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Considerations for deploying web and mobile technologies to support the building of patient self-efficacy and self-management of chronic illness

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Bibliographic citation

Cummings, Elizabeth; Turner, Paul (2008). Considerations for deploying web and mobile technologies to support the building of patient self-efficacy and self-management of chronic illness. University Of Tasmania. Chapter.

https://figshare.utas.edu.au/articles/chapter/Considerations_for_deploying_web_and_mobile_technologies_to_s_efficacy_and_self-management_of_chronic_illness/23053301

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End–User Computing: Concepts, Methodologies, Tools, and Applications

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INFORMATION SCIENCE REFERENCE

Hershey • New York

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Cover Design: Lisa Tosheff
Printed at: Yurchak Printing Inc.

Published in the United States of America by
Information Science Reference (an imprint of IGI Global)
701 E. Chocolate Avenue, Suite 200
Hershey PA 17033
Tel: 717-533-8845
Fax: 717-533-8661
E-mail: cust@igi-global.com
Web site: <http://www.igi-global.com/reference>

and in the United Kingdom by
Information Science Reference (an imprint of IGI Global)
3 Henrietta Street
Covent Garden
London WC2E 8LU
Tel: 44 20 7240 0856
Fax: 44 20 7379 0609
Web site: <http://www.eurospanonline.com>

Library of Congress Cataloging-in-Publication Data

Library of Congress Cataloging-in-Publication Data

End-user computing : concepts, methodologies, tools, and applications / Steve Clarke, editor.
p. cm.

Summary: "This collection compiles the most authoritative research in this area, . It provides libraries with definitive studies covering all of the salient issues of the field, it gives researchers, managers, and other professionals the knowledge and tools they need to properly understand the role of end-user computing in the modern organization"--Provided by publisher.

Includes bibliographical references and index.

ISBN-13: 978-1-59904-945-8 (hardcover)

ISBN-13: 978-1-59904-946-5 (e-book)

1. End-user computing. I. Clarke, Steve, 1950-
QA76.9.E53E44 2008
004.01'9--dc22

2007041257

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British Cataloguing in Publication Data

A Cataloguing in Publication record for this book is available from the British Library.

Chapter 3.14

Considerations for Deploying Web and Mobile Technologies to Support the Building of Patient Self-Efficacy and Self-Management of Chronic Illness

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ABSTRACT

This chapter examines issues relating to the introduction of information and communication technologies that have emerged as part of planning for the Pathways Home for Respiratory Illness project. The project aims to assist patients with chronic respiratory conditions (chronic obstructive pulmonary disease and cystic fibrosis) to achieve increased levels of self-management and self-efficacy through interactions with case mentors and the deployment of ICTs. The chapter highlights that in deploying ICTs, it is important

to ensure that solutions implemented are based on a detailed understanding of users, their needs and complex interactions with health professionals, the health system, and their wider environment. Achieving benefits from the introduction of ICTs as part of processes aimed at building sustainable self-efficacy and self-management is very difficult, not least because of a desire to avoid simply replacing patient dependency on health professionals with dependency on technology. More specifically, it also requires sensitivity toward assumptions made about the role, impact, and importance of information per se given that

it is often only one factor among many that influence health attitudes, perceptions, actions, and outcomes. More broadly, the chapter indicates that as ICT-supported patient-focused interventions become more common, there is a need to consider how assessments of benefit in terms of a cohort of patients inform us about an individual patient's experience and what this implies for terms like individualized care or patient empowerment (Muir Gray, 2004). At this level, there are implications for clinical practice and one-size-fits-all care-delivery practices. This collaborative project involves a multidisciplinary team of researchers from the University of Tasmania's School of Medicine, School of Nursing and Midwifery, and School of Information Systems. The project is supported by the Tasmanian Department of Health and Human Services and funded by the Commonwealth Department of Health and Ageing, and is due for completion in June 2008.

