





Mobile IT applications

Reap quality care, cost savings, staff retention, recruitment, and regulatory compliance

**BY GREGORY L. ALEXANDER, PhD, RN,
AND WILLIAM R. KEHR, PhD**

The use of mobile information technology (IT) to assist healthcare professionals in making treatment decisions at the point of care is expected to improve the quality, safety, and value of care delivery.¹ Added value from these applications is extremely increasing for the growing number of seniors who want to independently age in place in the least restrictive environment possible. Early adopters of mobile IT systems in long-term care environments are beginning to recognize benefits to resident care, clinical support, and administration.²

Resident care benefits

The potential for IT to enhance resident care is realized through better clinical decision support. Clinical decision support uses electronically stored clinical information to help alert healthcare providers to important information that might otherwise be missed in a paper record. Providers can be alerted through the decision support system through wireless e-mail messaging, pager systems, or other electronic means. The wireless capabilities of IT allow healthcare providers to be alerted about potential resident problems from anywhere.

Another benefit of technology to long-term care residents is in the ability to provide a better quality of service and improved safety. Quality is improved through IT because it makes the resident the center of care. IT reduces documentation times and allows staff to spend time focused more on meeting patient needs and providing activities. Furthermore, IT enables staff to communicate from virtually anywhere without having to make physical connection, thus improving efficacy and efficiency at the point of care.²

Aside from mobile hardware, another example is the mobile IT sensor network. Mobile IT sensor networks support resident care by enabling remote monitoring of elders by providers while residents continue to maintain active lifestyles. One such network is being piloted through the cooperative partnership between an independent living facility called TigerPlace and researchers at our institution, the University of Missouri in Columbia.

The mobile sensor network being installed in residents' apartments at TigerPlace allow off-site healthcare providers to remotely monitor sensing activities in apartments, including motion, physiological vital signs (pulse, respirations, bed or chair restlessness), falls, room temperature, kitchen activities, etc. The sensor system architecture is composed of non-wearable sensors, with a short range wireless interface for communication with user control devices, and a data manager that collects data from the sensors, date time stamps the data, and logs it into a file that is sent to a secure server as a binary stream stripped of resident identification. The network is capable of performing data processing tasks through clinical decision support modules to notify providers of early changes in resident conditions that would go unnoticed in apartments without sensors.

One benefit to residents using this sensor system is that it unobtrusively monitors their daily activities of living. Monitoring these activities allows remote providers to gain access and observe trends in daily activity patterns which, if went unnoticed, might result in poorer health outcomes,

Based on available information and projections, an annual national benefit of \$31.8 billion between outpatient providers and laboratories was projected.

placement in more restrictive environments and greater expense. An example of how our sensor system detects a change in daily activities might include an increased amount of time a resident is spending in or out of bed. If a person is having difficulty breathing while lying in bed, resulting in increased bed restlessness, and the resident moves to a recliner to sleep, our sensor system is able to detect these changes and notify a provider of the changes.

The residents with sensors installed in their apartments, as well as nurses and physicians, were interviewed and showed the data interface. The interviews were instructive: Residents had difficulty viewing the data and graphs, and experienced information overload and difficulty with understanding the terminology. Nurses and physicians used the data, however, to interpret clinical information and watch for warning signs, such as reduced movement, changes in activity levels, and changes in patient status preceding an adverse event, such as a hospitalization.

Mobile IT sensor technologies are being explored to determine their capability of supporting notification of clinical support services when adverse events occur. Typically, residents who live in independent living don't qualify for facility-provided clinician services because they are stable and living active lifestyles. However, these residents often experience periods of decline in their health that might be delayed in

length and frequency if attended to in early stages. Periods of decline in health can be detected by the mobile IT sensor technology through decreased resident activity levels being monitored by the sensors. Also, through the clinical decision support system, clinical support services such as nursing, physical therapy, and social services could be alerted to the changing activity levels and prompted to check on the resident. Early recognition of these events could lead to earlier intervention, reduced hospitalizations, and fewer placements in facilities having more restrictions.

Clinical support and EHR

The Institute of Medicine has outlined several key capabilities of electronic health records,³ with functionalities that should be implemented for long-term care by 2010. Strategic goals for long-term care include more emphasis on IT applications that relate to clinical support. These include technologies to support results management, such as automated reporting of laboratory, radiology, and pathology results; computerized provider order entry (CPOE) management that can facilitate ordering of resident supplies; electronic prescribing of medications and other treatments; and electronic communication with external trading partners, such as insurers, outside pharmacies, or other suppliers.

Although few long-term care settings have introduced IT for clinical support services as yet, important benefits can accrue from having such a system. Increased connectivity through IT allows for electronic monitoring of lab results and ordering of specific lab tests on a routine basis without the use of paper-based tracking systems that can be error-prone. For example, a clinical IT system that would increase laboratory clinical support would automatically be able to notify a lab when at a particular time of month technicians had to pick up lab specimens at a facility.

Administration benefits

From an administrative standpoint, adoption of mobile IT can impact the quality of resident or patient care and add cost savings. The healthcare information exchange and

interoperability (HIEI) concept discussed by Walker et al.¹² describes various levels of information sharing among providers and independent laboratories, radiology centers, pharmacies, payers, public health entities, and other providers. The ultimate application of this technology would be to create a seamless, integrated system, with access to both remote and local records.

Cost/benefit data for improved HIEI were developed, according to this study, using a panel of experts and a review of the literature— which was unfortunately limited by the lack of real-world implementations of standardized, interoperable systems in healthcare. Based, however, on available information, projections of an annual national benefit of \$1.8 billion between outpatient providers and laboratories have emerged. When other factors, such as avoided tests and improved efficiency of provider transactions (with laboratories, ra-

One benefit to residents using this sensor system is that it unobtrusively monitors their activities of daily living.

diology centers, pharmacies, public health departments) are factored in, the net value of HIEI becomes \$77.8 billion per year. Moreover, the authors of this study “suspect that the clinical payoff (an improved patient safety and quality of care) could dwarf the financial benefits projected....”

