Mobile technology has become increasingly prevalent in the workplace. Smart phones, tablets, and other forms of personal digital assistant have particular appeal for professionals seeking tools to enhance productivity. Research in particular requires the capacity to collect and process data in an efficient and cost effective manner. Investigators are increasingly turning to mobile devices for solutions as programs and data handling capabilities become more sophisticated. With these developments, however, arises the need to contemplate and address ethical considerations relevant to mobile technology use in the research context.

There are many reports describing use of mobile devices as part of the research process. Examples include remote field data collection\(^1\), observational data collection\(^6\)-\(^9\), survey administration,\(^4\)\(^,\)\(^10\)\(^,\)\(^11\) and patient data diaries\(^12\)-\(^15\). Mobile devices also have the potential to improve the feasibility of conducting research in poor and underserviced areas of the world where this is much needed\(^16\). In addition to facilitating data collection and/or the administration of study instruments, mobile technology can be used to enhance the methodological quality of a study.\(^17\),\(^18\)

While investigators may be excited by the potential for mobile technology to improve the research process, Research Ethics Boards (REBs) and Institutional Review Boards (IRBs) may be hesitant. The role of the REB/IRB is to ensure that research is conducted in an ethical manner\(^19\)-\(^21\) and in accordance with institutional policies and jurisdictional laws. Research involving human subjects must adhere to the basic ethical principles, including respect for persons, beneficence, and justice.\(^20\) Of particular relevance to research protocols incorporating mobile technology are considerations related to participant privacy, confidentiality and data handling.

While the considerations related to data handling may be obvious, there are additional aspects of mobile device use in research that may raise ethical questions. When a minimal risk survey study of health care providers was recently proposed to the REB of the author’s institution, concerns were raised about the impact of mobile device use on the voluntariness of study participation. The proposed protocol involved use of a tablet-based information and consent form followed by a tablet-based survey. In this case, the scanned information and consent form bearing the stamp of approval of the REB could be displayed on the tablet, and an associated signature box permitted eligible participants to sign the tablet-based consent form with their finger if they elected to participate. The tablet was to be offered to potential participants by a Research Assistant knowledgeable about the study and available to answer any questions prior to handling the tablet and/or prior to signing the consent. From a process perspective, the proposed sequence of events was very similar to that which occurs with use of a paper-based consent, where the medium would simply be a tablet rather than paper. The advantages of use of a tablet-based information and consent process are that this eliminates the costs related to printing information and consent forms, the need for the research assistant to carry these, and the need to securely store signed consent forms for the required period.

The REB chair rejected our proposed use of a tablet-based information and consent process on the basis that this did not provide eligible participants sufficient time to consider whether they wished to participate in the study or not. The ethical principle of concern related to the voluntariness of participation due to the immediacy of tablet based survey. Instead, the REB mandated use of a paper-based information and consent form.

**A/Prof Melissa Parker MD**

\(^1\)Pediatric Critical Care Medicine and Pediatric Emergency Medicine, McMaster Children’s Hospital,  
\(^2\)Pediatric Emergency Medicine, The Hospital for Sick Children, Adjunct Clinical Assistant Professor of Pediatrics, University of Toronto in Medicine.

Corresponding Author: parkermj@mcmaster.ca

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consent sheet in conjunction with the tablet-based survey, although participants were still recruited through direct approach by a Research Assistant. Interestingly, the same REB deemed acceptable the recruitment of survey participants via email, where the email inviting study participation contained a hyperlink to a Survey Monkey version of the survey and an electronic version of the information and consent sheet was simply provided as an email attachment which participants were under no obligated to review. Additionally, no signature was required from participants completing the Survey Monkey version of the survey as the REB interpreted the decision to click on the survey hyperlink as a positive indication of consent. The REB apparently considered the email invitation/web-based survey hyperlink process more autonomous, given that eligible subjects could read the email invitation in privacy and return to it at a later time if they wished.

Some of the considerations relating to data privacy, confidentiality, and security have been previously reported. In Canada, some institutional REBs are showing increasing disapproval of traditionally accepted survey programs (Survey Monkey) that involve web-based data collection and storage due to data privacy, confidentiality, and security concerns. Investigators planning to submit for ethics review a protocol involving the use of mobile technology should expect their REB to scrutinize procedures related to data collection, storage and security, as well as any potential threat to the privacy and confidentiality of participants. One way to avoid potential delays is to contact the REB directly regarding a study proposal prior to submitting a formal application. In the example provided, all correspondence was handled via email following an advance inquiry regarding the acceptability of the proposed process. REBs are typically open to such communication and this can save investigators time by identifying potential concerns early.

Mobile technology is an exciting development for investigators that allows for many creative research applications. While the technology or proposed use may be unfamiliar to an REB, the same basic ethical principals in judging the appropriateness of its use will be applied. Up front inquiries can ensure clarity and help avoid delays in obtaining protocol approval.

References


Letter to the Editor


Albert Road Clinic is an acute care private psychiatric hospital with active and committed Psychiatrists who work with us. The Albert Road Clinic Consulting Suites is based within the hospital and this space is tenanted by approximately 40 consultant psychiatrists who work either full time or on a sessional basis in their private practice. Several psychiatrists approached me to try and resolve the issue of their patients not attending for scheduled appointments; the non-attendance has potential detrimental effects for the patient (who may have forgotten the appointment) leading to possible clinical risk. The other consequences have been an adverse effect on the consultant psychiatrists’ business and the inability to back fill the appointment for which the patient has not attended.

There is evidence in the literature that reminder systems have reduced the non-attendance in various practice settings. Sims et al. in a controlled study demonstrated a relative risk reduction of 28 and 25 % in terms of non-attendance, in the two year studied when comparing the attendances with the year prior to no reminders being sent. Prasad and Anand using a broader outcome measure i.e. attending on the day and on time, noted that it occurred overall in 79% of those who received reminders and only 34% who did not receive the reminder. Stubbs in their review noted that all reminder systems improved attendance rates but SMS reminders were the most cost effective.

It was decided that we would try and harness technology to improve patient appointment attendances within the consulting suites and we commenced a trial of sending SMS reminders, on the previous business day to the patients who indicated through the individual practices that they would like to be contacted in this way.

Some strategies had been previously trialed in some of the private practices. This has included medical secretaries attempting to telephone patients directly to confirm appointment times with them but had limited success due several issues not least the ‘human factor’ such as work demand of the medical secretaries, patients availability to respond to phone calls and the not insignificant comments that many of patients found these phone calls intrusive; particularly if they occurred within their working hours. The strategy of calling patients was used in a limited fashion at the Clinic as well but the inherent problems outlined seemed to outweigh the benefits.

Our system now has now been in operation for eighteen months. Anecdotally patients have
expressed that the system works well. This view is in keeping with the conclusion following an extensive review of the literature. In order to ascertain acceptability, the author spoke informally with consultant psychiatrists. The responses have been variable. Although there were positive views there were negative comments as well. The negatives focused upon some difficulties with reliability regarding the provider; which resulted in further investigation and the subsequent move to adopting a SMS messaging system within a patient management system which is used within our consulting suites. The system we currently utilize has the advantage of being fully integrated with the appointment calendar and accounting package for each consultant psychiatrists’ private practice.

There is a minority of patients who do not use mobile phones and the occasional patient who has opted for email reminders, and staff now have adequate time to attend to them on an individual basis. A significant drawback has been that since patients have now become reliant on the service they have missed appointments when the system has occasionally ‘crashed’. These events have fortunately been rare but do have serious consequences for the individual practices and have caused understandable dissatisfaction to the consultants. We are now moving towards manual reminders when such eventualities occur. It has been essential to ensure that we have built processes to quickly respond to system failures; not least to ensure that there are contingencies in place to ensure that more than one staff member checks that the SMS reminders have been successfully sent.

