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Testing iCare 1.0- An EHR Learning Tool

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RUNNING HEAD: Testing *iCare™v.1.0*

Testing *iCare™v.1.0:* An EHR Learning Tool

Tami H. Wyatt, PhD, RN, CNE
Assistant Professor, College of Nursing
University of Tennessee, Knoxville

Xueping Li, PhD
Assistant Professor, College of Industrial Engineering
University of Tennessee, Knoxville

Chayawat Indranoi, MS
Doctoral Student, College of Industrial Engineering
University of Tennessee, Knoxville

Matthew Bell, BSN, RN
Masters Student, College of Nursing
University of Tennessee, Knoxville

Corresponding Author:
Tami H. Wyatt, PhD, RN, CNE
Assistant Professor, College of Nursing
University of Tennessee Knoxville
1200 Volunteer Boulevard
Knoxville, TN 37996-4180
Phone: 865-974-6804
Fax: 865-974-3569
Email: twyatt@utk.edu

Abstract

Testing *iCare™v.1.0*: An EHR Learning Tool

A precedent for quick action toward electronic health records (EHR) was established during a State of the Union address in 2004 when President Bush introduced the goal of universal adoption of EHRs by 2014. After taking office in 2009, President Obama promised 50 billion dollars of federal monies over five years to improve health including access to EHRs to reduce medical errors and costs while improving the health of Americans (Goedert, 2009). The health care industry is diligently working toward this goal, which has implications for the education of health care providers.

The Technology Informatics Guiding Education Reform, better known as the TIGER initiative, represents over 120 organizations who are working together to integrate nursing informatics, including EHRs into nursing education (TIGER, 2009). One goal of TIGER is to promote health information technology competencies across all levels of training as published in the Nursing Scope of Practice for Nursing Informatics (ANA, 2001). In 2008, the American Association of Colleges of Nursing and the National League for Nursing both published position statements encouraging nursing programs to incorporate nursing informatics competencies, with a focus on EHRs in their curricula (AACN, 2008; NLN, 2008). Meeting these competencies is a challenge because to date, there are no universal or interoperable applications. Even the components that define an EHR are debatable (DesRoches, Donelan, Buerhaus, & Zhonghe, 2008). Further, current EHR applications have exorbitant price tags because they must have state-of-the-art security features that protect patient data. These expensive security features are not necessary in EHR applications used for training purposes because data housed in them are fictitious and not associated with actual patient data.

To meet the competencies as promoted by the TIGER initiative and all of its represented organizations, the University of Tennessee Knoxville, College of Nursing and the College of Information and Industrial Engineering developed and tested a prototype EHR application, *iCare™v.1.0,* that allows students to input data, retrieve pertinent health data, such as lab values and vital signs, while accessing evidence-based health information through a portal to system libraries. *iCare™v.1.0* is a learning tool that combines the expertise of information engineers and nurses in a clinical tool with state-of-the-art information systems tools. Further, this tool is unique because it was specifically designed as a learning tool, not an EHR to store actual data. *iCare™v.1.0* can generate reports that track student performance over extended periods of time and allows multiple users to document and retrieve data simultaneously on one particular patient, unlike EHRs used in the clinical setting. To ensure *iCare™v.1.0* met the needs of students and faculty, usability testing occurred while it was developed using a rapid prototyping process of design and Nielsen's heuristic methods of evaluation. Faculty and students evaluated the application at various points during its modification (*iterative process*). The goal of this research project was to;

1. Develop an electronic health record application to use with nursing students during simulated lab learning situations.
2. Evaluate the usability of the electronic health record application in three stages while being developed.

Background

There are many reasons to teach nursing students how to use EHRs. The Institute of Medicine recommends integrating EHRs into nursing education to establish a framework for

evidence-based nursing (Greiner & Knebel, 2003). The American Organization of Nurse Executives developed basic computer and informatics competencies for nurse leaders that include using EHRs to document, retrieve, monitor, and create patient care plans (Westra & Delaney, 2008). Surprisingly, there are currently few RNs who use EHRs in their facilities. DesRoches and her colleagues (2008) revealed that approximately 20% of RNs in the U.S. work in facilities that have adopted minimally functioning EHRs. While the prevalence of EHR use by nurses seems low, this percentage will grow exponentially over the next five years if President Obama's goal of an EHR for every American is met by 2014.

Adopting EHRs into nursing practice can be a challenge. Some nurses perceive an increase in workload with EHRs. According to Moody and colleagues, (2004), only 36% of nurses reported a decrease in workload after the adoption of EHRs. However, most nurses, (75%), believed that EHRs improved patient care and those nurses who received extensive EHR training, (80%), were the most favorable about the benefits of EHRs. Clearly, nurse educators have an opportunity to influence a nurse's perceptions about EHRs by adequately training them during their studies. Consequently, patient outcomes may be improved when nurses feel adequately trained to use EHRs for data retrieval, entry, and to base practice on evidence generated by stored data.

One reason that nurses are not adequately prepared to interact with health information technology, such as the EHR, is due to the knowledge deficits of nurse educators. In fact, in a survey of administrators from 266 baccalaureate or higher nursing programs, they ranked about 50% of their faculty as beginner or advanced beginner users of nursing informatics (McNeil, et al, 2005). Without nursing informatics knowledge by educators, the needs of incoming nurses will not be met (Barton, 2005). Nurse educators at the University of Kansas did just that. They

partnered with other universities and Cerner® resulting in the Simulated E-hEalth Delivery System (SEEDS) project (Conners, Warren & Weaver, 2007). By coupling an EHR system created for learning with simulated learning experiences, students were able to enhance critical thinking and problem solving in the clinical setting, demonstrate proficiency in EHR data retrieval and documentation, and develop beginning healthcare informatics competencies, (Conners, Warren & Weaver, 2007). Thus, this enables the University of Kansas to meet the informatics criteria for nursing programs as outlined by the NLN and the Commission on Collegiate Nursing Education, (CCNE), an affiliate of AACN, which are the accrediting bodies of nursing programs.

