

Barriers and Drivers of Health Information Technology Use for the Elderly, Chronically Ill, and Underserved

Executive Summary

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Background

Interactive consumer health information technology (health IT) promises to engage consumers and promote their active participation in improving their health. Interactive technologies provide health information and tools that are patient-centered, offering care and support that integrates individual needs and preferences into clinical information systems. Such technologies, by tailoring health information and delivering targeted care, have significant potential to foster patient self-care monitoring and management. As the evidence on health IT interventions increases, it is important to understand how specific target groups such as the elderly, those with chronic conditions or disabilities, and underserved populations are able to access, use, and benefit from these applications.

This report was prepared on behalf of the Agency for Healthcare Research and Quality (AHRQ), in response to a recommendation from the American Health Information Community. The systematic search conducted for this report focused on studies of *interactive* health IT used by consumers or patients, and targeted to our populations of interest. The report describes factors influencing the use, usefulness, and usability of interactive

consumer health IT for elderly, chronically ill, and underserved populations. It also summarizes the scientific evidence on the effectiveness of interactive health IT applications and identifies gaps in research. By examining factors that influence the use and outcomes of interactive consumer health IT, the report provides a context for future inquiry in the study of applications designed for patients to participate more fully in their health care and health care decisions.

Methods

Our search for the published literature included structured searches of both standard and specialty bibliographic databases. We searched MEDLINE® (1950- Nov 2007), CINAHL® (1982-Feb 2008), PsycINFO® (1806-Feb 2008), the Cochrane Controlled Trials Register and Database of Systematic Reviews (1st quarter 2008), ERIC (1960-March 2008), and the American Association of Retired Persons (AARP) AgeLine® (1978-Dec 2007). We focused our review of citations from 1990 to present. We included studies of all designs that described the use of interactive consumer health IT by at least one of the populations of interest (elderly, chronically ill, or underserved). We then abstracted and summarized data from these studies with regard to key questions on:



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1. Level of technology usage
2. Usefulness and usability of the technology
3. Barriers to technology use
4. Drivers and facilitators to technology use
5. Effectiveness of the technology

Our analytic framework, developed in consultation with AHRQ and a Technical Expert Panel, helped guide the systematic review process. We specifically searched for articles having primary or subgroup analyses of the following health IT user groups:

1. Elderly (over the age of 65 or functionally elderly)
2. Chronically ill (condition longer than 1 year that would benefit from treatment) or disabled (impairments leading to activity limitations)
3. Underserved (including underserved minorities, low-income populations, and medically underserved geographical regions)

It was important to clearly define health IT that was both interactive and intended to be used by patients or consumers. Included papers were those that examined technology meeting the following criteria:

1. A consumer interacts directly with the technology
2. The computer processes the information in some way
3. A consumer receives or has access to patient-specific information in return.

Using this definition led us to include technologies such as self-management systems providing tailored advice, personal health records with data from a provider's electronic medical record (EMR), tailored health education, and online support groups. We specifically excluded Web browsing of general

health information databases, telemedicine systems which provide a simple conduit for communication between patient and health professional, and passive monitoring systems or electronic surveys without feedback to the patient.

Results

We identified a total of 8,522 abstracts, reviewed 563 full-text articles and included 129 articles for abstraction. Few studies were specifically designed to compare the elderly, chronically ill, or underserved populations with the general population. But in general, we did find evidence that several types of interactive consumer health IT were usable and effective in multiple settings and with all of our populations of interest.

The Level of Use of Interactive Consumer Health IT

In our review of studies having some description on the level of usage of interactive consumer health IT, we found that the data were limited and presented challenges. Measures related to usage varied considerably and offered no apparent standardization of terminology. We also found that the frequency of health IT usage needed to be placed in the context of expected or intended use of the technology.

Some studies reported on the frequency of participant use of technology over time, i.e., mean logins per subjects per month, or allowed an estimation of this measure. Collectively, such studies observed reductions in usage over time. Among studies of web-based interactive systems that offered usage frequency, findings ranged from less than 1 to as many as 27 mean logins per subject month. Empiric observation revealed that more highly used applications offered patient self-management tools and/or peer group

support. Studies that compared the use of specific components within an application found the most frequently used functions to be online peer group support, bulletin boards and self-management tools. These applications were tested across a variety of chronic conditions, including diabetes, tobacco use, chronic obstructive lung disease, and congestive heart failure.

The Usefulness and Usability of Interactive Consumer Health IT

Most studies providing information on the usefulness and usability of interactive consumer health IT systems addressed these issues as a secondary component of the study. However, the data indicated that usability played a key role in the use of these systems. Most researchers measured usefulness as part of their usability assessment, finding user perceptions generally rated high, especially for self-management systems. For each type of interactive consumer health information technology, the evidence offered examples that users believed were easy to use as well as those having usability issues. A small number of studies focused on usability testing early in design of the application. In these cases, the goal was to discover and fix usability issues early on in the process. Most issues had to do with graphics clarity and simplicity for older or impaired users.

Barriers to the Use of Interactive Consumer Health IT

The most frequent barrier to consumer use of interactive health IT across studies we examined was the lack of a perceived benefit. In several studies, lack of convenience was an important barrier. Specifically, patients were less likely to use systems requiring access to equipment or technology that did not fit seamlessly into their normal daily routines.

Similarly, overly cumbersome data entry was perceived as a barrier. Several studies found that of the level and timeliness of clinician involvement with the system was directly associated with patient use; low clinician participation (when it was expected by the patient) led to low patient use. Technical issues often prevented consistent use of health IT systems, especially among studies conducted on early system prototypes. Finally, although subjects were often provided with the technology for a research trial, several studies identified that costs and access to the technology would serve as barriers to use of health IT beyond the study interval.

