

iGEM: A Learning Tool for the 21st Century

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Caring for the growing population of elderly while hospitalized and the lack of education of their health care providers are well-documented challenges. The author presents a mobile learning tool that incorporates educational elements and tricks of the trade that will improve care of the older, hospitalized adult patient.

In 2007, the elderly accounted for about 13% of the total U.S. population, but they comprised 37% of hospital admissions and 43% of hospital days of care with an average length of stay (LOS) of 5.6 days.¹ A well-known common complication that may be a catastrophic event for hospitalized elderly patients is functional decline, or dysfunctional syndrome associated with hospitalization (DSAH).²⁻⁴ DSAH results in higher rates of institutionalization, increased mortality and morbidity, and decreased quality of life.⁵⁻⁷ In 2008, Medicare spent \$22.9 billion on recuperation and rehabilitation services for postacute care (PAC) for 2.56 million skilled nursing home facility admissions with a LOS of 27 days.⁸ The cost of long-term care and PAC expenses of DSAH will continue to increase dramatically over the next 50 years. Because VA has a long-standing partnership with the academic community and oversees the largest clinical health profession

education program in the nation, it is paramount VA clinical educators teach practitioners-in-training the art and science of integrated care and management in the high-risk environment of the inpatient setting and how to mitigate the effects of DSAH in the hospitalized elderly.⁹

Maintaining a safe patient care environment and delivery of safe patient care has been emphasized in numerous medical and federal reports. Starting in 1999, the Institute of Medicine (IOM) published a landmark report *To Err Is Human*, which pointed out that up to 98,000 people die in hospitals each year as a direct result of preventable medical errors.¹⁰ The ensuing publication, *Crossing the Quality Chasm*, went on to say, “medical science and technology have advanced at an unprecedented rate during the past half-century” resulting in complex clinical situations that are characterized by “more to know, more to do, more to manage, more to watch, and more people involved than ever before.”¹¹ In 2008, the IOM released a report, *Retooling for an Aging America: Building the Health Care Workforce*, that identified the overall health care workforce as

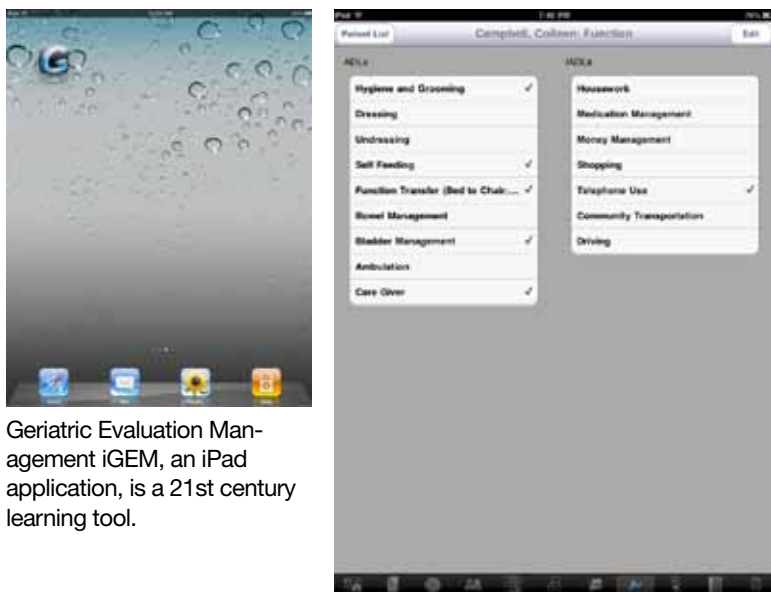
inadequately trained to care for older adults and specifically identified multiple studies showing clinical providers’ lack of knowledge in providing appropriate care for the elderly.¹² The IOM report went on to say geriatric principles are often insufficiently represented in the education and training of the health care workforce.¹² In 2002, a Medical School Graduate Questionnaire found only 68% of students felt adequately prepared to care for older persons in acute-care settings.¹³ Furthermore, little is known about the opportunities for advanced practice registered nurses to gain knowledge and skill in geriatric nursing.^{5,12} From the medical literature there is a clear mandate that medical educators provide the 21st century clinical practitioners-in-training learning tools to meet the challenges of caring for the hospitalized elderly.

CHANGING LANDSCAPE OF LEARNING

The traditional landscape of teaching and learning is changing. Health care education is embracing just-in-time education, which allows students to learn anytime, anyplace,

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Figure 1.