Overall, the introduction of a SMS messaging system for outpatient appointments at Albert Road Clinic has been positive. Adopting such a system not only provides a useful service but also the reminder systems have been shown to be a significant saving of costs as well. The system provides a cheap, automated alternative of sending out reminders. In addition it is a saving of the secretarial staff time. It is recommended that the adoption of such systems will enhance the attendance not only in medical settings (as noted in the literature) but also in psychiatric outpatient clinics. The focus for future research should be directed at patient satisfaction and probable medico-legal implications of failures of the system, even with the disclaimer. In addition the cost savings to the institution and the time savings to secretarial staff need investigation.

Our experience would lead me to recommend the adoption of similar systems in any practice. Where this is to be introduced the key is to adequately ‘educate’ all parties, i.e. secretarial staff, the clinician or others involved in its operation. A de identified print out of the message received by the patient and confirmation of sending which is available to the secretary can be seen in Figure 1. The system needs to be robust so that if a patient responds to the SMS (Figure 2) it must come directly back to the sender rather than it getting lost in the system. An improvement that is required for the current system we operate. Give the recipient a choice to accept or reject the reminder system and obtain written consent with the phone number on which to receive the message with the onus on that individual to inform if the number had changed or not functional any longer. The treating psychiatrist needs to keep a record of this. A disclaimer is that patients should not rely solely on the reminder would minimize the potential of claims against the organisation in case of a bona fide systems failure is handed to the patient. A back up system of sending out reminders is required if there are problems.
References


 WelTel Retain: A randomized controlled trial protocol of a text-messaging intervention to improve patient retention in pre-antiretroviral therapy HIV care

Abstract

High levels of patient retention after first clinical contact contribute to the timely initiation of antiretroviral therapy (ART) and better health outcomes. In Kenya (WelTel Kenya1), a weekly short message service (SMS) text message led to improved ART adherence and viral load suppression.

The objectives of this study are to: 1) determine if the WelTel intervention improves retention in Stage 1 HIV care (patient receives CD4 count results); 2) determine whether the WelTel intervention improves 12-month retention; and 3) evaluate the cost-effectiveness of the WelTel intervention.

A randomized controlled trial will be conducted at the Kibera Community Health Centre in Nairobi, Kenya. Over one year, HIV positive individuals newly enrolling at the clinic will be recruited and randomly allocated to an intervention or control arm (standard care) at a 1:1 ratio. Intervention arm participants will receive a weekly SMS ‘check-in’ to which they will be required to respond within 48 hours. An HIV clinician will follow-up and triage any problems that are identified. Patients will be followed for one year, with a primary endpoint of retention in care at 12 months.

This study is in a pre-enrolment phase; a recruitment target of 686 participants provides 80% power to detect a proportionate difference of 15% in the primary outcome (alpha=0.05). Data will be analyzed according to intention to treat principles. Chi-squared tests will be used for categorical outcomes; and t-tests or Mann-Whitney U tests for continuous outcomes.

The WelTel Retain trial will contribute important information on the effectiveness of an established mHealth intervention to engage patients in care during the first year of HIV care, before initiating ART. Trial results and cost-effectiveness evaluation will inform how WelTel might contribute to the long-term success of PEPFAR-funded programs and towards a sustainable global HIV/AIDS response.
MOBILE TECHNOLOGY AS A PROMISING TOOL FOR HEALTH RESEARCH IN THE SOCIAL SCIENCES

Marcos Reyes-Estrada¹, Marinilda Rivera-Díaz², Nelson Varas-Díaz²
¹ Ponce School of Medicine and Health Science, Pontifical Catholic University of Puerto Rico, Puerto Rico
² University of Puerto Rico, Puerto Rico

Abstract

BACKGROUND Mobile technology has revolutionized the way that behavioral scientists collect, store, and analyze data (Press, 2011). Recent literature has begun to point out the effectiveness of this technology for research in health scenarios (Miller, 2011). Therefore, researchers need to continue exploring the use of specific mobile technology and its relevance to the study of health related issues, particularly physician/patient interactions.

PURPOSE The purpose of our study was to document the behavioral manifestations of HIV/AIDS-related stigma in physician/patient interactions.

METHODS In order to achieve the aims of this study, a sequential mix method approach using focus groups and standardized patient technology was implemented. The qualitative phase included 9-focus group composed of 66 participants with an HIV/AIDS diagnosis. A qualitative analysis using iAnnotate-application on the iPad allowed the development of a behavioral manifestation of HIV/AIDS-related Stigma Inventory (BMHASI). The quantitative phase was based on three HIV/AIDS case simulations, which generated 91 video recordings of patient/physician interactions, and the administration of a previously validated scale to assess HIV/AIDS-related stigma attitudes. The stigma scales were completed in vivo by medical students using the iSurvey application on the iPad. Standardized patients also completed the BMHASI. In the third phase, six researchers use the BMHASI developed on iSurvey to evaluate the 91 medical interactions between the medical students and standardized patients.

RESULTS The preliminary analysis identified eight stigmatizing behaviors manifested by medical students during simulated interactions including: avoid shaking hands to the patient, avoid physical contact needed to perform physical examination required by medical protocol, and excessive physical distance.

CONCLUSIONS The iPad is an emergent and valuable research tool for the behavioral sciences field with great potential for documenting socially stigmatized interactions in the health scenario.
**BreathEasy: A Smartphone App to Manage Asthma in an Underserved Population**

**Abstract**

Asthma is a common, chronic illness, affecting over 23 million U.S. adults who face daunting challenges in managing their disease conditions on a daily basis. RTI and the Virginia Commonwealth University developed and piloted a smartphone app, built on the latest clinical guidelines for treatment and self-monitoring of individuals with asthma, to assist adults with asthma to better manage their care and disease condition.

BreathEasy, part of RWJF’s Project HealthDesign, was developed through a user-centered design approach with iterative development and feedback cycles. Patients used an Android-based smartphone to record their observations of daily living (ODLs), including asthma and mental health symptoms, medication use, symptom triggers, physical activity, and activity limitations, among others. Clinicians (physician/nurse pairs) used a Web-based dashboard to review patient data and visualize trends and patterns in the ODL data on a regular basis, in accordance with a disease management approach.

Six months of fielding with 30 patients in two urban practices has shown the app to be generally well accepted by both patients and clinicians, and findings indicate that collection and review of ODL data has resulted in positive changes in communication and care management. Changes in medication compliance and management, referrals to specialists, and diagnoses of comorbid conditions were attributed to use of the app. Patients reported using the ODL information in many ways, including recognizing when symptoms had become problematic, being more aware of symptom triggers, and better following recommendations made by their doctor.

These findings indicate early success of this smartphone and dashboard app to manage asthma. Further studies should focus on an evaluation including a control group and more closely approaching a controlled clinical trial. By providing a novel method of reporting patient-generated data to clinicians between office visits, this app shows promise for improving the quality of care of asthma patients.
Universal Depression Prevention via Mobile Phones


Abstract

Depressive disorder in adolescence is common, disabling, and heightens the risk of suicide. Universal depression prevention programmes can be effective but are resource intensive and difficult to scale up.

We developed a universal depression prevention programme for adolescents (MEMO) that is delivered solely via their mobile phones. The messages were developed from cognitive behavioural therapy (CBT) by experts in adolescent psychiatry and psychology, delivered within video diary style messages from teenagers, video messages from celebrities, mobisodes (30 second cartoon episodes), text messages and a simple mobile website. Coherence and memorability were provided by a logo, music, and three key words in every message.

