

2008 ATA Abstracts – Center for Connected Health

Research to reality: Transforming ideas into self-sustaining programs

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A multitude of telemedicine research projects are completed annually, but only a handful are ever incorporated into daily operational practice. Making the leap from research to reality is a tremendous challenge in telemedicine – but one that the field must perfect.

Common barriers to success include: immature or unreliable technologies; absent payer models; and reluctance to adopt by patients and/or providers. . Upfront awareness of these challenges allows the development of processes to surmount them.

Program planning should begin at the inception of the research project. All aspects of the project should be evaluated for reliability, efficiency, and scalability. During initial stages of program planning it is essential to establish clear criteria that define a feasible program. This sets clear expectations and aligns participants' goals.

Finding a champion to shepherd adoption at the provider level and identifying patients who will benefit, and are willing to participate, are key elements to building the program in a timely manner. A plausible economic model is also required to support the program. In the rapidly changing payer climate this may require vision by sponsors and development of innovative payment structures.

Robust, reliable technology and operational excellence are key components to achieving scale. Rigorous equipment field testing is instrumental in identifying and resolving unexpected integration issues in a timely manner. A process for tracking equipment and logging issues must be developed. Processes that were once manual must be enhanced and automated to manage large numbers of patients. This may require building new platforms to fit the programmatic needs. Strategies to store and communicate data must be developed and synthesized to drive appropriate actions.

The Center for Connected Health will share our methodology, our experiences and outline critical success requirements for leading projects through the research project life cycle into operational reality.

Review of a Telemedicine Global Retail Application: Remote Online Consultations

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Since July 2001, Partners HealthCare, through its division, the Center for Connected Health, has offered an online consultation service to patients and referring physicians throughout the US and the world. This service, Partners Online Specialty Consultations, allows patients, with their local referring physician, to obtain a second opinion consultation with a Specialist affiliated with Partners Healthcare/Harvard Medical School. The consultation is completed through a series of communications through a website, without the patient traveling to Boston for an in-person office visit.

During the online consultation process, medical records are submitted for review, and radiology and pathology materials are sent for re-evaluation. The patient and referring physician are given the opportunity to submit specific questions to be answered by a Specialist affiliated with Partners HealthCare. After review of the materials submitted, a second opinion letter is prepared and provided to both the referring physician and patient. The cost of the online consultation is not currently covered by health insurance plans. Patients are responsible for the cost of the

consultation, normally in the range of \$450 - \$750. As a retail offering, targeted directly to patients, providers, and employers, this is a unique telemedicine service.

In the last 6 years, over 5000 consultations have been completed through this program, involving over 400 physicians at Massachusetts General Hospital, Brigham and Women's Hospital and Partners/Dana Farber Cancer Care. The number of patients who are using this service continues to grow every year, such that it can sustain full-time staff to manage its operations. In this roundtable, we provide an overview of the service, trends in the types of cases we receive, and the business model for this service. We will also present feedback from patients and referring physicians, critical success factors, and plans for future development.

Improving Adherence to an Exercise Program: A Personalized Virtual Coach

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Over 65% of US citizens are currently overweight or obese. Poor adherence to exercise and diet are cited as major barriers to losing weight. Although motivational coaching, personalized feedback and patient education are effective tools, to deliver all these elements using traditional methods requires a level of manpower that is both costly and in short supply, leaving many patients without access.

In order to address this problem we developed an automated coaching platform designed to provide personalized feedback to change behavior. The platform has two key components: a wearable activity monitor and a computer avatar designed to provide exercise coaching.

The activity monitor tracks daily step totals and can be worn in a number of different locations on the body (on belt, in pocket, around neck), allowing it to be a 'wear and forget' device. The monitor transmits information about a patient's daily activity level through a "black box" console to a computer server.

The step counts are then sent to the 'Virtual Coach'; an animated, embodied computer agent designed to run on a patient's home computer. The coach uses verbal and non-verbal relationship building behavior to create an effective working alliance with a patient, offering educational information, feedback on performance and strategies to overcome barriers. By creating interoperability between the coach and the activity monitor, we allowed interactions to be tailored to the patient's step count.

