Practice Registered Nursing students learned how to apply health information technology and coordinate care in an interprofessional manner. Opportunities and challenges to guide future efforts to integrate eHealth-learning experiences into the curriculum are identified.

Keywords. eHealth, telehealth, curriculum, interprofessional, simulation

1. Introduction

The adoption of health information technology (HIT) in the health care industry increased in the United States following the enactment of the Health Information Technology for Economic and Clinical Health (HITECH) Act in 2009. At the time of its ratification, the HITECH legislation mainly focused on the implementation and meaningful use of electronic health records (EHR). With the increased adoption of HIT, the focus has expanded to telehealth, which has become an essential component of the health care delivery system[1]. The terms *Telehealth* and *eHealth* have been used interchangeably to describe the use of technology in a healthcare manner[2]. Telehealth can be integrated into eHealth as it encompasses e-commerce and e-business practices in health systems management[3].

With the increasing use of telehealth technology, a reevaluation of curricula in health care disciplines is needed to prepare this workforce. The Institute of Medicine's *Health Professions Education: A Bridge to Quality* report [4] includes HIT in their list of five core student competencies. In nursing education, there is limited data about incorporating telehealth technology into graduate curricula. Erickson, Fauchald and Ideker described the inclusion of telehealth in nursing education through classroom and clinical experiences. Results revealed that the experience strengthened the Advanced

[1] Corresponding author, Krista Estes: krista.estes@ucdenver.edu (email)

Practice Registered Nurse (APRN) students' knowledge in telehealth and increased their interests to work in rural settings[5]. Additionally, integration of telehealth technology into pharmacy practice has been found to enhance patient monitoring and medication adherence[6,7].

The value of incorporating telehealth technology into practice is reflected in the accreditation standards for training nurse practitioners and pharmacists through graduate level education in the United States. These organizations call for optimization of medical service delivery through training of nursing and pharmacy students, respectively, in the competencies of technology utilization[8,9]. This shared value provides further opportunities to foster interprofessional (IP) HIT education for nursing and pharmacy students. In 2012, the Health Resources and Services Administration (HRSA) awarded the University of Colorado College of Nursing (CON) a $1.2 million grant. The Interprofessional Technology Enhanced Advanced Practice Model (iTEAM) was formed to focus on the preparation of advanced practice disciplines in nursing and pharmacy to provide IP care through the use of HIT.

2. Methods

CON and School of Pharmacy (SOP) faculty collaborated to design and implement an educational experience that introduced students to telehealth technology in a simulated IP clinical environment. This elective simulation was offered to both second-year Doctor of Pharmacy students enrolled in an experiential education course and APRN students enrolled in an advanced physical assessment course during the 2015 spring semester. One student from each program was paired to form an IP team tasked to conduct a telehealth patient visit with a standardized patient (SP) integrating videoconferencing, telehealth monitoring tools, and a simulated academic EHR. A SP is an actor trained to portray a patient in a medical scenario in order to provide a consistent learning environment for all student participants.

After the telehealth encounter, the SP and faculty evaluated students based on the learning objectives (Table 1). Students completed an open-ended questionnaire evaluating their simulation experience and beliefs regarding telehealth. A qualitative content analysis[10] of all responses was undertaken to describe the learning experienced and evaluate effectiveness of the simulation in achieving outcomes.

Table 1. Student Learning Objectives and Telehealth Outcomes

Student Learning Objectives		**Telehealth Outcomes**
Shared Objectives	**Profession-Specific Objectives**	
1. Communicate in an IP manner during a simulated telehealth visit in order to positively influence patient outcomes. 2. Analyze patient telehealth data and correlate it to patient use of basic telehealth tools.	1. Perform a problem focused patient history pertaining to the chief complaint while drawing upon the knowledge strengths of the pharmacy student *(CON students only).* 2. Identify a pharmacy-related patient care need and communicate it to the patient, to the APRN student, and in a written clinical note *(SOP students only).*	1. Telehealth technology is reported to be valuable for providing patient care. 2. Telehealth is a tool that empowers and connects the provider and patient. 3. Students identify ways in which telehealth technology may improve patient care if applied to the clinical practice setting.