Benefits, challenges

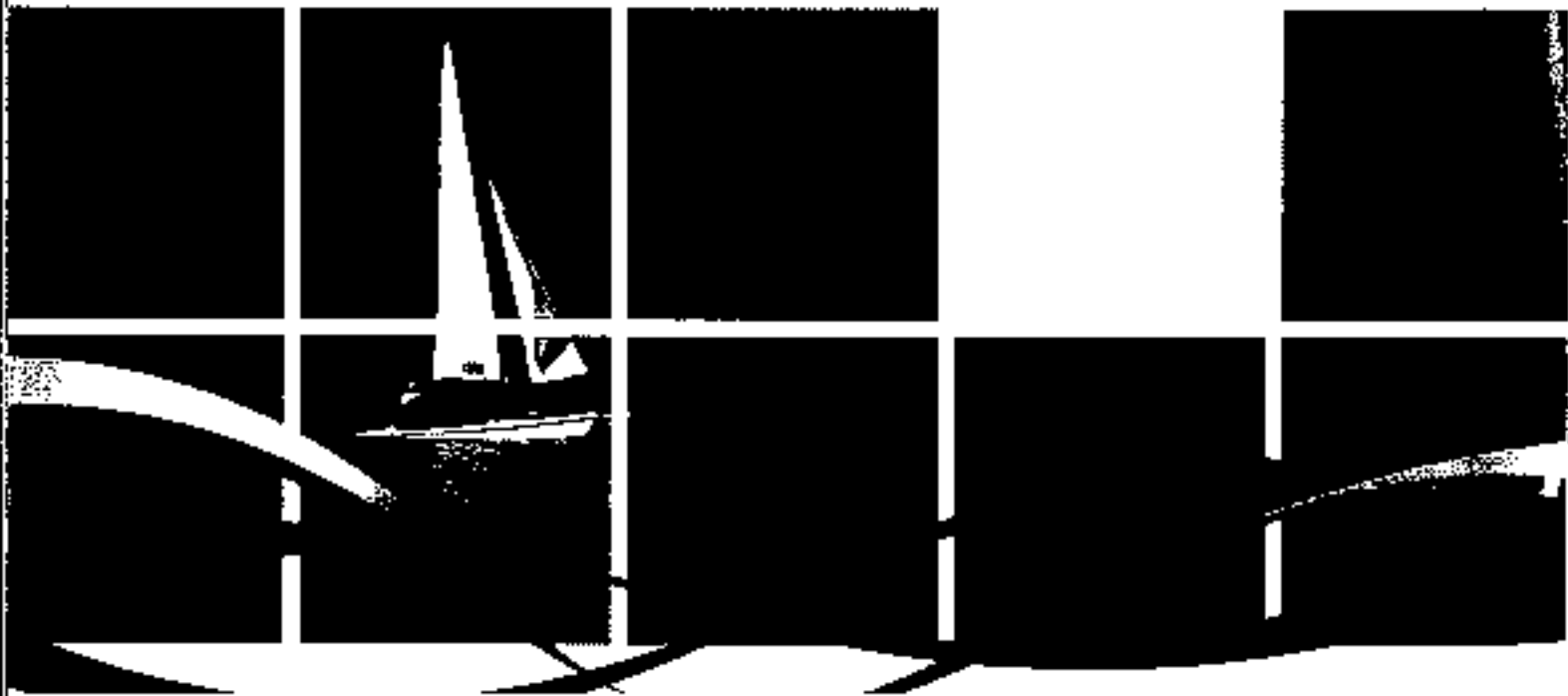
Implementing such an information system would require a wide level of consensus,

significant expense, and thorough training for staff, imposing both the personnel and financial management responsibilities on administrators. The payoff for all this would be, however, that for what has been described as the most regulated industry in the United States, the availability of such information could aid administrators in regulatory and legal compliance.

There can, of course, be resistance to change among even the most learned stakeholders in any system impacted by new technology. Certainly, despite the numerous potential benefits of the technology, providers have demonstrated resistance to such changes.¹³ Providers have been wary of such potential drawbacks as e-mail overload, poor information on Web sites, degradation of the patient-physician relationship, and risks to information security.

On the other hand, along with national attention being paid to rising healthcare

Smooth Sailing...



costs, concerns remain over issues such as preventable errors leading to patient injury or death and the uneven quality of care across the United States.¹ Medical IT allows critical medical information to move with the patient, providing accurate, current treatment information to all caregivers. In addition to long-term care providers, such technologies could allow close family members the opportunity to monitor residents' activities, leading to better family connections and better quality assistance in general.

Important goals

The application of IT to provide telemedicine in rural areas is helping to bring parity in quality of care and cost savings. Administrators in long-term care may find that the ability to give high-quality care provided by these advancements will aid staff recruitment and retention. Beyond this, mobile

IT can aid administrators in achieving the important goals of improved quality of care, sound financial management, and better regulatory compliance. ■

Gregory L. Alexander PhD, RN, is Assistant Professor at the Sinclair School of Nursing, University of Missouri, Columbia, Missouri. For further information, e-mail alexander@missouri.edu, or phone (573) 882-9348. William A. Kehr, PhD, is instructor at the Missouri University of Science and Technology, Rolla, Missouri. For more information, phone (573) 341-7100, fax (573) 341-4812 or e-mail wkehr@msl.edu. To send your comments to the authors and editor, e-mail alexander@tqmagazine.com

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