This platform offers patients access to scaleable, low-cost personalized coaching. This is a valuable form of motivational support to help overweight patients improve their adherence to an exercise regime. Furthermore, by basing the coaching interactions on measured step counts we eliminate the common errors seen when patients self-report this information. We believe this platform offers an effective approach to increasing patient activity and positively impacting overall health.

A solution for remotely monitored patient data – The Remote Monitoring Data Repository

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Is a blood glucose reading measured in the home and reported through an automatic process the same as patient data measured in the clinic or self-reported patient data? With the proliferation of connected health technologies, capabilities and programs a mountain of data is beginning to be generated and worse yet it is tending to be stored in different application and data silos. Generally speaking electronic health record systems lack the capability to store or handle this 3rd type of data – remotely measured - and make it a meaningful part of the care process.

At the Center for Connected Health at Partners HealthCare a rapidly growing number of remote measuring and automatic reporting of patient data programmatic efforts was leading to a chaos of technology solutions and data silos. In response to this challenge a system was designed, developed and deployed - the Remote Monitoring Data Repository (RMDR). This common place to store remotely measured and reported patient data has created a single scalable data repository that is a single integration point for the connected health programs. The RMDR also provides a single integration point to the other enterprise health information systems at Partners Healthcare.

The Center for Connected Health now has three connected health programs storing remotely measures patient data into the RMDR with more coming online. We have developed a series of standard integration points for new programs and for interacting with the different clinical systems around the enterprise. Further aiding this work is developments in the standards communities to create standard interfaces for sensor data to more easily reach health record systems. In this presentation the current and future planned programs and integration points at Partners HealthCare will be described as use cases that continue to define the architecture, design and development of the RMDR.

Improving Adherence – User feedback on novel applications of Communications Technology

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OBJECTIVE:

Medication non-adherence is a complex, multi-factorial issue that leads to 125,000 deaths annually in the United States. Technology tools may be an effective way to tackle this problem but to maximize the impact of these solutions, it is essential to understand existing barriers to adherence and assess usability of technology applications.

METHODS:

We developed a reminder system to improve adherence comprising a feedback loop between an electronic pill bottle and a desk lamp linked to a pager system. Opening the bottle triggered an SMS message, which was relayed via the pager system, to the desk lamp. The lamp glowed green when medication had been taken and red when it was overdue. We interviewed study subjects to assess self-reported adherence, satisfaction with this technology and suggestions for improvement.

RESULTS:

The mean age of subjects was 54 (range 52-60). The majority were white, college-educated, employed full-time and comfortable using technology. All participants reported frequent non-adherence to their medications at the time of enrollment, despite high levels of health literacy and knowledge. Frequently reported reasons by subjects for non-adherence included “forgetting”, lacking an effective system to manage medications, or subjects felt they “didn’t need” the medication and opted not to take it against medical advice. Following the study, 65% of subjects felt this technology was effective in improving their adherence and 46% would enthusiastically recommend it to others. Suggestions for technology improvements to enhance the value included better reliability, increased portability and addition of email or cell phone reminders.

CONCLUSIONS:

Our system was well received by patients but had room for improvement. Obtaining feedback from users throughout the design and development of our adherence platform has allowed us to make enhancements, thus enabling us to offer a more valuable tool for patients and physicians to address the issue of poor medication adherence.

A communication technology enabled diabetes self-management program: exploring patient perspectives

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Background: Information and communications technology (ICT) has been heralded as a means to connect patients and providers, empower patients to proactively manage their diabetes and address the growing diabetes epidemic. Our ICT solution automates blood glucose data collection, aggregates and presents this data to patients who can then use a journal feature to record significant lifestyle data. The care team has access to this information and can communicate directly with the patient via this solution.

Methods: A 90 minute, professionally facilitated focus group was conducted among 8 respondents and the prototype solution demonstrated. The participants included both newly diagnosed diabetics and those who had managed diabetes for many years. The focus group was video-recorded and thematic qualitative results and summary recommendations were reported.

Results: Participants perceived this solution as most valuable during certain stages of their diabetes management: newly diagnosed, or trying to get back in control. Participants agreed that if this solution is offered for a predefined time period, and not in perpetuity, they would be more likely to comply. Another factor affecting adoption was the level of involvement of providers; patients viewed the solution as more valuable if the practitioner was monitoring their information. Moreover, communication between providers and patients outside of scheduled office appointment times was perceived as an important enabler in improving diabetes management.