2.1 IP Telehealth Visit Simulation Design

All students were introduced to the telehealth tools and learning objectives during an initial meeting with the iTEAM project coordinator and faculty. Each student pair had the opportunity to demonstrate use of telehealth monitoring tools (blood pressure, weight scale, SpO2, and pulse monitors) and discuss logistics of the visit. A detailed outline of the activity, objectives and expectations were provided. Students were encouraged to become familiar with details of the clinical case uploaded into an academic EHR and to test the videoconferencing prior to the SP visit.

During an assigned time and from three remote locations, the students and SP accessed a videoconference meeting and conducted a simulated IP telehealth visit. The SP case involved a 69-year-old male with a history of heart failure, obstructive sleep apnea, and hypertension. Students were provided a brief patient history including the initial indication and instructions for the use of the telehealth tools. As described in the case, the patient was instructed to gather vital sign data daily and forward results to the office care coordinator weekly. During the simulation, the SP reports, "I am following up regarding my telehealth readings after I was given the heart failure kit to use at home". The patient's case data revealed sporadic adherence to this new program and the SP demonstrated confusion and misunderstanding of his current medication plan.

2.2. Qualitative Evaluation

Students received an anonymous electronic survey designed to obtain demographic data and narrative responses to the following questions:

1. Which program were you enrolled in when you participated in the exercise?
2. How do you feel about the patient interview exercise using telehealth tools?
3. Regarding the IP patient visit and use of telehealth tools, what worked well?
4. Where do you think you could have improved in this exercise?
5. After participating in this experience, what is your definition of telehealth?
6. Please provide any additional comments you wish to share related to your IP experience utilizing videoconferencing, the academic EHR, or telehealth tools.

A trained research assistant reviewed the text data and a content analysis was conducted to identify similarities and differences using ATLAS.ti software. Two faculty members reviewed unique elements and statements to determine if they provide evidence of meeting the pre-determined telehealth outcomes. Consensus was achieved through discussion and context review and three distinct themes were identified.

3. Results

Fifteen students participated in the simulation. Six teams consisted of one CON and one SOP student; one team that was assigned one CON student and two SOP students. Students submitted 158 lines of text in the questionnaire. The CON students were enrolled in the adult gerontology Clinical Nurse Specialty program (n=1) or the adult gerontology, family or pediatric Nurse Practitioner programs (n=6). The SOP students were in their second of a four-year program. Most students were female (12), Caucasian (12) and 20-29 years of age (n=10) with a range of 20-59 years.

3.1 Theme One: Telehealth Technology is Valuable

Twenty-three unique statements described the value of using telehealth technology in patient care (telehealth outcome #1). Connectivity between providers and patient (telehealth outcome #2) was the most predominate sub-theme expressed. Students identified opportunities for patients to access providers despite distance. One student described telehealth visits as " a modern day way of conducting a house/office visit." Another student stated the technology "can benefit those who are living in rural areas or who are mobility limited". An additional benefit identified was the increased ability to recognize verbal and non-verbal communication. One student stated that telehealth made it possible for the provider to "visualize the patient directly using the tools." Other responses reflected that real-time patient observation was a more accurate reflection of the patient's actual practice, "the provider can offer detailed instructions as well as [determine] whether the patient is on the right track."

A concern for patients who may not know "how to use a computer properly or lack Internet connectivity" was noted as a limitation. Another student mentioned that geriatric and socioeconomically underserved patient populations might find integrating telehealth technology more challenging compared to other patient populations.

3.2 Theme Two: Telehealth Technology May Provide Efficient Care

Several students described the technology as working well, "the academic EHR was fantastic in providing patient information" and there was "very minimal, if any, video lag." Video and voice quality were described as reliable, offering easily discernable communication. Four students offered differing opinions about the videoconferencing and EHR tools. Most issues described were minor, such as "the interview was very loud… if one of the computers has some un-fixable interference, the conversation becomes very hard to hear." One student noted a limitation of the academic EHR stating it "can be slow at times and requires a specific operating system."

3.3 Theme Three: Telehealth Technology Promotes IP Collaboration

Students clearly valued the simulation experience when describing the enhanced opportunities to practice as an IP team. One student stated, "Since we worked in an interdisciplinary team, we could spontaneously support each other." Another student stated, "I think telehealth can help improve the gap within interprofessional communication. Each professional has their own set of knowledge and experience and bringing those together makes for optimal plan of care and treatment."