We conducted a prospective double-blind randomized controlled trial in adolescents aged 13-17 years from 15 high schools across Auckland, New Zealand. Interested students (n=1348) consented to receive a mobile phone programme about living positively and were randomised (n=855) to either MEMO or a full attention control programme with the same frequency and types of messages. Trained researchers conducted individual interviews with participants at baseline, 9 weeks (post-programme) and 12 months. Students identified with high risk of depression or self-harm at baseline were excluded.

The Child Depression Rating Scale (CDRS-R) mean scores initially improved post-programme (mean change 0.61[SD 6.29]) then worsened by 12 months. There were no significant differences between MEMO and control groups (mean change from baseline to 12 months -1.18 [SD6.76] MEMO and -0.92 [SD 6.67] control), even when adjusted for multiple factors and in sensitivity analyses. There were also no differences between groups in self-rated scores of depressive symptoms and general functioning, or in the diagnosis of depression during the study period. We were unable to demonstrate a significant benefit in depression scores in those receiving our intervention compared with a control mobile programme. There are several potential explanations that will be discussed.
Efficacy of IVR-Based Brief Intervention for Alcohol Problems

Abstract

Alcohol screening and brief intervention (SBI) is a clinical approach to reducing alcohol consumption and harms whose efficacy is well established. In spite of empirical support for the intervention, and its endorsement by entities such as the National Institutes of Health (NIH) and the US Preventive Services Task Force, implementation in clinical settings is limited. Delivery of SBI to heavy drinkers may be expanded with technology.

We developed an Interactive Voice Response (IVR) system that delivers Brief Intervention (BI) according to NIH clinician’s guidelines. Pilot studies supported feasibility, and now we are evaluating efficacy with a randomized, controlled trial. Objectives are threefold: evaluate the efficacy of IVR-BI for reducing drinking; determine the impact of IVR-BI on patient-physician interaction; and determine patient characteristics associated with treatment effect.

Patients presenting to primary care clinics are called by research staff three days before their appointment and asked to participate. Consenting patients are transferred to IVR for a brief behavioral health screening questionnaire (IVR-Screen), the results of which are automatically routed to their electronic medical record (EMR). Participants drinking above NIH guidelines for low-risk drinking qualify for the IVR-BI; consenting patients are randomized immediately and either complete or do not complete the IVR-BI. Participants are interviewed by research staff after their health care visit and again 3- and 6-months later.

To date, 21 have been randomized to IVR-BI vs. usual care, with follow-up interviews pending. Interviews will assess participants’ alcohol-related conversations with their primary care providers, their drinking behavior, and any treatment experiences they have had. Results of 3-month interview data on an anticipated 300 participants will be available for presentation at the time of the mHealth summit. The future potential of this IVR-EMR integrated system for delivering health screening and education relates not only to alcohol but to other behavioral problems as well.
IN Touch: impact of and lessons learned from an mHealth intervention for overweight and obese youth

Abstract

Minority and low-income communities are disproportionately affected by obesity, a risk factor for diabetes, heart disease, and cancer. The iN Touch pilot study was conducted to determine whether use of a mobile Observations of Daily Living (ODL) tracking application with health coaching impacted a variety of health outcomes.

The study was a mixed methods pilot using a pre-post-comparison of a single group. Minority youths age 13-24 who were overweight or obese (BMI > 85th percentile for age and gender in adolescents and BMI > 25.0 in adults) from three clinics in San Francisco were enrolled. Twenty-four of 34 participants completed the study (70.59%). Participants were provided an iPod Touch with a customized ODL application from TheCarrot.com that included exercise, food, mood and socializing. Weekly summaries were available to providers. Participants met in person with a lay health coach. Measures included BMI, waist and hip measurements, depression (PHQ-2) and modified patient activation measure (PAM) which assesses the patient’s knowledge, skills and confidence to manage health and healthcare. Barriers and facilitators to use of technology were evaluated using semi-structured interviews.

Paired t-tests revealed a significant improvement in PAM scores (M = 3.21, SD = 7.472); t(23) = 2.10, p = 0.047 and waist circumference (M = -1.21 inches, SD = 2.52); t(22) = -2.21, p = 0.038. There were no other significant changes. Participants’ use of the technology varied significantly, ranging from almost none to multiple times per day. Interviews suggested the technology was easy to use, data entry burden was minimal, and ability to record ODLs was beneficial.

We demonstrated significant preliminary success with iN Touch suggesting it is a promising tool for self-management for overweight/obese youths when used in a health coaching program. This application may also provide valuable patient-centered data that is not currently in electronic health records.
Feasibility of a Virtual Exercise Coach to Promote Walking in Community-Dwelling Persons with Parkinson's Disease

Objective
Exercise improves function and quality of life in persons with Parkinson’s Disease (PD), but few people adhere long-term to home-based programs. A Virtual Exercise Coach (VEC) is an animated character viewed on a notebook computer in the subject’s home that emulates face to face interactions. The effectiveness of VECs to improve exercise adherence in people with PD or any other neurodegenerative disease has never been explored. The aim of this study is to explore the feasibility, acceptability and preliminary evidence of efficacy of a VEC to promote daily walking in community dwelling persons with PD over a one month period.

Methods
20 sedentary subjects with a diagnosis of PD participated in this Phase I clinical trial. Subjects were instructed to interact with the VEC for 5 minutes, wear a pedometer and walk daily for one month. Mobility (six-minute walk and gait speed) and exercise self-efficacy were assessed at baseline and one-month. Retention rate, satisfaction and interaction history were assessed at 1-month.

Results
Participants were 55% female, mean age 65.6. At study completion, there was a 100% retention rate and subjects had an average satisfaction score of 5.6/7 (with seven maximal satisfaction) with the VEC. Mean adherence to daily walking was 85% of prescribed sessions. Both gait speed and the 6-minute walk test significantly improved (P<0.05) from baseline to one month. No adverse events were reported.

Conclusions
Sedentary persons with PD successfully used a computer and interacted with a VEC. Retention, satisfaction and adherence to daily walking were high over one-month and significant improvements were seen in mobility assessments. Longer, controlled trials are needed to assess the effectiveness of the VEC in promoting adherence to long-term exercise in persons with PD.
A Tablet Game for Risk Reduction and HIV Prevention in Adolescents

ABSTRACT

BACKGROUND Thirty-nine percent of new HIV infections in 2009 occurred among individuals aged 13-29 years. Videogames are ubiquitous, can improve health behavior, but have not been evaluated as a tool for HIV/AIDS prevention in adolescents.

PURPOSE To develop and evaluate a videogame designed to help teens acquire and practice skills to avoid or reduce overall and HIV risk behaviors.

METHODS Yale’s Play2PreventTM, Digitalmill, and Schell Games are developing PlayForward: Elm City Stories, a videogame that incorporates evidence-based tools for behavior change. We will evaluate the efficacy of the game by conducting a randomized trial in 330 youths assigned to play PlayForward or a commercial videogame. Subjects will play two sessions/week of their assigned game for six weeks. Assessments will evaluate the game’s efficacy for reducing risk and promoting good decision making.

RESULTS The videogame will be ready for testing as a final playable iPad product in late Fall 2012. The player uses a personalized avatar to “travel” through life, making decisions and facing challenges in a repetitive and meaningful way, equipping them with skills that potentially translate to real life. During this talk we will describe how an originally planned desktop application was quickly retooled for touch interface tablets. While many traditional desktop and Web-based applications will easily move to tablet and mobile phone frameworks, understanding some of the nuances involved will provide new insights. We will outline specific approaches to game development for behavior change and discuss the potential global implications of our work.