INTRODUCTION

The crisis in healthcare across the developed world is, ironically, partly due to the success of medical innovations in fighting disease and increasing life expectancy. Aging populations are dramatically changing the nature and demand for medical procedures, medications, and healthcare services such that the need for high-quality, cost-effective approaches to the growth in chronic and/or complex medical conditions has been widely recognized. As part of the response to this need, a number of approaches that empower patients to participate directly in their own care are increasingly being explored as a means of improving disease treatment, management, and education. Underpinning these approaches are assumptions that patients are willing and able to take on these new responsibilities and that when they do, the result will be positive in terms of quality of care and health outcomes. While most evaluations to date report some benefit, the variety of methodologies and

assessment procedures used make comparisons of efficacy difficult and highlight the complexity and uncertainty associated with supporting the self-management of chronic illness (Warsi, Wang, LaValley, Avorn, & Solomon, 2004).

E-health initiatives have also been identified as a critical component in the development of responses to the health crisis. By improving opportunities for information access, delivery, and update, ICTs have strong support. However, there is increasing awareness that the design, development, and deployment of ICTs also raise numerous socio-technical, clinical, and legal challenges that influence the realization of benefits. Many approaches to the deployment of ICTs in the health domain continue to make problematic assumptions about how ICTs will actually benefit patients, health professionals, and the healthcare system as a whole. More broadly, as meta-analysis of research recording positive benefits from the introduction of ICTs into health shows, many measures of success have little to do with improvements in patient care or outcomes (Wyatt, 2004).

Combined, these discussions highlight that the development of technology to support self-efficacy and self-management of chronic illness is highly complex. However, from a practical perspective, it is clear that understanding the users is important not just for designing approaches to build self-efficacy and self-management, but also for considerations of how ICTs should be deployed: "finding out prior to design what the unique requirements are, and designing to support them, is much more cost-effective in the long run than finding out after launch that your design does not meet requirements" (Mayhew, 2001).

This chapter adopts a patient-centered approach in its examination of issues around the deployment of Web and mobile technologies to support the building of patient self-efficacy and self-management of chronic illness. From a patient-empowerment perspective, this work draws on a range of approaches advocating how to build

self-efficacy and self-management based on existing models of chronic-disease management. From a technology perspective, this work is informed by theoretical insights drawn from a range of approaches that indicate that successful design and deployment of ICTs rely on understanding users' needs and ensuring technology is both easy to use and useful (Singh, Turner, Burke, & Castro, 2003). Alongside generating practical insights for those engaged in deploying ICTs with patients, this chapter also aims to point toward the need for broader discussions on the implications of patient-focused interventions for current clinical care-delivery practices.

BACKGROUND

Patients' attitudes and willingness to participate more actively in their own care appear to be changing. A survey on the United Kingdom's National Health Service (NHS) conducted by the consumers' association in October 2003 and involving 2,000 respondents (drawn from the general public, and nationally representative and demographically weighted) revealed that patients increasingly want more control over their treatment and care (Granger, 2003). From the 2,000 participants, 33% interacted regularly with the NHS and 76% did so at least once in the previous year, with 40% having experienced a relevant event (problems with appointments, problems with their records, repetition of data, missing letters). In identifying the most significant benefits wanted by patients, the survey found the following:

- 63% wanted access to their records to see recent test results and 60% to see medical history.
- 68% wanted access from home.
- 60% wanted their GP (general practitioner) to be able to book instant hospital appointments.

- 53% wanted repeat prescriptions without having to go to the surgery.

This survey supports the perspective that there is a growing interest amongst patients to become more empowered and engaged in decision making around their own care. More specifically, there is also a growing body of literature on chronic-disease management that advocates a horizontal, integrated approach across hospital and community settings, with the inclusion of coordinated care and partnerships with patients. In this regard, supported early discharge and home-based care of patients with exacerbations of chronic obstructive pulmonary disorder (COPD) have shown promising results, with positive responses from clients, caregivers, and healthcare providers, as well as reductions in cost.

Within the technology domain, numerous approaches have also recognized that involving users is an important aspect of design and deployment. Indeed, there is now a large volume of research into the adoption and use of technologies that has revealed that to increase the probability that a consumer technology will be successful, it is important that it meets the following criteria.

- To be easy to use.
- To provide relative value in terms of cost, convenience, a mix of channels, or better ways of conducting the activity.
- To have acceptable social and cultural meanings.
- To support the generation of trust (Singh et al., 2003).