4. Discussion

With the increased utilization of teleconferencing and HIT in health care[2], nursing education now and in the future needs to focus on adequately preparing students[4,5,8]. In this educational experience, infusing telehealth technology into the curriculum through the use of an IP simulated telehealth visit was described as valuable. Students recognized the ability to increase connectivity and communication between the patient and the provider in an IP manner despite distance. A challenge included the cost of

hiring and training a SP as well as purchasing telehealth tools and use of an academic EHR. The SP and telehealth tools were purchased through the grant. Use of videoconferencing services was offered through the University for all students and faculty. If a SP cannot be purchased, a faculty member could play the role.

The SOP and CON students who participated in this pilot were volunteers, which may affect the transferability of the results. These students may have had a stronger curiosity or interest in telehealth. We did not determine what motivated these students to participate. This will be investigated further with future iterations of the simulation.

In conclusion, incorporating telehealth-learning experiences into academic curriculum has the potential to teach students the value of HIT as well as how it can connect different disciplines and be applied to the clinical setting. The next step will be the proposal of an academic module that can be implemented into the curriculum for all students. By acknowledging the direction of healthcare and continually guiding curriculum to stay up-to-date with HIT, students have an opportunity to be better prepared to practice in the ever-evolving health care environment.

"This project is/was supported in part by funds from the Division of Nursing (DN), Bureaus of Health Professions (BHPr), Health Resources and Services Administration (HRSA), Department of Health and Human Services (DHHS) under grant number D09HP25020. The information or content and conclusions are those of the author and should not be construed as the official position or policy of, nor should any endorsements be inferred by the Division of Nursing, BHPr, HRSA, DHHS or the U.S. Government" It does not constitute the official report on the grant and was not directed by the grant PI.

References

[1] American Hospital Association. Realizing the Promise of Telehealth: Understanding the Legal and Regulatory Challenges [Internet]. 2015 May [updated 2015 May; cited 2015 Sep 28]. Available from: http://www.aha.org/research/policy/2015.shtml

[2] F. Fatehi, R. Wootton. Telemedicine, telehealth or e-health? A bibliometric analysis of the trends in the use of these terms. Journal of telemedicine and telecare. 2012;18(8):460-4.

[3] The World Health Organization. E-Health [Internet]. 2015 [cited 2015 Sep 15]. Available from: http://www.who.int/trade/glossary/story021/en/

[4] E. Knebel, A.C. Greiner. Health Professions Education: A Bridge to Quality: National Academies Press; 2003.

[5] C.E. Erickson, S. Fauchald, M. Ideker. Integrating Telehealth Into the Graduate Nursing Curriculum. The Journal for Nurse Practitioners. 2015;11(1):e1-e5.

[6] K.A. Clauson, S. Elrod, B.I. Fox, Z. Hajar, J.H. Dzenowagis. Opportunities for pharmacists in mobile health. American journal of health-system pharmacy: AJHP: official journal of the American Society of Health-System Pharmacists. 2013;70(15):1348-52.

[7] K.L. Margolis, S.E. Asche A.R. Bergdall, S.P. Dehmer, S.E. Groen, H.M. Kadrmas, et al. Effect of home blood pressure telemonitoring and pharmacist management on blood pressure control: a cluster randomized clinical trial. Jama. 2013;310 (1):46-56.

[8] A.C. Thomas, M.A. Dumas, R. Kleinpell, M.C. Logsdon, J.D. Marfell, D.G. Nativio. Nurse practitioner core competencies [Internet]. 2012 [updated 2012; cited 2015 Aug 10]. Available from: http://c.ymcdn.com/sites/www.nonpf.org/resource/resmgr/competencies/npcorecompetenciesfinal2012.pdf

[9] M.S. Medina, C.M. Plaza, C.D. Stowe, E.T. Robinson, G. DeLander, D.E. Beck, et al. Center for the advancement of pharmacy education 2013 educational outcomes. American journal of pharmaceutical education. 2013;77(8):162. doi:10.5688/ajpe778162.

[10] H.F. Hsieh, S.E. Shannon. Three Approaches to Qualitative Content Analysis. Qualitative health research. 2005;15(9):1277-88.