Geriatric Evaluation Management iGEM, an iPad application, is a 21st century learning tool.

and in any increment of time, thus transforming instruction from fixed to fluid.¹⁴ Today's educators are challenged to keep up with a technology driven society.¹⁵⁻¹⁷ Mobile learning (M-learning) is an emerging platform for delivering health care education.¹⁸ The U.S. Healthcare Market for Mobile Learning Products & Service's 2009-2014 Forecast and Analysis Ambient Insight Comprehensive Research Report indicated a driving need for M-learning because of changing demographics of health care consumers, coupled with an accelerated need among clinical workers to achieve greater levels of efficiency, reduce medical errors, and improve patient outcomes.¹⁴

A Time-Honored Tradition

Beside rounds are a time-honored tradition of performing the clinical activities at the patient's bedside. Sir William Osler (1849-1920) stated, "no teaching without the patient for a text, and the best teaching is often that taught by the patient him-

self."^{19,20} Gonzalo and colleagues pointed out that bedside teaching was the primary method of student learning in the first half of the 20th century.²⁰ However, post-1950 literature shows an erosion of bedside rounds as a teaching tool, and by the late 1970s, the use of bedside rounds as a teaching tool had dropped from 20% to 15% of the time.²¹ Gonzalo and colleagues' 21st century study confirmed bedside rounds continued to occur about 25% of the time.²⁰ Historical and recent literature indicated reasons given for not wanting to be at the patient's bedside include fear and discomfort of the patient with bedside presentations, fears the learner and the attending physician will be "exposed" as imperfect in the presence of the patient, and time constraints.^{20,22-24} These reasons for moving bedside teaching rounds to the conference room are firmly entrenched in inpatient teaching cul-

Figure 2.



iGEM patient list and individual patient information.

ture. The patient's presence improves the learning opportunities.²⁵ A Cumulative Index to Nursing and Allied Health Literature and Ovid MEDLINE® scholarly literature searches from 2005 to 2011 were performed, and 32 articles were found using the key words "improving the bedside rounds." Daily bedside rounds are the cornerstone of communication and care planning in an academic institution. Communication is essential for good care, and deficits have consequences for patients and

Figure 3.

A list of high-risk medications that should be used with caution in the elderly and individual patient functional assessment tracker.

their clinical providers. Miscommunication is one of the root causes in 75% of medical errors and 82% of sentinel events.^{10,26} Interdisciplinary care is a core principle in the care of the frail elderly and clinical complex patient. Pronovost and colleagues demonstrated that 10% of intensive care team members consisting of nurse practitioners and medical residents understood the daily goals of care.²⁷ However, after instituting a “daily goals” checklist, understanding the daily goals of care rose to 90% and LOS decreased. Succinctly summarizing the individual patient-level data is one of the most important challenges in developing effective tools for clinical decision support.²⁸ Researchers designed an electronic medical record-generated rounding report for use during prerounds, team rounds, and sign-out/handoffs. Results of their intervention after 5 months of implementation showed almost 1 hour

of time saved per day per user, and 76% of subjects believed the rounding report improved patient safety. In addition, there was a trend in spending more time with the patient.²⁹

Handhelds as a Tool for Learning

With the introduction of the Palm Pilot 20 years ago, the era of the handheld device (personal digital assistant [PDA]) began.³⁰ Because of the complexity of 21st century health care and the vast amounts of information presented in medical education, handheld computers quickly became a valuable resource for practitioners-in-training at the point of care. In clinical education they are used as a reference guide (ie, drug information and practice guidelines).³¹ Also, PDAs are incorporated into both academic medicine and nursing as a learning tool.^{30,31} PDAs have been shown to improve professional confidence and leadership skills in the clinical setting.³² In 2008, Farrell and Rose demonstrated that the use of PDAs enhanced students’ pharmacologic knowledge, and they perceived their use as beneficial to their clinical learning experience.³³

Although PDAs have become a valuable tool for medical education, well-known inherent security risks exist in their use, such as being lost, stolen, easily damaged, attacked by computer viruses, or subjected to hacking. In the medical field, PDA vulnerabilities also include “threats against the confidentiality, integrity, and availability of patient data.”³⁴ In 1996, the Health Insurance Portability and Accountability Act was enacted to establish a national framework for security standards and to maintain the confidentiality of health care information.³⁵ Encryption is central to protecting the personal health information stored on a PDA. In 2001, the National Institute of

Standards and Technology endorsed Advanced Encryption Standard (AES) as the approved algorithm for protecting sensitive (unclassified) electronic information stored on smart cards.³⁶ In 2003, the U.S. government released National Policy No. 15 “Use of the Advanced Encryption Standard (AES) to Protect National Security Systems and National Security Information at all classification.”³⁷

In the world of digital communication and the high-risk environment of the inpatient setting, a key issue is how to teach practitioners-in-training the art and science of integrated care and management, and how to mitigate the effects of DSAH. Ongoing use of PDAs in the clinical setting is worth exploring.