Conclusion: The major benefit of the program is empowering patients to manage their diabetes by offering education and facilitating communication between care providers. Our focus group reflected the hypothesized perception of value of creating this ICT gateway to help manage their diabetes. The information gathered from this initial phase will be used to guide the development of an ICT-enabled diabetes management system for patients and their care team.

Connected Cardiac Care – patient acceptance of a new home heart failure monitoring program

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Background: Heart failure is the number one reason for hospital admissions in the over 65-age population. A previous study demonstrated telemonitoring of homebound patients reduced hospital readmissions by 25%. Partners Healthcare launched a quality improvement program utilizing remote monitoring of non-homebound heart failure patients to improve patient outcome and reduce cost amongst this patient population.

Methods: Hospitalized patients with heart failure were identified and offered the opportunity to participate in the program. Their physician's agreement was also required. Participants had home telemonitoring equipment installed and were required to send daily vital sign and symptom reports to a telemonitoring nurse. Timely interventions and teaching were offered over the 6-month course of the program. At the end of the program, all patients completed a satisfaction survey.

Results: Of the 81 people found to be eligible only 42 ultimately enrolled in the program. Of the remainder, 23 patients refused to participate and 16 physicians declined consent. Reasons for

refusal by patients and physician varied widely. Patients most commonly declined to participate because they were too busy, unsure of the technology, or worried that monitoring would make them feel disabled. Physicians most frequently cited dislike of technology, fear of information overload and doubt that their patient would cooperate as reasons for refusal.

Initial feedback from participants has been overwhelmingly positive with 100% of patients reporting that the program has improved their overall health and helped them stay out of the hospital.

Conclusions: Telemonitoring has the potential to greatly improve outcomes in patients with heart failure and our program has been well received by participants. However, significant barriers to adoption exist amongst patients and providers and these must be addressed and overcome to fully realize the benefits of this program.

Patient and Doctor Satisfaction with an Electronic Visit (E-Visit) Program for the Management of Acne

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Introduction: Internet technology offers new ways to increase access to care for dermatology patients. We conducted a randomized controlled trial comparing asynchronous electronic visits (e-visits) consisting of online surveys and digital images with conventional office care for the management of mild-moderate acne. We report efficiency and satisfaction for 121 trial subjects and 5 participating dermatologists.

Results: The mean age of subjects was 28.1 (SD 8.70, range 13-60) years old; most were white (65%) and female (77%). Usual care subjects spent an average of 22 min (range 15-35 min) in the physician's office, of which only 4:37 min was spent with the dermatologist. In addition, almost half (45%) of this group spent 30-60mins traveling to the office. In contrast, 91% of e-visit subjects were able to complete their e-visit, in less than 20 minutes. Dermatologists took comparable lengths of time to complete e-visits and office visits (4:42min vs. 4:08 min, $p=0.552$). Subjects in the office and e-visit groups reported similar levels of satisfaction with their care (98% vs. 90% respectively, $p=0.06$) and improvement in their acne (88% vs. 90%, $p=0.664$). Of the e-visit patients, 91% would consider using e-visits to receive acne care in the future and 75% believed that the dermatologist could assess their acne using an e-visit system as well as they could have in person. Dermatologists' satisfaction with the improvement in their patients' acne was similar in both office and e-visit groups (9.39 vs. 9.04 on a 10-point scale, $p=0.158$). In 91% of cases, dermatologists were satisfied with their ability to assess acne using digital images.

Conclusions: E-visits appear to be well-received by patients and physicians. Patients in particular benefit from considerable time savings when using this method of care delivery. We anticipate increased uptake of the e-visit platform as dermatologists seek efficient and effective ways to conduct follow-up visits for non-urgent conditions.

Delivering successful medical Distance Education programs through various technologies: Our experiences

Jerrick Haddad, Brian Hammond

Since late 2001, a worldwide spike in interest in medical Distance Education programs has provided new opportunities for Partners Collaborative Media Services to showcase its technology capabilities to audiences around the world. To become a successful program, however, required creating new processes and building relationships from the ground up. The purpose of this roundtable is to discuss some of the key elements for creating a successful Distance Education program. Additionally we will be highlighting some of our experiences on this

topic as they directly relate to the healthcare world, and what technologies assist us in achieving this goal.