Unfortunately, few other nursing programs have taken such rigorous steps toward preparing nurses and meeting beginning level informatics competencies (Ornes & Gassert, 2007). The topic of e-health and informatics competencies for practicing nurses is just beginning to surface in the nursing literature (Booth, 2006) and even fewer articles exist that discuss the ways informatics competencies, such as EHRs, are included in nursing education. However, technology in nursing education is common on conference circuits today and there are a growing number of interest groups and listservs discussing informatics competencies. In fact, new ideas and solutions are surfacing about ways to integrate informatics competencies, such as EHR data entry and retrieval with simulation to create meaningful learning experiences.

Undoubtedly, nurse educators must incorporate the use of EHRs into curricula to prepare students for their nursing roles in the 21st century. Nursing programs are currently meeting this educational need in several ways. Some have adopted EHR tools by forming partnerships with existing EHR companies such as McKesson® and Cerner®. Others have access, albeit limited access, to EHRs during clinical experiences in healthcare facilities. Still other nursing programs

seek EHR products that can be integrated into simulation scenarios or be used as a stand alone learning tool. Nursing programs in the U.S. are not alone. Schools in Canada are also seeking ways to prepare nurses as more healthcare facilities are adopting EHRs. Canada's Academic Learning Advisory Group, similar to the U.S. TIGER initiative, has a goal to develop strategies to integrate EHRs into health discipline curricula (Nagle, 2007). This indicates there is great need for further discussion and novel ways to incorporate learning opportunities and teaching strategies with EHRs for the purpose of improving patient outcomes. In an attempt to answer this call for action, this team of researchers developed *iCare™v.1.0* and conducted usability testing through focus groups of faculty and students to create a user friendly EHR learning tool.

Methods

Prior to building the program, the research team including 2 registered nurses (RNs) and 2 information systems engineers, one with extensive experience in health care informatics, reviewed a variety of EHR applications designed for teaching and learning. Each product offered a unique teaching/learning approach and ranged in pricing but none met the needs of the University to find an affordable product that could be fully integrated with simulation scenarios. Based on the experience of the research team and the review of products, it was determined that a robust yet affordable product could be developed to teach students data entry and retrieval, how to access evidence-based practice guidelines, and generate student reports for educators.

A storyboard prototype was built with a Microsoft Excel spreadsheet using the tabs of the Excel worksheets as a navigation tool. Nursing flow sheets were gathered from local health care facilities to compare and contrast checklists and data entry formats. Data from case studies helped guide the interface, design, and presentation of health data that would be reviewed by student nurses in a newly designed electronic health record system to supplement simulation

learning. The aforementioned review of products and the organization of data from nursing case studies in the Excel worksheets served as a method of communication between team members. The prototype *iCare™v.1.0* was built with Microsoft Visual C# .NET and interfaces with a XML file that presents data from a relational database. The design of the database uses Health Level 7 standards, which are the accepted messaging standards for clinical data. The functionality of *iCare™v.1.0* was continuously tested by the development team of engineers and the usability and feasibility testing occurred with focus groups of undergraduate and graduate students and faculty following Nielsen's usability evaluation model.

The Nielsen evaluation model identifies user (usability) problems and devises solutions that are incorporated into the next sequence of program development. These problems may be varied in nature: engineering, design, interface, and interaction. A focus group of users evaluates the product because no one user can identify all of the problems, yet when users work together in focus groups, they often reveal problems not discovered when evaluating the program alone. Products are evaluated on five components as described in Table 1. A focus group following Nielsen's model allows users to discover mistakes and recover without assistance because this provides more data than simply helping the user. Data collectors, however, intervene and assist users only after it is determined that they can no longer proceed. While observing, data collectors record user behaviors, actions, and comments.

Once IRB approval was obtained for this study, a convenience sample of faculty and students from a university in the southeastern region of the U.S. were recruited to participate in one of three focus groups evaluating the usability of *iCare™v.1.0*. This research used a rolling recruitment technique because data collection occurred over a 4-month period. Eligibility criteria included faculty who teach in the undergraduate and graduate program because *iCare™v.1.0* was

designed for both student populations. Students from the same programs and over 18 years of age were eligible. Faculty not involved in simulation or clinical lab learning were excluded. Each focus group included faculty and students representing either the undergraduate or graduate student body. Testing occurred during 3 focus groups and the demographic description for each focus group is described in Table 2. Lunch was provided for participants because focus groups occurred during the lunch hour in meetings rooms to accommodate 10 people.

Instruments

The script and interview schedule for each focus group was based on the functionality, usability, and content that had been developed prior to each focus group. The interview schedule for the first group concentrated on ease of use, general appearance, and navigation. First, participants in focus group one were asked to locate information about patients in the EHR. For example: 1) What is Mrs. Hughes major complaint? 2) What is Mrs. Hughes level of pain? 3) What diagnostic procedures have been performed on Mrs. Hughes? Next, participants in focus group one were asked to report on the ease of use. For example: 1) How would you improve the organization of the information? 2) What information would you expect to add to the documentation? 3) What could be added to better help you learn (or teach) from this program?

The second focus group interview schedule identified flaws in the design and content areas and determined how users would input and retrieve data. Example questions included: 1) What information do you want to locate for Mrs. Hughes? 2) Was that information where you expected to find it? 3) Go to the Nurses Notes tab and insert a fictitious cardiac assessment. Was this task confusing and how would you improve it?

The third and final focus group interview schedule identified any omissions in the EHR and more efficient ways to present data. Sample questions during this focus group included: 1)

Locate Mrs. Hughes latest vital signs. Where you able to retrieve them quickly? 2) Have there been changes in Mrs. Hughes level of consciousness during this hospital stay? 3) What information do you need to provide care to Mrs. Hughes that you cannot find? 4) How would you change the information presented about Mrs. Hughes?