Drivers of the Use of Interactive Consumer Health IT

As a counterpoint to the findings above, the most frequent factor associated with increased use of the interactive health IT was the patient's perception of a health benefit. Most of the systems we reviewed were designed for use by patients with a chronic condition, and it was important that patients believed the system was helping them manage their condition. Convenience of access to the interactive technology, and the amount of time required for the intervention, were both factors driving technology use. Interventions found to be beneficial were those that were delivered on devices familiar to patients and used routinely for other purposes. Clinician involvement was a driver in patient use of the technology; furthermore, rapid response from a clinician was shown to increase patient satisfaction. Also, providing content tailored to an individual consumer was shown to increase both system use and satisfaction. Finally, an important driver of technology use relating to older users was the gradual introduction of technology.

Effectiveness of Interactive Consumer Health IT

An important and consistent finding in this review was that systems were effective when they provided a complete feedback loop that included (a) monitoring of patient status; (b) interpretation of this data by comparison to individual treatment goals; (c) adjustment of management according to patient status; (d) timely communication to the patient of tailored recommendations or advice; and (e) repetition of this cycle at appropriate intervals. These “complete loop” interventions were effective across a wide range of conditions, technologies, geographical areas, and patients’ socioeconomic status. Systems providing only one or a subset of these functions were less consistently effective. Systems that delivered reminders, alone or based on patient self-monitoring were not consistently effective. Systems offering online peer interaction, alone or as part of multi-component systems, were generally effective in improving intermediate outcomes but not health outcomes. Weak but consistent evidence showed that education or information alone had minimal effect on health outcomes. Online access to a patient view of the clinician’s EMR did not improve outcomes, except when combined with tailoring or bi-directional information flow. When asked, in some cases patients expressed a strong preference for human interaction, even with systems that were effective. Many studies showed these systems to be effective in our specific populations of interest: elders, those with chronic illness, members of underserved populations. However, no direct comparisons of interactive health IT between a target population and the general population were identified.

Discussion

There were several challenges to reviewing interventions based on interactive consumer health IT, primarily due to the fact that the interventions being studied varied so widely. First, the underlying technology varied significantly and included Web-based applications, hand-held PDAs or cell phones, touch-screen computers or kiosks. Second, the systems were designed for a wide variety of purposes, not a single intervention. Even though we focused the review on systems for the elderly, chronically ill, and underserved populations, we covered many application areas, such as systems for diabetes, asthma, cancer, mental disorders, smoking cessation, and medication reminding. Children with chronic conditions were included in our review, and we found that they have very different types of usage issues and systems designed for them. Third, the frequency of intended use of the various systems could be quite different. Some were single-use interactive educational systems or decision aids. Others were intended for daily use in the home. Fourth, these systems varied widely in complexity, from simple systems providing a single function to complex systems with a robust suite of diverse features. Last, the embedded care protocols and the degree to which clinicians participated differed dramatically from study to study. All of these issues are critical when interpreting the results of these studies, and the variability in approaches demands caution in generalizing these results too broadly.

Few of the studies were specifically designed to compare the elderly, chronically ill, or underserved to the general population. But in general, we found that several types of interactive consumer health IT applications were usable and effective in many settings and with all of our populations of interest. The most important and consistent finding

regarding the effectiveness of these technology interventions was the benefit of systems that provided a complete feedback loop including assessment of current patient status, interpretation of this status information in light of established treatment goals or plans, and communication back to the patient with tailored recommendations or advice, repeated over time. Interactive consumer health IT applications that provided only one or a subset of these functions were less consistently effective.

The barriers and drivers to use were most often reported as secondary outcomes in these studies. Many studies were hampered by usability problems and unreliable technology, primarily due to the nature of research typically being performed on early stage system prototypes. But beyond this, the most common factor influencing the successful use of the interactive technology by these special populations was that the consumers perceived a benefit from using the system. Convenience was also an important factor. It was critical that data entry not be cumbersome and that the intervention fit into the user's daily routine. Usage was more successful if the intervention could be delivered on technology consumers used every day for other purposes. Finally, rapid and frequent interactions from a clinician improved use and user satisfaction.

The systems described in the studies we examined depended on the active engagement of patients and the involvement of health professionals, supported by the specific technology interventions. Questions remain as to (a) the optimal frequency of use of the system by the patient, which is likely to be condition-specific; (b) the optimal frequency of use or degree of involvement by the health professionals; (c) whether their success depends on repeated modification of the patient's treatment regimen or simply ongoing assistance with applying a static treatment plan. However, it is clear that the consumer's perception of benefit, convenience and

integration into daily activities will serve to facilitate the successful use of the interactive technologies for the elderly, chronically ill, and underserved. Perhaps most challenging, these systems shift the locus of care away from traditional physician office visits, and many of them involve the participation of a multidisciplinary health care team; these activities are difficult to support financially under current episode-based, fee-for-service health care reimbursement mechanisms.

Availability of the Full Report

The full evidence report from which this executive summary was taken was prepared for the Agency for Healthcare Research and Quality (AHRQ) by the Oregon Evidence-based Practice Center, under Contract No. 290-02-0024. It is now available for viewing and downloading at <http://www.ahrq.gov/clinic/tp/hitbartp.htm> Printed copies of the report will be available in December 2008 and may be obtained free of charge from the AHRQ Publications Clearinghouse at that time by calling 800-358-9295.



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