Currently, our program has expanded to include five very successful client relationships connecting 24 countries. These relationships have provided us with a steady source of revenue. Over a thousand physicians worldwide participate in these courses with many earning CME credits.

Such a strong Distance Education Program is impossible to achieve without careful implementation and planning to take a program from its inception, through negotiations, to operational excellence. Our program enjoys this level of success because of the marriage between the operational arm and the technical arm of our group. During this roundtable we will identify the processes and technologies that have proven invaluable for seamlessly bridging the gap between lecturers and students. We will also look at promising emerging technologies we plan to integrate into our programs in the coming year.

Disease management redefined – A novel approach to tackling high blood pressure among employees using an internet enabled automated self management platform

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Introduction

Chronic diseases, such as high blood pressure, place an enormous economic burden on self-insured employers through loss of productivity and high costs of health utilization. Furthermore, high blood pressure ranks among the most expensive diseases for large employers. Previous interventions have focused on education, with poor attempts to engage patients or create incentives to change negative behaviors. New approaches are needed to promote self management in an interactive, engaging and sustainable way. We describe the concept and design of an automated self-management program for employees with high blood pressure.

Conceptual framework

Our approach to improving blood pressure in hypertensive and pre-hypertensive patients comprises self-management, regular self-monitoring and structured education. Based on this framework we built an automated algorithm that tracks trends in the blood pressure and triggers a sequence of responses to promote lifestyle changes and reinforce positive behaviors.

Methods

We create a conceptual framework for improving blood pressure in hypertensive and pre-hypertensive patients. The framework consists of regular self monitoring, self management and structured education. Based on this framework we build an automated algorithm that tracks the trends in the blood pressure and triggers a sequence of responses to promote lifestyle changes, reinforce positive behaviors and target education.

Implementation

The program uses an interactive web based portal that receives blood pressure readings wirelessly from a portable blood pressure device. The automated algorithm analyses blood pressure data and generates messages and reminders for the user at periodic intervals. The algorithm also directs users to an educational module with interactive quizzes on blood pressure control and lifestyle management. In addition the website supports a discussion board for users to discuss aspects of blood pressure control such as diet, stress and medications. The users are given “points” for completing a certain number of blood pressure readings every month which can be redeemed through the employer for monetary rewards.

Conclusion

Large self-insured employers are in unique position to lead such initiatives among their employees and rapid advances in communications technology have made it possible to efficiently

implement and scale such interventions. This program is currently being tested as a randomized control trial at a large self-insured employer in Massachusetts.

Improving Adherence to Topical Medications: Using Electronic Monitoring and Reminders to Change Behavior

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Adherence to topical medications is poor among patients suffering from dermatological diseases. This leads to persistence of disease and increasing healthcare costs. The estimated 30% adherence to topical agents is even lower than adherence to chronic, oral medications; however, few interventions have been designed to address this issue.

In this project, our aims were two fold: 1) to develop a novel, accurate, and reliable monitoring device, and 2) to create electronic reminders to enhance adherence to topical agents.

We developed a detachable, electronic monitoring device specifically designed to be used to track adherence to topical agents (SIMCream). The device could be adapted to fit tubes of varying shapes and sizes. Each time a tube cap was removed, the electronic monitor delivered an SMS text message to a central server. The SMS message provided date and time-stamped information about when an individual unit was used; along with information on battery status and signal strength of the device.

In order to deliver electronic reminders to patients, we employed an automated cellular phone text-messaging system to send timely, brief reminders over a secured network. In addition to reminding patients to use topical medications, the messages contained daily weather information, customized to each patient's location, to maintain interest in the message content. The messages could be delivered at a time pre-specified by each patient. This electronic reminder system also tracked when each message is delivered, received, and read by the patient.

In this project, we developed innovative monitoring and reminder technology to tackle a previously overlooked problem: the issue of poor adherence to topical medications. Our electronic monitoring and reminder system offers physicians an insight into their patient's behavior, and provides patients feedback, reinforcement and reminders. We believe this system will improve patient adherence rates to topical medications and positively impact their overall health states.