Procedures

A mutually agreed upon time and place for a meeting between the researcher and the participant occurred to discuss the study and obtain consent. All questions regarding the study were answered prior to obtaining a signature on the consent form. All participants were notified of scheduled focus groups via email and in the body of the email, participants were asked to respond to ensure that each received notification. Focus groups were scheduled during weekdays that corresponded with student class schedules requiring no one to travel to campus unnecessarily. Focus groups were also scheduled during lunch breaks so that students and faculty could attend the focus groups between classes.

Three focus groups were conducted between May and September 2008. During each of the one hour focus groups, participants reviewed *iCare™v.1.0* on a university owned laptop and responded to interview questions. All participants responded to each question; if they had no response, then they stated, "no response at this time". Researchers moderated each group and used the interview schedule to elicit feedback from subjects. During the focus group, the research team did not guide or coach subjects in finding information so that design flaws could be identified. A research assistant recorded all comments and feedback on the interview schedule. Each focus group was audio-taped to ensure that all data were captured. Audio-taped focus group data were transcribed verbatim and the tapes were destroyed once all data were included on the heuristic evaluation tool described later in the analysis section.

During the first focus group (May, 2008) subjects evaluated the interface, design (look and feel) and functionality of the application by examining *iCare™v.1.0.* The second focus group (June, 2008) incorporated modifications from the first focus group and evaluated the functionality of *iCare™v.1.0* including the addition of a health assessment documentation function. Participants in the third and final focus group (August, 2008) evaluated all features and functionality of the completed EHR application, which incorporated all revisions and modifications from the first two focus groups.

Analysis

Neilsen's usability heuristics and methods of evaluation were used to analyze data captured on the interview schedule after each focus group. Each item identified during the focus group was evaluated to determine if the item reflected a user's personal preference or a usability flaw. Items on the interview schedule that were classified as a usability issue were scored and ranked according to the importance of correcting the function and the feasibility of modifying the application. Those items ranking highest were modified and re-evaluated by the participants in the follow-up focus group. See sample evaluation tool Table 3.

Results

To familiarize focus group 1 (FG1) participants with *iCare™v.1.0,* the interview questions required participants to find clinical data about a fictitious patient. All participants were able to retrieve data but each participant also identified omitted features or required content areas. For example, one participant noted that the "pain scales need ranges", while another participant found a navigation error; "If you open up a tab you are forced to use that tab. You cannot get out of it without clicking on something else." Overwhelmingly, students and faculty reported that *iCare™v.1.0* was easy to use and required little effort to become familiar with the

layout. Two of the four participants reported that the design of the program was "nice", while the third reported it was "attractive" and the fourth said, "I liked the ease of reading." Interestingly, FG1 participants concentrated on the content in the EHR rather than the layout and design. The facilitator of FG1 had to frequently repeat questions about layout, design, and functionality to keep the participants on track. All feedback was scored and ranked and those content issues scoring 15 or greater were modified for the second focus group (FG2).

Results from FG2 focused on content, design flaws, and features for data entry and retrieval. Participants in FG2 needed little introduction to *iCare™v.1.0* because data were populated for several patients and participants were allowed to freely navigate and explore to locate information. Details about content were the first usability issues identified. For example, the height and weight of a patient needed to be available in both metric and English units and for the EHR to automatically calculate the conversion. A key finding in this focus group related to the assessment screens. Participants identified the need to chart "by exception" instead of requiring a full head to toe assessment. During this focus group, it was also noted that students needed guides or access to help for many of the features, acronyms, and assessment options. One participant suggested adding a feature whereby a user could *hover* or *mouseover* words to reveal a definition or helpful hints. Faculty who participated in FG2 identified key reporting features to add to the program that would enable an instructor to evaluate student performance. For example, faculty suggested adding an instructor dashboard that allowed an instructor to retrieve student reports about information accessed and data entry by the students. Faculty also requested options to easily modify and add patient data to simulate a hospital length of stay for any case scenario. Focus group two generated the greatest product scores on the heuristic evaluation when compared to the other two focus groups. Due to the complexity of the modifications based on the

focus group evaluation, the research team required more time to revise *iCare™v.1.0* so the third and final focus group occurred approximately two months later.

Participants in FG3 evaluated all aspects of *iCare™v.1.0* including the design, usability, content, and functionality. As a result of the comprehensive review and evaluation performed by the participants in FG2, there were minimal usability and design issues identified during FG3. Usability issues included more detail about assessment data such as the following; 1) "the abnormal lab values need to appear in red", 2) need abbreviation of RUE, RLE, LUE, and LLE, 3) Need "Alert" tab under level of consciousness- neurological exam. Because the usability issues identified by participants were easy to resolve the product scores on the evaluation tool were high and all issues were addressed.

Discussion

Advancing healthcare technologies demand nurses' to be competent in technology skills that improve patient care. While healthcare facilities offer specific technology training, it is neither feasible nor desirable for healthcare facilities to assume training in its entirety. Without a baseline understanding of technologies and their role in healthcare, it is nearly impossible to gain rapid proficiency in facilities that use advanced technologies such as EHRs to deliver care. For this reason, it is essential to integrate the use of healthcare technologies into nursing programs. Without these vital technology skills, nurses are neither marketable nor prepared for their future roles. While this seems a daunting task when considering the already packed curricula, it does merit further consideration and creative ways to integrate healthcare technologies, similar to the way technologies are integrated in healthcare delivery.

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TABLE 1: NIELSEN'S USABILITY COMPONENTS

Component	*Description*
Learnability	How easily can the user learn the product? If the user returns to the product, how long will it take to reorient/relearn the product?
Efficiency	How quickly can the user learn the product?
Memorability	Once the user returns to the product, how long will it take to reorient or relearn the product?
Errors	How many errors does the user make?
Satisfaction	How pleasant or unpleasant is the design and functionality and does the product deliver what the user expects?