CONCLUSIONS This videogame represents a paradigm shift, hopefully providing evidence for the role of games as risk reduction and HIV/AIDS prevention in youth. Videogame technology has the potential to expand the available vehicles for HIV/AIDS prevention to the increasing number of electronic gaming platforms including mobile technologies, creating a new venue for public health interventions.
Wrist-based accelerometers successfully differentiate walking from other activities

There is a significant body of literature that demonstrates that accelerometers placed at various locations on the body can provide the data necessary to recognize walking. Most of this literature, though, either does not consider accelerometers placed at the wrist, or suggests that the wrist is not the ideal location. The wrist, however, is probably the most socially-acceptable location for a monitoring device. This study evaluates the possibility of using wrist accelerometers to recognize walking during everyday life in order to not only evaluate the amount of time spent walking, but also potentially recognize changes in stability that might lead to falls. Thirty elderly individuals aged 65 years and older were asked to wear a wrist accelerometer for four hours each while simultaneously being videorecorded. Study participants were instructed to go about their normal daily activities during those four hours. Activities captured in the videorecordings ranged from doing laundry and cooking lunch to watching television. Accelerometer data were then analyzed by looking for the well-recognized walking frequencies between 0.7 and 3.0 Hz, as well as by calculating a number of other features from the time-series data. Particular attention was given to features that are capable of being calculated on the wrist device so that future work will not require streaming large amounts of data from the device to a central server. Using the presence or absence of the walking frequencies to characterize the test set yielded results of 93% area under the receiver operating characteristic curve (AUC). Using an algorithm limited to features calculable on the wrist device, moreover, achieved an AUC of 90%. A wrist-based accelerometer, therefore, can successfully be used to differentiate walking from other activities, and, moreover, can do so on a small, socially-acceptable wrist-based device.

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SOLVE-IT: Socially Optimized Learning in Virtual Environments: A Web-Delivered HIV Prevention 3D Game Intervention for Young At-Risk MSM

Lynn Carol Miller, 1 Paul Robert Appleby, 1 Alexandra N Anderson, 2 Stephen J Read, 1 John L Christensen, 3 Stacy Marsella 1

1 University of Southern California, 2 Stanford University, 3 University of Connecticut

Abstract

Young men (18-24) who have sex with men (YMSM), especially men of color, are at high risk for contracting HIV. Most existing HIV prevention interventions focus on changing intervening cognitive and deliberative processes or outcomes (e.g., beliefs, norms, self-efficacy, intentions) to change behavior. Many MSM, however, guided by contextual cues in emotionally arousing scenarios, make more automatic risky decisions they later regret. One emotion in a sexual narrative that might precipitate more automatic risky choices for young MSM may be shame (e.g., in one’s sexual desires). But, HIV prevention interventions are not designed to reduce MSM’s shame. SOLVE (Socially Optimized Learning in Virtual Environments), as demonstrated by an NIAID RCT grant, used a sex-positive game to reduce MSM’s shame, increase traditional immediate cognitive outcomes, and reduce unprotected anal intercourse for young Black, Latino, and White MSM (18-24) over 3 months. Could interactive interventions be delivered more broadly over the web? In prior CHRP funded work, a SOLVE interactive video (IAV) intervention was streamed over the web throughout California. However, an IAV approach limits the amount of user interaction, risk challenges users receive, and intervention tailoring to MSM’s decisions. This is addressed using a nationally deliverable 3D animated intelligent agents/interactive digital storytelling game in UNITY. MSM design their own characters, make choices for them on dates and sexual interactions, and are scaffolded by the user character’s virtual future self (participant’s older chosen self-character) to enhance self-regulation when risky. The NIMH-funded SOLVE-IT game development process for young MSM is discussed. Results (N=876) from an ongoing 6-month randomized controlled trial (RCT) -- conducted nationally, over the web, are promising. They reveal greater initial shame reduction and cognitive variable increase (e.g., intention, self-efficacy, consideration of future consequences p’s <.01) for at-risk YMSM immediately following the SOLVE-IT game compared to the wait-list control group.
NightWatch 2.0: The Role of Mobile Phones in Malaria BCC

Abstract

Two years ago, as governments across Africa began ramping up delivery of mosquito nets, diagnostic tests, and malaria treatments, we asked ourselves: how can we ensure these investments in malaria control tools translate into malaria control behavior (and therefore, into malaria control success)? Our answer: NightWatch. The idea is simple: send out messages with a signature style – delivered by recognized local celebrities – through multiple media channels every night, reminding people to protect themselves from malaria.

Developed by Malaria No More and Lalela Project, the NightWatch program aims to increase the utilization of malaria control tools, such as mosquito nets, through a targeted communications campaign. NightWatch campaigns in Senegal, Tanzania, Cameroon, and Chad all began with radio and TV spots, but immediately expanded to reach individuals through their mobile phones with SMS reminders to sleep under a mosquito net. NightWatch SMS messages are free to subscribers – and to Malaria No More – thanks to generous in-kind donations by leading African telecoms. Mobile partners MTN (Cameroon), Airtel (Chad), and Tigo (Senegal) have generously sent SMS messages to over 10 million subscribers. The messages are distinguished from “spam” by coming from trusted sources – the companies themselves, the Ministries of Health, and celebrity spokespeople.

Our research shows that SMS is expanding the reach of NightWatch and impacting behavior. In Cameroon, the “K.O. Palu” (“Knock Out Malaria”) NightWatch program reached over 6.8 million adults. In a nationally representative survey (n=2,176 adults 15+) conducted in March/April 2012, 22% of all respondents recalled receiving an SMS and one or more other elements of the campaign (anthem, radio or TV ads), and 8% – representing over 875,000 adults – only recalled the SMS without other elements; 30% recalled some element(s) of the campaign but not SMS and 40% did not recall the campaign. Thus, SMS not only increased the reach of the campaign by 15% over what it otherwise would have been, but also reinforced the messages for a large portion of the total campaign audience.

Analysis of the link between NightWatch campaign exposure and malaria control behavior in the Cameroon 2012 survey data shows a strong impact of the campaign on net use. Cameroonian adults exposed to the campaign were 13% more likely to sleep under a net, and 24% more likely to have their children sleep under a net, than those not exposed. Even after controlling for other factors through propensity score matching analysis, K.O. Palu NightWatch exposure was associated with 7 percentage point higher net usage by adults (12 percentage point higher net usage by respondents’ children) in households with at least one net.

However, our research suggests that the added value of SMS is still limited. Analyzed on its own, exposure to SMS still had a positive impact on net use, but not as large or significant as the impact of the K.O. Palu anthem or the joint impact of NightWatch elements together. Therefore, we are focusing on next steps: how do we build on the early success of SMS to use mobile phones better, to make NightWatch more interactive and engaging?

We’ve already begun experimenting with more interactive and engaging ways of incorporating mobile phones into NightWatch. In Tanzania, audience members were encouraged to vote via SMS for winners in the televised 2011 Tanzanian Gospel Music Awards; of more than 3 million subscribers who received voting reminders with malaria messaging, 192,000 responded by voting – and received another malaria-themed message. But we want to go further – using pre-recorded voice messages from celebrities to reach illiterate phone users, linking our successful

Malaria No More

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malaria anthems to ring tones and call tones, having a presence on social media (accessed on mobile phones), and incorporating call-ins and SMS input into local radio programs.