CONTRIBUTION OF THIS RESEARCH

In this context, the Pathways Home for Respiratory Illness project aims to assist patients with chronic respiratory conditions (COPD and cystic fibrosis [CF]) to achieve increased levels of self-manage-

ment, self-efficacy, and empowerment in relation to their conditions through interactions with case mentors (community health nurses, CHNs).

The project incorporates aspects of a number of different models of chronic-disease management, including the Stanford model, Flinders cue and response model, and the Whitehorse Division of General Practice Good Life Club. This type of approach has been shown to work well to capture those patients who may not wish to, or physically cannot, attend group sessions, and contrasts with the conventional models of medical intervention.

This patient-focused approach is premised on the view that where possible, patients should play a central role in decisions about their own health. At the broadest level, this approach is underpinned by the perspective that providing evidence-based knowledge to patients will enhance their ability to participate in decisions about their own care and contribute to the development of an increasingly effective patient-centered healthcare system (Hill, 1998). Within the area of chronic illness, two important elements of the patient-centered approach are the concepts of self-efficacy and self-management.

In this context, following Bandura (1994), self-efficacy can be defined as follows:

people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives. Self-efficacy beliefs determine how people feel, think, motivate themselves and behave. Such beliefs produce these diverse effects through four major processes. They include cognitive, motivational, affective and selection processes. (p. 71)

Aligned to self-efficacy is the concept of self-management, which involves individual chronically ill patients working in partnership with their caregivers and health professionals to manage their illnesses. Adapting the Flinders Human Behavior & Health Research Unit (n.d.) approach, the aim in this project is to ensure that patients are able to self-manage to the extent that they can achieve the following:

- Know their condition and various treatment options.
- Negotiate a plan of care, that is, structure a care plan, and review and monitor the plan.
- Engage in activities that protect and promote their health.
- Monitor and manage the symptoms and signs of the condition
- Manage the impact of the condition on physical functioning, emotions, and interpersonal relationships.

From a technology perspective, developing and deploying information systems to support self-efficacy and self-management amongst chronically ill patients presents numerous challenges. Most significantly, this cohort of patients exhibit diverse levels of physical and psychological capacities as a result of their illness, as well as a wide range of abilities, experiences, support mechanisms, and interests in relation to the following:

- Participating in the project.
- Building self-efficacy and self-management competencies.
- Adopting and utilizing ICTs.

Critically, the project team was keen to avoid the possibility that any ICT systems introduced should end up simply replacing patient dependency on health professionals with a dependency on the technology, such that patients end up undertaking the monitoring of their symptoms without actually developing the self-efficacy and self-management skills necessary to respond to changes in their illness. As a result, the project team made considerable efforts to identify and accommodate the range of patient characteristics from amongst potential users of the system in the design, deployment, training, and use of the ICTs developed. In essence, this involved providing a variety of different accessibility tools and the provision of an extensive range of data-entry

methods to enable accessibility for all members of the disease cohort. This is demonstrated by the wide variety of Web and mobile devices, applications, and interfaces made available to different patients as part of the project. Noticeably, major distinctions were apparent between the two main types of patient groups (COPD and CF).

From this experience, it is argued that for an ICT system to be truly patient centered, its actual purpose, the characteristics of the end users, and their contexts must be considered along with ensuring that the system is easy to use, fulfills a perceived need, and presents a clear value proposition for adoption and utilization. In this regard, information-systems researchers within the team have spent considerable amount of time and effort in understanding, interacting with, and training all participants in the adoption and use of the technology.

More specifically, this resulted in the following aspects of the tailored solution developed:

- At the level of systems architecture, the project relied on four application modules: the research-management system, the participant portal, the mentor portal, and the workflow system. The research-management system, participant portal, and mentor portal are all Web-based applications built using Oracle HTMLDB 1.5 (Application Express). The applications operate on a Mac OS X Server (V10.4) running the Oracle 10G Database environment and HTTP (hypertext transfer protocol) server. The Web-based applications were secured using the Oracle HTMLDB built-in authentication scheme, with user sessions accessed via HTTPS and encrypted using a 128-bit SSL (secure socket layer) certificate. Workflow was implemented using XForms and Microsoft's InfoPath 1.5 Forms.
- At the level of hardware and software development, project participants were provided with the following equipment. Mentors

received laptop computers running a full suite of Microsoft applications including InfoPath 1.5 forms. COPD patients received desktop computers with accessibility options tailored to users' needs including the use of trackballs. CF patients will receive handheld wireless-enabled pocket PCs (personal computers).