TABLE 2: SAMPLE DESCRIPTION

	FG 1	*FG 2*	*FG 3*	**Total**
Faculty	1 ♀	1 ♀	1 ♀	3
Graduate	1 ♂	1 ♀		3
Students	2 ♀			
Undergraduate Students		2 ♀	1 ♂	5
			2 ♀	
Total	4	4	4	12

TABLE 3: EVALUATION TOOL

FOCUS GROUP 1-3		IMPORTANCE	EASE of ACHIEVEMENT	PRODUCT
iCare™: An Electronic Health Record System **Content Issues**	**Preference or Flaw?**	**Low ..... High** 1 2 3 4 5	**Difficult .....Easy** 1 2 3 4 5	
Patient allergies on every screen	Flaw	☐ ☐ ☐ ☐ ☒	☐ ☐ ☒ ☐ ☐	15
Diagnosis vs Chief Complaint	Flaw	☐ ☐ ☐ ☐ ☒	☐ ☐ ☐ ☒ ☐	20
Document 2 different pupil sizes	Flaw	☐ ☐ ☐ ☐ ☒	☐ ☐ ☐ ☒ ☐	20
Need picture of pupil size	Preference	☐ ☐ ☐ ☒ ☐	☐ ☐ ☐ ☒ ☐	16
Need descriptions of MRN, FIN …	Flaw	☐ ☐ ☒ ☐ ☐	☐ ☐ ☒ ☐ ☐	9

CURRICULUM VITAE
Tami Hodges Wyatt

I. GENERAL INFORMATION

Work Address:

Tami Hodges Wyatt
Assistant Professor, Tenure Track
College of Nursing
University of Tennessee
Knoxville, TN 37996-4180

Work Telephone: 865-974-6804

E-Mail: twyatt@utk.edu

II. EDUCATION

Institution	Location	Degree	Year	Major/Specialty
University of Virginia	Charlottesville, Virginia	Doctor of Philosophy: Nursing	2003	Instructional Technology in Patient Education
University of Virginia	Charlottesville, Virginia	Master of Education: Instructional Technology	2002	Multimedia and Internet based Patient Education
University of Virginia	Charlottesville, Virginia	Master of Science: Nursing	1993	Critical Care Nursing Specialty: Neonatal
Radford University	Radford, Virginia	Bachelor of Science: Nursing	1988	Minor: Psychology

III. LICENSURE AND CERTIFICATION

Registered Nurse: Tennessee License (# R0000144352)	Expires 4/2011
Certified Nurse Educator	Expires 7/2012
Neonatal Resuscitation Program (NRP) Provider	Expires 9/2011
Basic Life Support (BLS) Provider	Expires 8/2011

IV. PROFESSIONAL EXPERIENCE

Institution	Location	Title	Date
University of Tennessee College of Nursing	Knoxville, Tennessee	Assistant Professor	2004 - present
Bon Secour Memorial Regional Medical Center	Richmond, Virginia	Staff Nurse	2003 - 2004
Pfizer Corporation	New York, New York	Research Quality Control Consultant	2001 - 2002
University of Virginia	Charlottesville, Virginia	Teaching and Technology Consultant	2000 - 2003
University of Virginia	Charlottesville, Virginia	Distance Site Coordinator	1999 - 2000
Carilion Community Hospital	Roanoke, Virginia	Clinical Nurse 1	1991 - 2000
College of Health Sciences	Roanoke, Virginia	Assistant Professor	1991 - 1999
Carilion Roanoke Memorial Hospital	Roanoke, Virginia	Team Leader / Head Nurse	1990 - 1991
Carilion Roanoke Memorial Hospital	Roanoke, Virginia	Clinical Nurse III	1988 - 1990

V. PUBLICATIONS

Refereed Publications

Wyatt, T.H., Krauskopf, P.B., Gaylord, N., Ward, A., Hawkins-Huffstutler, S. Y., & Goodwin, L. (In Press). Cooperative M-learning with Nurse Practitioner Students, *Nursing Education Perspectives.* (Data based); 65% contribution.

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Keeling, A. W., Snyder, A., **Wyatt, T.H.,** & Krauskopf, P. (2003). Practice Pointers: Accessing PDA Information. *The Nurse Practitioner, 28*(1), 10; 40% contribution.

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Wyatt, T. H. (1999). *First Aid.* A multimedia module reviewing first aid geared toward teens, Developed with Hyperstudio.

Wyatt, T. H., Seamans, N. & Clark, W. (1997). *The Power Portfolio.* A multimedia instructional tutorial. Developed with Asymmetrix Toolbox.

Wyatt, T.H. (1996). Meeting the Needs of Nurses. *Virginia Nurse Today 5*(2) 17.

Manuscripts Submitted for Publication

Phillippi, J. & **Wyatt, T.H.** (In review). Smartphones in Nursing Education. *Computers, Informatics, Nursing*. 25% contribution.

Nalle, M., **Wyatt, T.H.**, & Myers, C. (In review). Continuing education needs of RNs in a voluntary CNE state. *Journal of Continuing Education in Nursing*. (Data-based); 35% contribution.

Wyatt, T.H., Li, X., Indranoi, C. & Bell, M. (In review). Testing iCare™ v.1.0: An electronic health record learning tool. *Computers, Informatics, Nursing.* (Data based); 80% contribution.

Mountain, B, **Wyatt, T.H.** Smithson, L. & Cramolini, M., (In review). Dexmedetomidine as a pediatric anesthetic pre-medication to reduce anxiety and to deter emergence delirium. *American Association of Nurse Anesthetists Journal.* (Data based); 50% contribution.

VI. GRANTS AND CONTRACTS

Internal

University of Tennessee, Graduate Arts and Sciences Faculty Professional Development Award. *Developing and Testing an Innovative Psychosocial Asthma Management Intervention.* **Wyatt, T.H. (PI).** 2008, $1,000, 1-year, funded.

University of Tennessee, SARIF Summer Graduate Assistantship Award. *Cooperative m-learning with nurse practitioner students.* **Wyatt, T.H. (PI)**, Gaylord, N., Krauskopf, P.B., Ward, A. 2006, $3,600, 1-year, funded.