With generous support from the IWG mHealth catalytic grant mechanism, funded by the Norwegian Agency for Development Cooperation (Norad) and implemented in partnership with the World Health Organization (WHO) and mHealth Alliance, Malaria No More will expand NightWatch mobile phone tools in Tanzania in 2013-2014. The lessons learned in Tanzania will then be used to enhance the mobile phone elements of NightWatch in other countries as well. Elements of the program that are successful in Tanzania can be rolled out with mobile phone partners in Cameroon, Chad, and Senegal. The results of the NightWatch mobile expansion will also be shared within the malaria control community to encourage adoption of interactive and engaging communication strategies by national malaria control programs.
Using Mobile Technology to Promote Healthy Behaviors in Teens

Misbah Mohammed,1 Meghan Searl,1 Khinlei Myint-U,1 Joseph Kvedar,1 Kamal Jethwani,1
1Center for Connected Health, Partners Healthcare, Boston MA, USA

Abstract

The prevalence of childhood obesity has more than tripled in the past 30 years. To combat this growing problem it is essential that public health interventions promote healthy eating and regular physical activity (PA). In March 2011 the Center for Connected Health (CCH) launched the Partners Step it UP program to 200 elementary students at two Boston schools. The health promotion program incorporates PA tracking using a pedometer, educational feedback relating to physical activity and a fun team-oriented foot race. This year the program expanded to 6 schools and 400 students. The program has met with huge success and CCH is currently exploring ways to modify the Step it UP program for use among high school students. As a first step in understanding the needs and preferences of this group, we conducted a focus group session with twenty-four 9th graders to understand what features they would want included in a health promotion program. Participants revealed that on average they text 300 times/day and would like this to be a way to engage in this program. Participants also provided useful feedback on the frequency of messages to send, how to frame messages and discussed the importance of competition and incentives to drive health behavior changes. These findings have provided CCH with a clear understanding of how to develop a health promotion program for this population. Thirty high school students will be recruited to participate in a 11-week pilot study. The participants will be divided into 2 groups based on their PA levels during Week 1 and will compete to earn points based on their PA level during the study. The purpose of this pilot study is to engage high school students in the program, increase and sustain students’ level of PA, and understand the role of team competition in promoting healthy behavior change.
UTILIZING mHEALTH RECRUITMENT & RETENTION STRATEGIES IN AN RCT WITH YOUNG CHILDREN WITH TYPE 1 DIABETES

ABSTRACT

Due to an increase in cell phone and email use in recent years, mHealth strategies are commonly used in research data collection and intervention delivery and provide increased flexibility for scheduling and completing assessments and treatment sessions. Dissemination of effective mHealth strategies is vital to their successful use in future studies. The goal of the current study was to examine the use of mHealth strategies in an ongoing RCT to promote parental management of type 1 diabetes (T1D) in young children and specifically explore recruitment/data collection completion/retention rates.

Primary caregivers of children with T1D who were fluent in English and had telephone access completed an eligibility phone screener, a pretreatment phone assessment, an in-person orientation session, 5 telephone-based program sessions, and 3 post-treatment phone assessments. mHealth recruitment/retention strategies included flexible scheduling of assessments/interventions, email communication, and frequent contact according to participants’ phone/email preference.

Of 285 recruits, 16 did not meet inclusion criteria. No recruits were ineligible due to lack of telephone access. The majority of eligible recruits (82.3%) agreed to participate and completed all phone sessions (85% of intervention and 98% of control participants). Most treatment/control phone sessions were completed as scheduled (73%); only 7% needed to be rescheduled more than once. Interruptions occurred for 24% of sessions, with the most frequent interruption being child-related. Of the 127 participants in the study’s follow up portion, over 90% have been completed.

For the current RCT, mHealth strategies encouraged high recruitment/retention in program sessions and follow up and resulted in few rescheduled/interrupted sessions. This may suggest that phone contact for assessment as well as intervention is a strong medium for consistent participant contact. Continuation of flexible contact and the extension of text message reminders, Skype intervention sessions, and online questionnaires may be desirable options for encouraging higher retention rates in future projects.
Use of parent consultants in a telehealth intervention for parents of children newly diagnosed with Type 1 diabetes

Management of type 1 diabetes (T1D) in young children requires significant parent effort and parents often report feeling overwhelmed following diagnosis. The current study examined the use of a novel mHealth component, parent consultant (PC) contact via telephone, to augment an ongoing randomized controlled trial for parents of young children recently diagnosed with diabetes. Pilot data are available on the PC development and training process and from 13 parents randomized to the treatment condition.

Four out of 5 parents who were invited to serve as PCs completed a 4-hour PC training with our team. All PCs (100% female; 75% Caucasian) had children diagnosed with T1D at a young age (M age at diagnosis=3.72 years; M disease duration=4.87 years). Usage and satisfaction data were examined from 13 primary caregivers (100% female; 76.9% Caucasian) of children age 2-6 with T1D (M age=4.85 years).

The 13 participants randomized to the treatment condition were offered optional PC telephone contact (up to 4 contacts) to augment the intervention (5 telephone sessions with a research counselor). All but one participant (92.3%) agreed to PC phone contact, and thus far, 7 participants (58.3%) have successfully connected with their assigned PC, ranging from 1-3 phone contacts. PC phone calls ranged from 16-60 minutes and covered a variety of topics including diabetes management, school concerns, nutrition, and sleep.

Satisfaction data suggest that use of a PC via an augmented mHealth strategy (telephone contact) is feasible, and can be a positive addition to behavioral interventions. Participants noted that PCs were ‘extremely helpful,’ with one parent commenting “I loved this”... component. Connecting with trained PCs with a shared history of parenting a young child with T1D may offer additional benefits to regularly used mHealth strategies by promoting parental adjustment to diabetes, quality of life, and child physical and emotional well-being.

Randi Streisand,1 Linda Herbert,1 Victoria Owen,1 Maureen Monaghan1
1Children’s National Medical Centre

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Use of Booster Calls in a Behavioral Intervention for Adolescents with Type 1 Diabetes

ABSTRACT

Behavioral interventions are commonly utilized to prevent declines in adherence and glycemic control among adolescents with type 1 diabetes (T1D). Mobile health strategies may maintain participant engagement and improve retention rates and outcomes in such interventions. The present study explored the use of booster calls (BCs; quick telephone check-ins), in maintaining participant engagement throughout an ongoing RCT for adolescents with T1D.

Data are available from 143 adolescent-parent dyads (Mchild age= 12.96 years) who were randomized to the treatment condition. Most adolescents were female (54%) and Caucasian (68%), and ninety-two percent of parents were mothers. Most were prescribed a basal bolus or pump regimen (75%), and average glycosolated hemoglobin (HbA1c) at baseline was 8.69%. Dyads participated in four treatment sessions designed to improve coping skills and promote medical regimen adherence. BCs were conducted one month after each session, and participants completed follow-up assessment 3 months after their final session.

Ninety-six percent of participants completed at least one BC; 29% completed all four. On average, 2.88 contact attempts were made per BC and completed calls lasted eight minutes. Adolescents on a basal bolus/pump regimen were more likely to complete BCs (p < .05); however, child age, gender, and A1c were unrelated to BC completion. Families who completed at least one BC were more likely to participate in follow-up assessment (p < .05). Overall, families reported that BCs were “somewhat helpful” (34%), or “pretty helpful”/“very helpful” (46%).