- At the level of education and training on self-efficacy and self-efficacy mentoring, all team members and mentors participated in an intensive 2-day workshop on training in self-efficacy, mentoring, and capacity building in self-efficacy.
- At the level of education and training on information systems, mentors and patients were given an initial assessment to identify skills and capabilities. This was followed by the tailored training of mentors (community health nurses) and patients on an individual basis to stimulate adoption and usage.
- From the perspective of the research team, the database was designed to collect all information from the forms generated and used by the mentors: all the information entered by patients in their daily diaries and ongoing action plans as well as data and Web logs for use to generate usage-patterns statistics. A document-management system and archive of qualitative field notes was also maintained.

KEY ISSUES AND CONSIDERATIONS: DEVELOPMENT OF THE APPROACH

Due to the closely intertwined nature of the technology development and building of self-efficacy and self-management, a more detailed explanation of the project as a whole is provided prior to presenting the key technological considerations.

During the initial phases of the project, the methodology was developed. The first phase of the project consisted of the formation of a multidisciplinary team, an evidence-based review of the literature, and an iterative process of discussion among the team, culminating in the identification of a preferred methodology for the development of self-efficacy. This process culminated in training and project-development workshops involving community health nurses, hospital-based respiratory nurses, physiotherapists, respiratory medical specialists, and information-systems researchers.

As this is a collaborative, multidisciplinary piece of research, it has been developed to facilitate multiple research objectives. To this end, the research is a balanced allocation-controlled study with independent, objective, and concealed recruitment into study groups. Recruitment is to be undertaken for a period of 12 months, with each participant being actively engaged in the project for 12 months post recruitment.

Participants in the project are recruited while hospitalized with an acute exacerbation of COPD; those in the CF group will be recruited on a voluntary basis. Participants are allocated to the intervention or control (usual-care) group according to domicile. The enrollment process involves establishing baseline indicators that can then be used to compare with the quarterly evaluations to be undertaken on both intervention and control groups throughout their participation period.

Following discharge, intervention-group participants are linked with a CHN mentor who acts in partnership with them to facilitate their self-management during the 1 year that they are involved in the study. Mentors have been prepared for their coaching role by being trained in the trans-theoretical model of change (TTMC) and motivational interviewing (MI), as well as in the utilization of the IT supports. The TTMC aims to develop effective interventions to promote health-behavior change, while MI is a directive, patient-centered counseling style that assists participants

in changing their behavior while respecting their choices about the change. Mentors visit participants in their home on two occasions early after hospital discharge to establish contact, initiate the rapport-building process, and to perform initial assessment of the situation and initial orientation of the patient to self-monitoring. They then maintain contact at regular (weekly-monthly) intervals via the telephone. The mentor encourages the client to recognize adverse health behaviors and to formulate new healthy behaviors, structuring these discussions into a written action plan.

The mentoring process has been augmented by the development of information systems to enable participants to closely monitor their diseases on a daily basis using their newly developing skills of self-management to respond appropriately. This approach is particularly suited to these participants because of their breathlessness, lack of mobility, and geographical dispersion, which limits their attendance at centralized or group activities. Due to the variation in IT capability and experience, and to provide an opportunity for them to become comfortable with daily self-monitoring and reporting processes, participants initially use paper-based monitoring systems (daily diary) and progress at their own pace to telephone and/or Web-based systems.

The project seeks to support self-monitoring and recording of symptoms (preferably in an electronic format), which can then be viewed in a graphical longitudinal form by the patient and automatically transferred to a repository for viewing by clinicians. This system has been developed to assist participants, and to a lesser degree health professionals, in the early identification, comprehension, and initiation of early action in relation to alterations in their condition.

IT Considerations

The IS researchers in the project team have been involved with the project from the time that funding was confirmed. Thus, they have been integral

to the complete project-development cycle. This early and close involvement has resulted in the intermingling of ideas throughout the development cycle and a deep understanding of all aspects of the project. Throughout this process, the IS researchers have been careful to encourage and support the team to identify their specific requirements and those of the participants rather than limiting the requirements to those perceived to be technically simple. The only limitations resulted from budgetary constraints and the desire to develop the project for expansion and sustainability. This resulted in the need to conform to local health-department systems and intended state and national initiatives.