University of Tennessee, Innovative Technology Center Research Award. *Cooperative m-learning with nurse practitioner students.* **Wyatt, T.H. (PI),** Gaylord, N., Ward, A. 2006-2007, $33,000, 2-years, funded.

University of Tennessee, Innovative Technology Center Research in Technology Award. *Handheld technology and cooperative learning: Do they go hand in hand?* **Wyatt, T.H. (PI),** Gaylord, N., Ward, A. 2006, $5,000, 1-year, funded.

University of Tennessee, Innovative Technology Center Teaching and Technology Award. *Using Technology to enhance health promotion and health policy.* **Wyatt, T.H. (PI),** Chen, S., Hodges, M.S., Nalle, M, & Shoffner, D. 2004-2005, $15,000, 1-year, funded.

University of Virginia School of Nursing Innovative Teaching Award. *Expanding possibilities in clinical decision making consultation using Palm technology.* Keeling, A (PI), Synder, A., Burns, S., **Wyatt, T.H. (Coordinator)** 2001-2002, $5,000, 1-year, funded.

University of Virginia School of Nursing Graduate Student Presentation Award. *Shaping Innovative Nurse Practitioner Curricula: Handheld Technology (Palm) in Education and Practice*, **Wyatt, T.H. (PI).** 2002, $150., 1-year, funded.

External

National Institutes of Health, National Institute of Nursing Research, RO3 Award. *Usability testing Okay with Asthma, v. 2.0: An interactive narrative asthma program.* **Wyatt, T.H. (PI),** Li, X (PI). 2009-2011. $147,000, 2-years, funded.

National League for Nursing, *Cooperative m-learning with nurse practitioner students*. **Wyatt, T.H. (PI),** Krauskopf, P.B., Gaylord, N., Ward, A., & Goodwin, L. 2006-2008, $6,675, 2 years, funded.

Sigma Theta Tau, Beta Kappa Verhonick Research Award. *Development of the digital story: Okay with Asthma™*, **Wyatt, T.H. (PI),** 2002, $500, 1-year, funded.

National Institutes of Health, National Institute of Nursing Research National Research Service Award. *An Interactive Story for Asthma Adaptation: A Pilot test.* **Wyatt, T.H. (PI),** 2001-2003, $55,000, 2-years, funded.

Grants Not Funded

National Institutes of Health, Department of Education, Challenge Grant. *Healthcare Logistics Engineering Edutainment.* Li, X., (PI), Wilck, J, (PI), **Wyatt, T. (PI),** Hodge, L. (PI), Sawhney, R. (PI). 2009-2011. $1,000,000, 2-years, not funded.

National Institutes of Health, National Library of Medicine, Challenge Grant. *Cloud-based Intelligent Syndication and Search to Answer Clinical Questions.* Li, X., (PI), **Wyatt, T.H. (PI).** 2009-2011. $1,000,000, 2-years, not funded.

Robert Wood Johnson Foundation Games for Health Research Award. *Interactive Narrative Design with StoryCrafter's "Okay with Asthma".* **Wyatt, T.H. (PI),** Li, X. 2008-2010, $200,000, 2-years, not funded.

McArthur Foundation's Humanities, Arts, Science, and Technology Advanced Collaboratory (HASTAC) Digital Media & Learning Innovation Award. *Learning with StoryCrafter, v. 1.0.* **Wyatt, T.H. (PI),** Li, X. 2008-2010, $250,000, 1-year, not funded.

American Nurses Foundation Research Award. *NAEPP Asthma Guidelines for the Web & PDAs: A Usability Study.* **Wyatt, T.H. (PI),** Gaylord, N., Krauskopf, P.B. 2008, $10,000, 1-year, not funded.

University of Tennessee, Graduate Arts and Sciences Faculty Professional Development Award. *Evaluating the Interactive Narrative "Okay with Asthma".* **Wyatt, T.H. (PI).** 2008, $3,268, 1-year, not funded.

Blackboard Corporation Greenhouse Grant Program. *Cooperative M-learning with Blackboard.* **Wyatt, T.H. (PI).** 2007, $25,000, 1-year, not funded.

Quality and Safety Education For Nurses Pilot Schools Program. *University of Tennessee Knoxville College of Nursing as a QSEN pilot school.* Mozingo, J. (PI), **Wyatt, T. H. (Co-PI),** Brown, A. 2007, $24, 725, 1-year, not funded.

American Nurses Credentialing Center's Institute for Credentialing Innovation Styles Scholars Grants Program. *Does it make a difference in C.A.R.E?* Gaylord, N., **Wyatt, T.H. (Co-PI),** Carden, D., Van-Ostrander, W. 2005, $10,000, 1-year, not funded.

VII. RESEARCH AND CONSULTING ACTIVITIES

Dissertation Committees:

Carter-Templeton, H. (2008-present). *PDAs in nursing education.* Doctoral Student at the University of Tennessee, Memphis. Committee Members: Russell, C. (Chair), **Wyatt, T. H. (Member),** Conner, P., (Member), Thompson, C., (Member), McKeon, L. (Member).

Overstreet, M. (2008-present). *The Current Practice of Nursing Clinical Simulation Debriefing: A Multiple Case Study.* Committee Members: Roman, M. (Chair), Phillips, K. (Member), **Wyatt, T. H. (Member),** Brockett, R. (Member).

Knowles, A. (2009). *Exploring Stories from Atomic Bomb Survivors: A Qualitative Descriptive Study.* Committee Members: Speraw, S. (Chair), Lee, J. (Member), **Wyatt, T. H. (Member),** Anders, A. (Member).

Other Research Projects

Evaluating a Faculty Development Program for Best Practices in Online Teaching. Paulus, T. (PI), **Wyatt, T. (Co-PI),** Myers, C. (Co-PI), Mixer, S. (Co-PI). Not funded.