A Solution

In 2007, the John Hartford Foundation and the Association of American Medical Colleges (AAMC) released 6 domains of care as the minimum foundation for knowledge, skills, and attitudes for graduating medical students with respect to the older adult patient. The domains are (1) medications to be avoided or used with caution in older adults; (2) ability to define and distinguish delirium, depression, and dementia; (3) assessment of activities of daily living (ADLs) and instrumental ADLs; (4) identification of physiologic changes due to aging; (5) identification of psychologic, social, and spiritual needs of patients; and (6) performance of examination to assess skin pressure ulcer status.³⁸

Because today’s students have been raised in a media-rich environment and live in an information-centric world, they expect technology driven learning tools. A teaching-learning tool that is built on the John Hartford Foundation and the AAMC 6 domains

of care targeting the older hospitalized adult patient and uses a software platform that incorporates AES is the Geriatric Evaluation Management Patient (iGEM) log. iGEM is not a stand-alone learning tool but is intended to augment the practitioners'-in-training clinical knowledge and clinical bedside faculty's instruction.

iGEM is more than a scut sheet (essential patient data captured on a sheet of paper used during bedside rounds) for practitioners-in-training. iGEM is designed as an "at the fingertips" log of primary patient data, which enhances the consulting relationship with other disciplines and ensures that the different components of rehabilitation and medical care provide the most favorable outcome for the patient. The purpose of this pilot project is to provide practitioners-in-training a 21st century scaffold and tricks of the trade learning tool to meet the challenges of caring for the hospitalized elderly. The specific object of this project is to develop a first-generation scaffold iGEM iPad application (app) that will enhance the 21st century practitioners'-in-training experiential learning (Figure 1).

EXPECTED OUTCOME

The expected benefits from developing a first-generation, password-protected working model of the iGEM mobility medical app is an M-learning tool that incorporates educational elements and tricks of the trade that will improve the care of the older hospitalized adult patient. Because the app is a framework for essential data entry and is scaffolded around domains of care identified by geriatric experts targeting the older hospitalized adult, use of the app by the practitioner-in-training will provide the learners' easy access to primary patient data, assistance in an en-

hanced consulting relationship with other disciplines, and assistance in ensuring that the different components of rehabilitation and medical care provide the most favorable outcome for the patient (Figures 2 and 3). iGEM is designed to allow the learner to create a patient roster for 20 unique individuals. Shortcut keys allow the learner to input succinct essential data into specific fields, such as past medical history, recommendations by consultants, and hospital course. Other shortcut keys cue the learner to think about and track invasive lines and tubes, functional status, high-risk medications via the Beers List, and important bedside questions. The "Specialized Bedside Questions" field queries the learner about the patient's skin, the status of any wounds, the condition of the feet, whether the goals of care/prognostication are changing, and the availability and ability of a caregiver. The goal of this project is to have iGEM used by practitioners-in-training as a day-to-day data management tool to support their practice of the care of the hospitalized elderly.

Impact on Practice and Future Directions

The implication for this practice-based learning improvement project is to gain insights into the efficacy of the iGEM learning tool at the bedside. Because medical education research and medical education practice have similar key components, the line between them can become blurred. Since the learning tool targets practitioners-in-training, the next step in this project is to develop a quasi-experiential research project, approved by the institutional review board, to answer the question: Will practitioners'-in-training exposure to iGEM increase the importance of geriatric clinical skills, their confidence

in performing geriatric clinical skills, and the frequency of their practice of geriatric clinical skills in hospitalized patients aged ≥ 65 years? Because of the complexity of the primary care setting and the emerging medical home, further research is needed to determine whether iGEM has applications as a learning tool beyond the inpatient setting. As with any learning tool, continued refinement, such as a summary page and linkage to other references and aides at the point of care, is necessary. The next generation of the iGEM is on the horizon.

CONCLUSION

Individuals aged ≥ 65 years are the major consumers of hospital inpatient services. Effective treatment of patients in complex medical and social situations calls for providers who understand and practice a biopsychosocial model of care, a care model that addresses the whole person, not just the illness. From the medical literature there is a clear mandate that medical educators provide the 21st century clinical practitioners-in-training learning tools to meet the challenges of caring for the hospitalized elderly. Medical educators must be a driving force in developing evidenced-based teaching tools that will reshape how practitioners-in-training deliver care to the hospitalized elderly. iGEM was developed as a learning tool based on the John Hartford Foundation and AAMC 6 domains of care as the minimum foundation for knowledge, skills, and attitudes for graduating medical students with respect to the older adult patient. The iGEM is not a stand-alone learning tool but is intended to augment the practitioners'-in-training clinical knowledge and the clinical bedside faculty's instruction. iGEM is a 21st century scaffold and tricks of the trade learning tool to meet the

challenges of caring for the hospitalized elderly. ●

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