Many families participated in BCs and found them helpful, and completion of BCs was related to participant retention at 3 month follow-up, suggesting that this mHealth strategy may be a promising tool for improving participant retention and treatment outcomes in behavioral interventions. Further exploration of the use of mHealth strategies among adolescents with T1D participating in behavioral RCTs and their families is warranted.
mHealth: An Effective Education Channel for Hard-to-Reach Ethnic Minority Populations in Vietnam

Abstract

Lack of health knowledge and access primary health care services for hard-to-reach ethnic minorities is an issue in Vietnam. Recognizing unmet needs, Pathfinder International designed an innovative, culturally and linguistically appropriate mHealth intervention. The project was implemented in two provinces with the Ministry of Health’s (MOH) Central Health Information and Technology Institute (CHITI) as the main collaborating partner. Three messages in three languages were delivered through SMS and interactive voice response (IVR) channels, focusing on sexual and reproductive health (SRH), tobacco, and health insurance topics. The project measured client acceptance of the program to understand the value in MOH investing in scale up.

From November 2010 – 2011, two toll free numbers were created creating a database of 7,116 mobile phone subscribers. 2,313 subscribers received SRH messages; 2,073 received health insurance messages; and 2,730 received tobacco messages. The IVR system received 984 calls (67% male and 33% female). 547 SRH calls (56%), 143 health insurance calls (14%), and 294 tobacco calls (30%) were received. Of all IVR users, 44% were 15-24 year olds, highlighting youth as an important target group. Based on a rapid assessment, 57% of respondents reported increased adoption of safer sexual practices, 40% of smokers reported they smoked less and 13% reported they stopped smoking as a result of the program. 80-90% of IVR callers were outside of the target areas suggesting a broader reach of the intended intervention population. Key lessons learned include:

1. Government partnership and guidance is critical for ownership and sustainability in implementation, collaboration with mobile providers and developing appropriate marketing strategies.
2. Effective collaboration with multiple mobile operators is important for interoperability.
3. Further investigation of the IVR system to assess cost implications of callers outside of program areas.
4. Close follow up with government and other partners new to mHealth interventions is critical to build capacity and confidence to expand services.

Annexes:
1. Detailed description of recommendations
2. Final project report
Web-based Clinical Decision Support to Improve the Quality of Tobacco Use Treatment in Dental Clinics

Shelly Tseng, Jannat-Khan Hager

New York University School of Medicine

Abstract

Smoking remains the leading cause of morbidity and mortality in the United States. Dental providers have a credible and central role in providing tobacco cessation services. Controlled trials have demonstrated the efficacy and effectiveness of dental office-based cessation interventions. Yet adherence to well established tobacco use treatment guidelines in dental care settings is suboptimal. Clinical decision support systems (CDSS) are promising strategies for increasing provider adherence to guideline recommended care. However, there are no studies examining the use of CDSS to improve adherence to clinical guidelines for treating tobacco use and dependence in dental practice. We developed a web-based CDSS that offers dentists a simple algorithm for assessing smokers’ readiness to quit and prescribing the appropriate cessation medication. The purpose of this Agency for Healthcare Research and Quality funded research is to 1) test the feasibility of integrating the system into routine dental practice, 2) assess the usability and acceptability of the CDSS among dental professionals, and 3) to examine the preliminary effectiveness of the CDSS in improving dental provider adherence to treatment guidelines. To assess Aims 1 and 2 we will use qualitative interviews conducted with five dental providers per study site (n=30) and will analyze data user data collected from the website. For Aim 3 we will conduct pre and post intervention interviews with patients, after they complete their dental visit, to assess improvements in adherence to tobacco use treatment guidelines and patient satisfaction with the CDSS print materials. Findings from two sites indicate that providers believe this is an easy to use system and is saving them time and improving their confidence when addressing tobacco use. We will present additional findings at the meeting. This web based program has the potential to enhance the quality and consistency of tobacco use treatment in this important setting.
TAILORED SMS MESSAGING TO INCREASE EXERCISE IN CANCER SURVIVORS: A QUALITATIVE PILOT STUDY

ABSTRACT

BACKGROUND Exercise is recommended for cancer survivors, but we know little about increasing exercise in this population. Ecological momentary assessment (EMA) can help us understand behavioral processes by examining within day influences on behaviors. We used EMA to measure self-efficacy (SE) and positive and negative outcome expectations (OE+, OE-) each morning in order to tailor motivational exercise messages to participants and increase their daily moderate-vigorous intensity exercise minutes and steps.

METHOD Ten endometrial, breast and colorectal cancer survivors with a mean age of 58 (±9.2) participated in a 5-day pilot study, completing EMAs each morning and evening. Participants were provided with an Android smartphone with EMA and self-monitoring exercise applications and a pedometer. Based on the cumulative scores of SE, OE+, OE- and logic rules, up to 4 tailored, motivational messages based on Social Cognitive Theory (SCT) constructs were sent randomly throughout the day. Upon completion, a semi-structured individual interview was held to assess difficulties experienced, preferred features, and future directions.

RESULTS The daily exercise minutes and steps increased over the 5 days that participants used the program (p for linear trend = 0.018 and 0.055 for minutes of exercise and steps, respectively). Mean daily minutes of exercise increased from 19.4 on day 1 to 32.2 on day 5; mean daily steps increased from 5,957 to 7,085. 80% of participants said that they would be willing to use the program for 6 months or longer. Participants found the messages to be good reminders with useful content. Common themes included desiring a future version with goal setting, self-monitoring and feedback features.

CONCLUSION The preliminary data from this group of cancer survivors suggest that the use of technology to provide personalized motivational support for increasing exercise is an acceptable and feasible intervention and a formalized, expanded SMS-based exercise intervention should be developed.
A COMPUTER ADAPTIVE TESTING (CAT) APPROACH TO PATIENT REPORTED OUTCOMES (PROs) FOR MOBILE DEVICES

ABSTRACT

The NIH PROMIS system consists of validated measures and software for assessing a patient’s health status across physical, mental and social well-being domains.

Assessment Center, the accompanying software developed by PROMIS utilizes computer adaptive testing techniques that tailor respondent’s questions based on their previous responses. This results in reliable, flexible and precise scores with low patient burden when compared to traditional static PRO measures.

The software was written by developers at the Department of Medical Social Sciences (MSS) at Northwestern University Feinberg School of Medicine. It was initially designed as a turn-key solution for patient-reported outcomes research. In an effort to better target mobile devices, we have recently ‘wrapped’ the adaptive technology and workflow of Assessment Center in a REST API that permits developers and researchers to write applications for any connected mobile device.

This presentation will provide a background and history of the PROMIS measures, describe the REST API, demonstrate a smartphone application that utilizes the REST API and conclude with a look at the impact and future use of mobile applications that provide broader distribution of PROMIS tools.
Electronic Decision Support for Cardiovascular High-Risk Patients Management in Tibet, China

Maoyi Tian, Jiake Chen, Liqun Xu, Hao Chen, Ruilai Li, KaWing Cho, Yangfend Wu, Lijing Yan

The George Institute for Global Health, Beijing, China, China Mobile Research Institute, Beijing, China, Beijing Hospital, Beijing, China, Columbia University, New York, USA, Northwestern University, Illinois, USA

Abstract

BACKGROUND An electronic decision support (EDS) system in the health sector is a computer or smartphone based application used to assist clinicians in medical decision making. Community healthcare workers (CHWs) who usually have little professional training may particularly benefit from EDS to better equip them for community-based chronic disease care. To our knowledge, there are no studies in China on EDS for CHWs.

METHODS We will incorporate an EDS component in a cluster-randomized controlled trial currently being conducted in 23 villages in 2 counties in Tibet, China whose aim is to develop, pilot test, and evaluate a guideline-based yet simplified cardiovascular management program delivered by CHWs (also called village “doctors”) for high cardiovascular risk patients.