Through the expertise of the project team and initial brief interviews with COPD sufferers, an understanding of the potential range of technological experience and expertise of this group was developed. The picture that emerged was of a group of elderly people with minimal exposure to or trust of technology. The majority had telephones with very few having mobile phones or computers. As the second participant cohort, CF sufferers are much younger and generally more technologically savvy. This information coupled with the original project objectives and information gained through the initial stages of development led to the identification of the need to provide a range of technologies for use by the participants so they can move through different technologies as their skills and technology use evolves.

The technologies identified for development included everything from paper-based data entry, telephones using a call centre interactive voice response (IVR), to full Web-based data entry on desktop PCs and via mobile devices (personal digital assistants, PDAs). While it is anticipated that the CF cohort will be the main end users of the mobile technologies, every effort is made to make all technology options available to all participants. As these groups frequently have limited financial resources, all hardware requirements are provided by the project.

The Participants

Patients participating in the project are interviewed by one of the IS researchers as part of the enrollment process. Initially it was anticipated that this would be a data-gathering exercise, but with increasing experience, it was discovered that more benefit was gained by using this as a relationship-building exercise. With participants being more comfortable with the IS researcher, it has made them more comfortable with the idea of these people entering their homes at a later date to install technologies and conduct training.

Individualized training will be provided for participants in their homes to support the adoption of new technologies. This is in part because the COPD participants are primarily sick, elderly, and not particularly mobile, but also because people learn better in a familiar, non-threatening environment. For the CF population, individualized training is also essential as this group should not be gathered together for cross-infection purposes. The concept of individual training in these instances is supported by the principles of self-efficacy in education (Bandura, 1994).

The CHN Mentors

Engagement with the CHN mentors by the IS researchers began early in the development stage. It was quickly identified that this group was quite diverse in age and computer experience. The IT infrastructure available to this group was found to be minimal, and also different groups of CHNs displayed considerable variation in terms of high-level management support. These features all had significant implications for the development of the system.

New laptop computers were provided for those sites where the managers identified the need. This created some discussion at one site where the manager had decided that the CHNs did not currently use computers and would therefore not wish to use a laptop. This centre subsequently

ordered and received a laptop once the manager concerned moved on to another position.

The identification of IT experience and self-efficacy amongst the CHNs was undertaken through a preliminary survey, with the intention that this will be repeated a number of times over the duration of the project to assess any increases amongst CHNs in self-efficacy. This survey indicated that many of the CHNs actively avoided using computers and only a very small number had previously had good experiences with technology. This demonstrated the potential for poor adoption of technology within this group and therefore additional knock-on effects in relation to patients' adoption and use of technology solutions available. Again, it became evident that a significant investment of time was required in gaining the confidence of this group prior to the discussion of any technology. The IS researchers attended many information sessions to gain exposure to the CHNs. From experience, minimal discussion of technology was undertaken at these meetings as the focus was upon familiarization and relationship building. This has resulted in a good rapport being established with the IS researchers and the CHNs—an essential element in the project.

Training of the CHNs for use of online forms has been undertaken in an incremental manner. This has involved a number of walk-throughs demonstrating the forms and requesting feedback. This information has then been fed back into the iterative design of the forms. This process has resulted in forms being designed with significant input from the CHNs, and they have incrementally been exposed to the technologies being implemented. The CHNs have direct access to the IS researchers and can at any time contact them for additional small-group or individual support or training.

The Project Team

Despite, or as a result of, the close working relationship between the IS researchers, clinicians, and

nursing researchers, the identification of requirements was not a simple task. The multidisciplinary nature of the group and the project has required a mixture of research paradigms. Traditional power structures have been confronted and a balance of personalities has also offered challenges that are perhaps broader than those confronted in other types of development where a single discipline is involved.

During the development of the project, a number of skills requirements for the project team were identified. Training in a number of software applications was undertaken, particularly for the project officer. Training has taken into account the maintenance requirements for the system. This has seen the project officer and others actively involved in the development of online forms as well as learning how to maintain them. Further understanding of data-management principles may be required as the project is bedded down.