Relationships between Master's Entry Students' learning characteristics and student performance and satisfaction in an online learning course. Wade, J. (Co-PI), **Wyatt, T.H. (Co-PI).** 2006-2008, not funded.

Continuing Education Needs of RNs in a Voluntary CNE State. Nalle, N. (Co-PI), **Wyatt, T.H. (Co-PI),** Myers, C. (Co-PI). 2006-2008, not funded.

Oral Dexmedetomidine as a Pediatric Anesthetic Pre-Medication to Reduce Anxiety and Deter Emergence Delirium. Smithson, L. (Co-PI), Cramolini, M. (Co-PI), Mountain, B. (Co-PI), **Wyatt, T. H. (faculty advisor).** 2005-2007, not funded.

Consulting Activities

Changing Narrative of Depression in Rural Women of the South. Hauenstein, E.J. (PI), **Wyatt, T.H. (consultant).** 2008-2010, funding pending from the National Institutes of Health, National Institutes of Mental Health, R34 mechanism.

A New MSN in Mass Casualty & Homeland Security Nursing. Speraw, S. (PI), **Wyatt, T.H. (consultant).** 2005-2008. U.S. Department of Health and Human Services, Health Resources & Services Administration (HRSA), Advanced Nursing Education Program Announcement No. HRSA-05-024 (CFDA No, 93.247).

VIII. PRESENTATIONS

International

Wyatt, T.H. (June, 2008). *Relat hips among Learning Style, Readiness to Le and Student Satisfaction in a Paediatric Online Course for Accelerated Masters Entry Nursing Students.* 2nd Annual International Nurse Education Conference, Dublin, Ireland, (paper), contributor.

Wyatt, T.H., Gaylord, N., Krauskopf, P.B. (July, 2007*). Cooperative M-learning as a teaching strategy among nurse practitioner students.* 18th International Nursing Research Congress Focusing on Evidence-Based practice. Collaboration: A transdisciplinary roadmap to discovery, Vienna, Austria, (Paper) Presented by Krauskopf, P. B., contributor.

Wyatt, T.H., Gaylord, N. Huffstutler, S.Y., Krauskopf, P.B., Ward, A. (July 2006). *Cooperative M-Learning with Nurse Practitioner Students.* Sigma Theta Tau International, Montreal, Canada (poster), presented by **Wyatt, T.H.** contributor

Rhee, H., **Wyatt, T.H.,** & Wenzel, J. (July 2006). *Living with Asthma: A focus group study of Adolescents with Asthma.* Sigma Theta Tau International, Montreal, Canada. (Poster), presented by Rhee, H. contributor

National

Wyatt, T.H., Li, X., Indranoi, Y., & Bell, M. (April 2009). *Usability testing iCare: An electronic health record for learning.* 2009 AACN Hot Topics in Nursing Education Conference, Salt Lake City, Utah, (Paper) presented by Wyatt, T. Contributor.

Indranoi, Y., **Wyatt, T.H.,** Li, X., Bell, M. (May 2009). Usability testing iCare: An electronic health record of learning. *2009 Institute of Industrial Engineering (IIE) conference.* Miami Florida, (Paper) presented by Indranoi, Y. Contributor.

Brown, A., **Wyatt, T.H.,** Roman, M., Melcher, P, & Fiellland, S. (October, 2008). *Using Simulation for Students with Physical Challenges.* SREB Council on Collegiate Education for Nursing Annual Conference, Atlanta, Georgia, (Poster) presented by Brown, A. contributor.

Brown, A. J., **Wyatt, T.H.,** Roman, M., Melcher, P., Fielland, S. (July, 2008). *Using Simulation for Students with Physical Challenges.* Emerging Technologies in Nurse Education, Seattle, Washington, (Poster) presented by Brown, A. J., contributor.

Wyatt, T.H., Krauskopf, P.B., Gaylord, N., & Ward, A. (September 2008). *Cooperative M-learning with Nurse Practitioner Students.* 2008 NLN Education Summit, San Antonio, Texas. (Paper) presented by **Wyatt, T.H.** contributor.

Wyatt, T.H. (March, 2008). *Cooperative M-learning with Nurse Practitioner Students.* Drexel's Innovative Technology in Nursing Education Conference, Hilton Head, South Carolina. (Paper) presented by **Wyatt, T.H.** contributor.

Krauskopf, P.B., **Wyatt, T.H.** & Gaylord, N. (February, 2008*). Overcoming Distance Barriers: Cooperative M-learning with Nurse Practitioner Students.* 22nd Annual Southern Nursing Research Society conference, Birmingham, Alabama. (Paper) presented by Krauskopf, P.B. contributor.

Wyatt, T.H. & Hawkins, S.H. (June, 2007). *Nurse Practitioners Incorporate PDAs into Practice, Education & Research.* American Association of Nurse Practitioners Annual Conference, Indianapolis, Indiana. (Paper), presented by **Wyatt T.H.** & Hawkins, S.H. contributor.

Wyatt, T.H., Gaylord, N. Huffstutler, S.Y., Krauskopf, P.B., Ward, A. (April, 2007). *Cooperative M-Learning with Nurse Practitioner Students.* National Organization of Nurse Practitioner Faculty, Boulder Colorado (poster), presented by Gaylord, N. contributor.

Wyatt, T.H., Nalle, M. (June, 2006). *Design It & Then Refine It: Developing Web Based Modules.* VillaNova Education on the Move, Philadelphia. Pennsylvania. (Paper), presented by **Wyatt T.H.** and Nalle, M. contributor.

Wyatt, T.H., Gaylord, N., Huffstutler, S.Y., Krauskopf, P.B., Ward, A. (May 2006*). Pilot testing Cooperative M-learning with Nurse Practitioner Students.* American Medical Information Association Spring Congress, Phoenix, Arizona (poster), presented by **Wyatt, T.H.** contributor.

Wyatt, T.H. (Dec. 2005). *Pilot testing Okay with Asthma.* International Association of Respiratory Care Congress. San Antonio, Texas (poster), contributor.