The EDS system is a smartphone-based application that aims to help CHWs better follow up and manage their high cardiovascular risk patients on a monthly basis during the 12 months intervention period. The application consists of prompts regarding patient’s medical history, new conditions, medication use, lifestyle habits, physical examination findings, and appropriateness for prescribing two types of CVD risk lowering medications (aspirin and low-dose diuretics). These monthly records from the cellphone can easily be uploaded by CHWs to a central server to generate key performance indicators and provide performance feedback to the CHWs to improve the quality of their care.

CURRENT STATUS The EDS application were supplied to all CHWs between May and June 2012 and will be used for about one year. Interim process evaluation on EDS will be conducted by October 2012 with final data collection by May 2013.

SIGNIFICANCE As the first study with an EDS component for CHWs to manage cardiovascular high-risk patients in China, this project provides an opportunity to evaluate the feasibility and effectiveness of this innovative technology in capacity building and medical decision support.
Twitter + Health: The psychosocial impact of short-form text-based messages on wellbeing

Abstract

Social relationships are one of the most well-documented psychosocial factors influencing physical and mental health. Benefits include decreased mortality and levels of distress, increased feelings of security, belonging, and self worth, and a source of regulation for maintaining healthy behaviors.

Over one billion people are a member of at least one online social network, designed to forge and maintain social ties, and 75% of the world’s population communicates through a mobile phone. This study quantifies how digital exchanges impact wellbeing and feelings of perceived social support among users. Hypotheses were tested using Twitter, the interactive microblogging service that is utilized on a mobile device by 300 million active users.

My research puts forth a new theory known as the theory of perceived companionship, concluding that short-form text-based communication presents unique affordances to facilitate the development of companionate relationships known to improve health. Hypotheses were tested with an online survey of 61 Twitter users, which evaluated network structure, expectations for interactions, and explicit reactions to digital correspondences along metrics known to boost wellbeing.

Results indicate that Twitter users are not directly connected through channels outside of Twitter but nonetheless accrue some personal benefit from interactions with these weak ties, especially during interactive exchanges such as retweets and replies. Reciprocal online interactions enhanced wellbeing for users, notably through a perceived boost when a tweet is acknowledged. In addition, subjects experienced feelings of heightened recognition, connectedness, and appreciation, especially in the retweet and reply scenarios.

By identifying digital interactions known to improve wellbeing, researchers and developers may employ these principles in order to configure interactions that consider the psychological impact of online use and advance its known benefits. The study underscores the influential role that interaction and social design plays in influencing user perception of digital conversation partners and community, which promotes engagement and impacts user wellbeing.
ABSTRACT

BACKGROUND Argentina’s treatment success rate remains well below the World Health Organization (WHO) TB key target of 85%, averaging 46% from 2008-2010. Few studies have applied mobile phone-based interventions for TB management. This study assessed feasibility, acceptance and explored the initial efficacy of a short message service (SMS)-based intervention to improve patient adherence and support TB patients in a setting where self-administration is the standard care.

METHODS Newly diagnosed TB patients were screened from November 2011 – September 2012 from a hospital-based outpatient clinic within a pulmonary specialized reference hospital in Argentina. Patients were randomized into control and intervention in a 1:1 allocation ratio in block randomization of 10. The intervention arm received standard of care plus a SMS-based intervention which included instructing patients to ‘text-in’ after self-administration of medication; reminders/check-in when patient did not ‘text in’; receipt of bi-weekly SMS education messages; and the option to consult during the first two month intensive treatment phase. Educational messages were selected based on the Informational-Motivational-Behavioral Skills Model. FrontlineSMS open-source software was used as the SMS platform. Semi-structured, in depth, individual interviews were conducted with 9 patients and 3 others responded to structured questions via text-messages. Outcomes of feasibility (e.g. number of potential participants with mobile phones), acceptability (e.g. participant and staff perceptions, type of messages) and initial efficacy (e.g. notification rates, sputum conversion) were assessed.

RESULTS Thirty-seven participants were enrolled from 122 screened, of whom 3 potential participants did not have access to a phone and 3 did not know how to send text message. Other feasibility issues included: varying mobile phone coverage (58% interviewed notified having some technical difficulties, e.g. missed sent/received messages), modem partially capturing data, feature limitations of FrontlineSMS (e.g. manual individual entry of each educational message, time stamp 2 hours early), computer security and challenges with infrastructure/staffing to track and bring patients who did not notify back to treatment. Most participants found intervention acceptable (82% would highly recommend to others), reported being “cared for” and “having a friend when all others wanted nothing to do with them” and that notifying made them feel that they were “responsible for their treatment”. Four participants were not included in final analysis (1 transferred care, 1 withdrew, 2 due to modem technical problems). Average notification rate (n=14) over 60-day period was 77% (22-100%), of those 83% (53-100%) notified without reminder. Running out of credit and technical difficulties were reported as reasons for missing notification. On average, participants texted in 2 questions (2-6) and 1.5 messages that reported side-effects (0-8). Only 15 (45%) had follow-up sputum smear or culture tests, the difference between groups was non-significant.

CONCLUSIONS Mobile phones and text messaging was prevalent among potential participants making intervention contextually appropriate in this setting. Intervention was largely accepted. Feasibility issues may be

Sarah Iribarren,1 Christina Chirico,2 Mirta Echevarria,2 Daniel Cardinali2
1University of Utah, College of Nursing, USA, 2Health Region V TB Program, Hospital Dr A Cetrangolo, Argentina
improved with adjunct programs to manage educational texts, free-to-text in number and strengthening infrastructure to trace and bring patients back to treatment. Treatment outcomes, such as sputum-smear or culture, testing is low. Further research is needed to evaluate this interactive intervention’s potential.
Improving health awareness through mobile based health messages in Bangladesh

Abstract

Background MAMA Bangladesh is poised to reach approximately 3 million pregnant women, new mothers and their families within 3 years of national scale service with voice (IVR) and text (SMS) messages and achieve sustained improvements in health knowledge, behaviors, and outcomes under the brand name “Aponjon” (meaning the ‘trusted one’). During a successful pilot phase, “Aponjon” served 1403 subscribers in a few selected urban and rural areas of Bangladesh. A core research team had evaluated various aspects of the service before large scale rollout at a national level.

Purpose Formative research attempted to evaluate and understand users’ acceptance level of the service, get closer understanding of willingness to pay for the service, understand role of community health workers and popular media campaigns in subscriber acquisition, analyze the mobile technology and regulatory landscape to run such an innovative mHealth service etc.

Method Formative research collected feedback from 359 subscribers through extensive in-depth interviews, phone surveys, field visits and system generated reports.

Results Receiving information through mobile phone was well accepted by women and gatekeepers. Women who were less educated chose to receive recorded voice messages while women who were educated chose text messages. Not all women had access to mobile phones, 41% of women depended on the handset of their family members. A significant number (53%) of gatekeepers opted to receive the service alongside the women. Families were following advice on immunization, nutrition, family planning, hygiene, breastfeeding and household healthy practices towards pregnant members, infants and mothers. Though trust on mobile content is high (91%) willingness to pay for mobile based messages is low across all socio-economic classes. Willingness to pay differs between women and gatekeepers; gatekeepers tend to pay more for the service as they control the phone bills.