The System

The information-system model being developed is one that is compatible with the Department of Health and Human Services (DHHS) IT infrastructure. Participants' data will be available to be viewed by individual participants and their primary and secondary mentors only. However, should a participant desire their GP or other clinicians access their data, this can occur with the participant present. It is intended that the possibility of healthcare providers being given access will be investigated as the trial progresses. Development of the system is being undertaken in consultation with DHHS staff and *HealthConnect* to ensure compatibility and scalability of the model.

Evaluation

Evaluation tools, as part of the research project, will monitor a range of elements relating to respiratory physical symptoms (sputum, breathlessness, cough, physical activity, medication

use, spirometry, weight) as well as a sense of well-being (SF-36v2), the level of self-efficacy (Stanford self-efficacy for managing chronic disease six-item scale), and depression and anxiety scales (Hospital Anxiety and Depression Scale). Participants in both the intervention and control groups will be visited by the research officer at baseline (in the hospital) and then every 3 months over the 1 year of the participant's involvement in the study. This will allow comparisons to be made between participants in the intervention group and those who have received usual care for quality of life, symptom levels, health-resource usage (e.g., doctor visits, drug use, readmission rates), and level of self-efficacy. Evaluation of the IT and CHN aspects of the project will also occur through focus groups with CHNs and qualitative feedback from participants and their caregivers.

It is hypothesized that this model will improve and optimize the quality of life for people with chronic respiratory conditions and will slow the progression of their disease by initiating early treatment of exacerbations, thus avoiding unplanned hospital admissions and presentations to emergency departments. It is anticipated that the model will be transferable to other chronic respiratory conditions. The project will build capacity to support clients with a range of chronic diseases by forging links between acute- and chronic-care providers (utilizing IT networks), enhancing skill levels of CHNs in effective management of chronic illness, facilitating self-management among participants, and building a system of integrated care based on partnership between hospital and community services.

NEXT STEPS AND FUTURE DIRECTIONS

The health system has evolved to be responsive to acute conditions. There is a rising prevalence of chronic and complex conditions now, and the current health system cannot cater to this. Chronic

conditions require treatment at different levels including psychological and lifestyle changes as well as the physical and treatment regimens themselves. Patients need to adapt to being self-caregivers in partnership with health professionals so as to improve the management of their illness and the ability of the health system to respond to the growing challenges.

The role of medical care is changing and it is now important to ensure that patients with chronic illnesses "have the confidence and skills to manage their condition; the most appropriate treatments to assure optimal disease control and prevention of complications; a mutually understood care plan; and careful, continuous follow-up" (Wagner, Austin, Davis, Hindmarsh, Schaefer, & Bonomi, 2001, p. 66).

With the development of a more sustainable model of care for chronic illness, the principles of self-management become increasingly important. Adopting these principles requires supporting the chronically ill and their caregivers to make the move from the traditional dependence on clinicians for decision making to a team approach that is based upon a patient-centric model. Self-management requires an understanding on the part of the patient of the need for self-care, and the importance of the maintenance of their condition to aid in prevention of exacerbations and the subsequent requirement for acute care. To support this paradigm shift, chronic-illness sufferers need to be provided with appropriate information, and symptom-recognition and problem-solving skills to empower them to develop the self-efficacy to make appropriate decisions regarding their care needs (Bodenheimer, Lorig, Holman, & Grumbach, 2002).

The provision of appropriate information can assist patients in how to determine the appropriate balance between self-reliance and when to seek professional help. Aligned to this is the recognition of the shortage of health professionals and the need to find ways to address the growing demand for services. Critically, this paradigm

shift cannot and should not attempt to replace clinician consultations, but it can make them more productive.

The rise in the use of ICTs in health coincides with the desire of consumers for more information and to assume more responsibility for their own health:

Patients are the experts in their experience of a condition and coping with it. Capturing this experience and using it to benefit others as well as improve the quality of care is vital to improving the whole healthcare process. The development of e-health utilizing the Internet could be pivotal in this regard. (Detmer, Singleton, MacLeod, Wait, Taylor, & Ridgwell, 2003, p. 13)

Eysenbach (2000) demonstrates this trend toward increasing information requirements and increasing use of ICTs.