Wyatt, T.H. (Nov. 2005). *Pilot testing Okay with Asthma.* 38th Sigma Theta Tau International Conference. Indianapolis, Indiana. (Paper), contributor.

Wyatt, T.H. & Krauskopf, P (July, 2004*). Honing Your Nursing Practice Skills: Survival Skills using handheld technology.* American Nurses Association 2004 Biennial Convention. Minneapolis Minnesota. (Paper), presented by **Wyatt T.H.** & Krauskopf, P.B. contributor.

Wyatt, T.H. (Mar. 2003). *Developing the Digital Story and Story Writing Program: Okay with Asthma™.* Association of Teachers of Preventive Medicine. Albuquerque New Mexico, (Poster), contributor.

Wyatt, T.H. (Feb. 2003). *The Development of the Digital Story and Story Writing Program: Okay with Asthma™.* 17th Annual Southern Nursing Research Society. Orlando, Florida, (Poster), contributor.

Huffstutler, S., Krauskopf, P., & **Wyatt, T.H.** (April 2002). *Shaping Innovative Nurse Practitioner Curricula: Handheld technology in education and practice.* The National Organization of Nurse Practitioner Faculties. Minneapolis, Minnesota. (Paper), presented by **Wyatt, T.H.** Huffstutler, S.H. and Krauskopf, P.B. contributor.

Krauskopf, P. & **Wyatt, T.H.** (Mar. 2002). *PDA Use in the School of Nursing at the University of Virginia.* The Mobile Technology Fair, University of North Carolina Chapel Hill and Duke University, Chapel Hill, North Carolina. (Paper), presented by **Wyatt T.H.** and Krauskopf, P.B. invited.

Wyatt, T.H. (Feb. 2002). The *Impact of PDAs on clinical decision-making and accessing evidence-based research.* 16th Annual Southern Nursing Research Society, San Antonio Texas, (Poster) contributor.

Huffstutler, S. & **Wyatt, T.H.** (Sept.2001). *Using PDAs in a Graduate Pharmacology Course.* National League for Nursing Summit 2001, Baltimore, Maryland. (Paper), presented by **Wyatt, T.H.** and Huffstutler, S.H. contributor.

Regional

Wyatt, T.H. (November 1999). *The Untold Story: Silent Nurses and Contraception in Twentieth Century America.* University of Virginia, Charlottesville, Virginia. (Paper), invited.

Wyatt, T.H. (April 1997). *Fostering Caring Behaviors through Structured Controversy*. Sigma Theta Tau, Epsilon Psi Chapter, Radford University, Radford, Virginia. (Poster), contributor.

State

Snyder, A. E. & **Wyatt, T.H.** (June 2002). *Accessing Information at the Point of Care with PDAs.* The 3rd annual Southeastern Seaboard Emergency Nursing Symposium. Norfolk, Virginia. (Paper), presented by Snyder A. and **Wyatt, T.H.,** contributor.

Huffstutler, S. & **Wyatt, T.H.** (Mar. 2002). *Nurse Practitioners Using PDAs in Practice.* The Virginia Council of Nurse Practitioners 2002 Annual Conference, Norfolk, Virginia. (Paper), presented by **Wyatt, T.H**. and Huffstutler, S.H., contributor.

Wyatt, T.H. (Nov. 2001). *Technology for Acute Care Nurse Practitioners (ACNPs): Using the Palm™ to promote clinical decision-making. Changing practice through clinical research.* Charlottesville, Virginia. (Paper), invited.

Local

Wyatt, T.H. (June, 2007). *Using Stories to Promote Health in Children.* School Nurse Conference sponsored by East Tennessee Children's Hospital, Knoxville, Tennessee. (Paper), invited.

Wyatt, T.H. (May, 2007). *Cooperative M-Learning with Nurse Practitioner Students*. University of Tennessee Faculty, University Center, Knoxville, Tennessee. (Paper), invited.

Wyatt, T.H., Chen, S.L., Hodge[illegible]S., Nalle, M. & Shoffner, D. (March, 2005). *[illegible]bility Testing of Web-based Modules.* Sigma Theta Tau, Gamma Chi Chapter, Research Day. Knoxville, Tennessee, (Poster), presented by **Wyatt, T. H.**, contributor.

Wyatt, T.H. (Mar. 2000). *Research Forum: Technology and Research.* University of Virginia, Charlottesville, Virginia. (Paper), invited

Wyatt, T. H. (June 1994). Labor and Delivery Process. Childbirth Educators Workshop. Southwest Region. Roanoke, Virginia. (Paper), invited.

Wyatt, T. H. (December 1995). Facilitator, Program Chair, Mock Ethics Consultation Conference. American Nurses Association. Roanoke, Virginia. (Paper), invited.

IX. OTHER SCHOLARLY ACTIVITIES

Organization and Activity	Dates
Mental Health Nursing, Manuscript/Column Reviewer	2007-present
Computers, Informatics, Nursing; Manuscript Reviewer	2007-present
Nursing Education Perspectives; Manuscript Reviewer	2008
UT College of Nursing, Online Faculty Development Program & PhD student orientation	2008
Asthma Curriculum for K-8, Knox County Public Schools	2008
Asthma 1-2-3 Trainer, American Lung Association	2009

X. PROFESSIONAL APPOINTMENTS AND OFFICES

College Service

Committee and Role	Dates
Committee on Research Involving Human Subjects, Member	2005-present
Curriculum Committee, Member	2006-2007
Technology Advisory Committee, Chair	2005-present
Search Committee for Associate Dean of Research, Member	2005
Academic Review Committee, Member	2008-2010
Student Nurses Association, Advisor	2008-present
Simulation Work Group	2007-present
Technology Faculty Development & Orientation Task Force	2008-present
Advisor to PhD students	2007-present
Advisor to BSN students	2007-present