However, care must be taken to ensure equity of access to healthcare and health information. Eysenbach (2000) identified the “inverse information law.” This is where access to appropriate information is particularly difficult for those who need it most. More specifically, it also requires sensitivity toward assumptions made about the role, impact, and importance of information per se given that it is often only one factor among many that influence health attitudes, perceptions, actions, and outcomes.

The use of mobile and Web technologies have the potential to provide significant support for information exchange and healthcare reform. It is essential that when considering the introduction of ICTs, the characteristics of the whole patient cohort are considered to ensure that an appropriate choice of technologies is deployed. This must include an understanding of the cohort’s range of physical, economic, emotional, and experiential abilities or limitations. In considering the employment of technologies, it is also essential that the basic well-utilized technologies such as fixed telephones are not forgotten in the enthusiasm for

frontier, next-generation solutions. In many situations, the introduction of a call-centre service may have greater potential for uptake, and so provide greater benefits than a state-of-the-art system.

Through the process of implementing Web and mobile solutions to support the development of self-efficacy and self-management skills, it has become evident that the actual role of the ICTs and the evaluation of them are extremely difficult. When the process of introducing ICTs needs to be transparent and their use is not the primary focus of the project, how does one identify the benefits that can be attributed directly to the ICTs and how should they be evaluated? Where does the role of the ICT start and stop, and where does dependency shift from the clinician to the development of genuine self-efficacy and self-management, if at all?

Clearly these questions are difficult to provide definitive answers to at this stage of the project, but a number of conventional approaches have been considered. These include the main approaches used in the measurement of technology adoption and acceptance that variously focus on end users’ perceptions, satisfaction, and usage patterns, and the ease of use and/or usefulness of the technology studied. While these approaches vary in scope from broad-based theories such as the diffusion of innovations (Rogers, 1995) to attitudinal approaches including the theory of planned behavior (Ajzen, 1985) and the technology acceptance model (Davis 1989), it is evident that they have relevance. This is particularly the case where more recent approaches have seemed to combine a number of theories (Karahanna, Straub, & Chervany, 1999; Van Akkeren & Cavaye, 1999). Significantly, these newer approaches have highlighted differences between users’ pre- and post adoption attitudes and beliefs, including the issue of discontinuance (Karahanna & Limayem, 2000; Karahanna et al.). In the context of this and other health projects, there is also a critical requirement for the evaluation of the impact of the systems upon patient health outcomes. More broadly, this

chapter indicates that as ICT-supported patient-focused interventions become more common, there is a need to consider how assessments of benefit in terms of a cohort of patients inform us about an individual patient's experience and what this implies for terms like individualized care or patient empowerment (Muir Gray, 2004). At this level, there are implications for clinical practice and one-size-fits-all care-delivery practices.

CONCLUSION

This chapter has examined issues relating to the introduction of ICTs that have emerged as part of planning for the Pathways Home for Respiratory Illness project. The project aims to assist patients with chronic respiratory conditions (chronic obstructive pulmonary disease and cystic fibrosis) to achieve increased levels of self-management and self-efficacy through interactions with case mentors and the deployment of ICTs.

From the above discussion, the following is evident:

- ICT development and deployment considerations need to be based on a detailed understanding of users, their needs and complex interactions with health professionals, the health system, and their wider environment.
- Whilst this project is still in progress, mechanisms are in place to enable the team to implement and evaluate both the role and impact of building self-efficacy and the influence and contribution of ICTs.
- The work to date has already contributed to a realization of the need to re-conceptualize the role of information and ICTs, and the role of patients and their interactions with health professionals as part of process of developing new paradigms for patient-centered healthcare.

- There evidently is a role for Web and mobile technologies in the changing healthcare environment, but these must be flexible in their design and implementation.
- However, this important role in supporting self-efficacy and self-management must be done in a manner that avoids building dependence on the technology as opposed to genuine patient empowerment. For the research team, this continues to be the main challenge.

The authors look forward to presenting further results and insights from this project as it continues until its completion in 2008.

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This work was previously published in Web Mobile-Based Applications for Healthcare Management, edited by L. Al-Hakim, pp. 258-273, copyright 2007 by IRM Press (an imprint of IGI Global).