University Committees

Committee and Role	Dates
Online Learning Standards subcommittee	present
Tennessee Teaching and Learning Center Ambassador	present
UT Knoxville Innovative Technology Center, Grant Reviewer	present
Committee on Research Involving Human Subjects, Member	2005-present
Provost Junior Scholar, Scholar	2007-present
McNair Scholar Program, Mentor	2007
Life of the Mind Freshman Entry Program, Instructor	2005
Search Committee for UT Innovative Technology Center, Member	2004

Community Service

Organization and Role	Dates
All About Women Convention, Knoxville, Tennessee, Asthma Expert Panel Member	2009
Strawberry Plains Festival, Knoxville Tennessee, Asthma Health Volunteer	2009
School Health Advisory Board, Knox County Public Schools	2007 - present

State of Tennessee Asthma Task Force, Task Force Convener	2008 - present
Remote Area Medical, LaFollette Tennessee, Volunteer	2007- present
Homeless Project Connect, Knoxville Tennessee, Volunteer	2006 - present
Interfaith Clinic, Knoxville, Tennessee, RN Volunteer	2004 - present
School Health Advisory Board: Albemarle, Virginia, Member	1999 - 2003
School Nurse Institute Partnership (SNIP), Member	1999 - 2003
Virginia Asthma Summit, Member	1999

Professional Service

Organization and Role	Dates
National League for Nursing, • Ambassador	Present 2007 - present
Asthma & Allergy Network, Member	2007 - present
Omicron Delta Kappa Leadership Honor Society, Member	2002 - present
Sigma Theta Tau/Gamma Chi Chapter • Research Chair • Chapter Delegate • President Elect	1993 - present 2006 - present 2006 - 2008 2008 - 2010
American Nurses Association/State Association • State Delegate • District President • Vice President/Program Chair • Membership Chair	1995 - present 2005 1996 - 1997 1995 - 1996 1995
American Medical Informatics Association, Member	2000 - 2002
Association of Teachers of Preventive Medicine, Member	1998 - 2002
Association of Women's Health, Obstetric, and Neonatal Nurses, Member	1994 - 1995

XI. HONORS AND AWARDS

Organization and Award or Honor	Dates
Sigma Theta Tau, Gamma Chi Chapter; Excellence in Research Award	2008
Sigma Theta Tau International Honor Society; International Information Technology Computer-Based Public Education Technology Award	2007
GlaxoSmithKline; National Asthma Patient Education Award; Amount $3,000	2006
Case Western Asthma Interdisciplinary Team; Invited Fellow	2000
University of Virginia; Teaching and Technology Support Partner Fellow, 3 year tuition remission + $15,000	2000-2003
University of Virginia Barbara Brodie Scholarship Award; Amount $7,000	2002
Virginia Nurses Association; Outstanding Nurse District Award	1999

XII. CONTINUING EDUCATION (Most recent 5 years)

Organization and Type of Learning Experience	Dates
Nursing Informatics for Nurse Educators in Tennessee, Continuing Education Course, Vanderbilt University	August, 2009
American Association of Colleges of Nursing's 2009 Host Issues Conference in Nursing Education; Technology in Nursing Education	April, 2009
National Student Nurses Association, updates on National Council for State Board of Nursing & Nursing Education Updates	November, 2008 April, 2009
Sigma Theta Tau International Leadership Academy	September, 2008
International Nursing Education Conference	June, 2008
Sigma Theta Tau International Rho Mu at Large, Annual Research Day	April, 2008
Drexel University Technologic Innovations in Nursing Education	March, 2008

Sigma Theta Tau International H[illegible]or Society 39th Biennial Convention	November, 2007
March of Dimes; Preterm Labor Prevention & Nursing Management	November 2007
University of Tennessee Knoxville Regional Faculty Forum	August, 2007
University of Tennessee Knoxville College of Nursing Grant Writers Guild Research Retreat	May, 2007
National League for Nurses Education Summit	September, 2006
17th International Nursing Research Congress; Focusing on Evidence based practice	July, 2006
Villanova University, Nursing Education on the Move	June, 2006
National Safety Council; Protecting our Children's Environment: An educational Workshop	June, 2006
March of Dimes; East Tennessee Perinatal Program, Prematurity Prevention Symposium	February, 2006
Sigma Theta Tau International, Gamma Chi Chapter, Regional Annual Research Day	March, 2005 April, 2006 April,2007 April, 2008
American Respiratory Care Conference	December, 2005
Sigma Theta Tau International Honor Society, 38th Biennial Convention	November, 2005
Tennessee Nurses Association Annual Conference	October, 2005
American Nurses Association 2004 Biennial Convention	June, 2004

XIII. TEACHING HISTORY

Course Number		Course Title	Semester & Year
University of Tennessee Knoxville, Tennessee	N403	Health Promotion and Maintenance of Childbearing Families	Fall 2004-08 Spring 2005-09
	N605	Mid Range Theoretical Formulations for Nursing Science	Fall 2007-08
	N566	Educational Principles and Strategies	Summer 2006-09
	N577	Technology in Nursing Education	Summer 2009
	N471	Nursing Research	Fall 2004
	N582	Scholarly Inquiry for Advanced Practice Nursing	Fall 2005-08 Spring 2005-09 Summer 2005-09
	N609	Research Practicum	Fall 2005-08 Spring 2005-09 Summer 2005-09
	N490	Nursing Specialty Preceptorship	Spring 2005-07
	N565	Teaching Practicum	Fall 2008
College of Health Sciences Roanoke, Virginia	N285	Professional Issues in Nursing	Spring 1996-00
	N231	Maternal Child Nursing	Fall 1994-99 Spring 1995-00 Summer 1999
	N312	Nursing Roles, Theories & Concepts	Fall 1998-99 Spring 1999-00
	N320	Computers in Health Care	Fall 1997-99 Spring 1998-99
	N420	Nursing Research	Fall 1997-99 Spring 1997-00
	N281	Nursing Skills and Assessment	Summer 1994-95