Conclusion Inclusion of gatekeepers/important family members in the service is essential both from the perspective of sustained behavioral change as well as additional revenue generation. Engaging community agents is an effective way of registering the underprivileged women in rural Bangladesh. Longer term financial sustainability would depend on successful implementation of a potential business model which suggest alternative source of revenue generation and cross subsidies. Infrastructure to trace and bring patients back to treatment. Treatment outcomes, such as sputum-smear or culture, testing is low. Further research is needed to evaluate this interactive intervention’s potential.
Mobile phone ownership and widespread mHealth use in 168,231 women of reproductive age in rural Bangladesh

Alain B Labrique,1 Shegufta S. Sikder,1 Sucheta Mehara,1 Lee Wu,1 Rezwanul Huq,2 Hasmot Ali,2 Parul Christian,1 Keith West1
1 Department of International Health, Johns Hopkins Bloomberg School of Public Health. 615 N. Wolfe St., Baltimore 2 The JIVitA Maternal and Child Health Project. Godown Road, Poschim Para, Gaibandha Bangladesh

Abstract

As part of a rapid cross-sectional assessment of vital and health status among a cohort of approximately 650,000 people tracked under surveillance in a decades-long community research population, we sought to collect data on two critical mHealth indicators, in a typical rural South Asian setting. Between January and May 2012, field workers visited 143,239 households and interviewed 168,231 women of reproductive age. Of this, data on 37,979 has been entered, and is presented here. Women aged 15 to 45 were asked about household working phone ownership and their use of mobile phones during an emergency health situation (such as to call for medical advice, call a health provider, arrange transport, or ask for financial support). We found that 71% of surveyed women (n=25,577) reported household ownership of at least one working mobile phone, while 29% (n=10,577) of women reported none. Irrespective of phone ownership, 20% of all women surveyed (n=7,244) reported using a mobile phone for an emergency health situation. Of these women who used a phone for emergencies, 85% (n=6,169) owned a household phone. Women who owned phones were 2.8 times more likely (95%CI: 2.6 – 3.0) to use a phone for an emergency health situation than those who did not own phones. Surprisingly, household electricity was not a barrier to phone ownership or use, as only 23% (n=8,720) of surveyed women reported having electricity. In the absence of formal mHealth systems, nearly a quarter of women reported using a phone during an emergency health situation. This reflects a promising opportunity to harness these ubiquitous systems to inform, educate, and connect vulnerable women in rural populations to advice and care, when and where needed. mHealth interventions should still consider equity gaps that may persist in access to mobile phones in rural communities in South Asia, although ownership should not be a pre-requisite for access, given the current degree of penetration of mobile technology.
THE EFFECTS OF A mHEALTH INTERVENTION ON ASTHMA SYMPTOM CONTROL IN INNER-CITY TEENS

ABSTRACT

Smartphone based technology has emerged as a promising tool for facilitating behavioral change and promoting healthy choices. CHESS, an extensively investigated eHealth system designed to provide information, support, and decision making tools for individuals was adapted for smartphones and tailored for use by teens with a current diagnosis of asthma. The M-CHESS (Mobile asthma Comprehensive Health Enhancement Support System) application provided periodic asthma education, case management, an asthma action plan, and access to peers with the primary goal of helping the participants learn to better control their asthma symptoms.

218 inner-city adolescent Medicaid recipients were enrolled into the study. Participants were randomized to either a control group (n = 87) which received a smartphone and access to an asthma education website or to an intervention group (n = 131) that received a smartphone preinstalled with M-CHESS. Surveys – including the Asthma Control Test (ACT), a measure of how well an individual’s asthma symptoms are being managed – were administered throughout the intervention period to both the control and M-CHESS teens via the smartphones.

Initial analysis shows a significant effect of M-CHESS on the change in ACT scores across the first 60 days on study (p=.011). On average, the M-CHESS group showed a 2% improvement in ACT score per day of study over the control group. There was no significant difference between groups on the change in ACT score from month 2 to month 4. These results indicate that M-CHESS may be an effective intervention for teens who have trouble controlling their asthma symptoms. Ongoing analysis will examine whether the drop-off in improvement of symptom control is related to a decline in use of the M-CHESS application and attempt to identify specific subgroups for which M-CHESS may provide the greatest benefit in asthma symptom control.
A CROSS-LANGUAGE MOBILE RESOURCE FOR ACCESSING MEDLINE/PubMED BASED ON AN OPEN-SOURCE, CROWDSOURCED CONTROLLED MEDICAL VOCABULARY FOR THE PHILIPPINES

Raymond Francis Samiento,1 Fang Liu,1 Paul Fontelo1
1National Library of Medicine, National Institutes of Health, Bethesda, Maryland, USA

Using a standardized set of medical terminologies can help organize EMR content and facilitate patient care, follow-up and documentation in countries with many official languages. A controlled medical vocabulary of clinical terms from patient-provider encounters was developed from submissions of members of the medical community in the Philippines. Crowdsourcing may be useful for building standardized medical terminologies. It also increases awareness on MeSH, SNOMED CT and the UMLS.

INTRODUCTION
There is a need for a standardized set of medical terminologies to avoid loss of translational integrity of the chief complaint. A controlled medical vocabulary will be useful for a country like the Philippines which has eight major languages. Using the patient’s exact words of the chief complaint is crucial since it often leads to a diagnosis. This study describes the development of a cross-language tool in the Philippines using mobile devices.

METHODS
We announced a call through social media for submission of translations of medical terms. Healthcare personnel could either manually enter a medical term and its translation to one of the eight languages, or provide a translation of a MeSH term after selecting one from the following categories: Disease, Signs and Symptoms, Pharmaceutical Preparations, Health Occupations, Diagnosis, Therapeutics, and Other. Experts from the University of the Philippines Center for Filipino Languages (Sentro ng Wikang Filipino) will validate the translations. If a MeSH term has multiple submitted translations, the experts choose the best one from the entries.

RESULTS AND DISCUSSION
A standardized controlled medical vocabulary for the Philippines was developed using a mobile-friendly interface. To date, the database contains 2,447 translations. Filipino (29.87%), Pampangeno (13.11%) and Bicolano (13.04%) are the top three languages with the most translations. Current efforts are focused on validation and deduplication of translations. There is still a need to intensify crowdsourcing efforts to populate the database and to include translation of terms from the Core Problem List Subset of SNOMED CT.

CONCLUSION
A standardized medical vocabulary will be useful for integrating to patient information in the vernacular with EMR implementations. This will be also be useful for searching knowledge databases such as MEDLINE/PubMed for retrieving of journal citations. Crowdsourcing leverages the medical community around this effort in a highly mobile phone-using population. Future directions include linking the vocabulary to a database of reference images of medical conditions to enhance its usefulness as a clinical reference.
Evaluation of a SMS Medication Reminder System to Improve Medication Adherence in African Americans with Uncontrolled Hypertension

Abstract

African Americans are disproportionately more susceptible to Hypertension (HTN) than non-Hispanic Whites, which is a leading cause of cardiovascular disease. Poor adherence to prescribed medication regimens is a major contributor to HTN, as only about half of patients are adherent. Moreover, while the majority of HTN treatment is delivered in primary care settings, a sizable proportion of care is provided in the emergency department (ED), particularly within low income communities. Short Message Service (SMS) text messaging may offer a simple, non-labor intensive strategy for improving medication adherence among African Americans in both primary care and ED settings, as text message use within this population is widely integrated into everyday life, even among the lowest income levels. The goal of this evaluation is to determine intervention efficacy, as well as to establish the feasibility and acceptability of using an automated SMS intervention to improve medication adherence in African Americans with uncontrolled HTN in these settings.

We recently launched two randomized controlled trials (RCTs) of uncontrolled hypertensive African Americans in Detroit, MI; one with participants from primary care clinics, and one with participants from an ED. The primary outcome measure is change in medication adherence from baseline to one-month follow-up. Secondary outcome measures include changes in blood pressure and medication self-efficacy, participant satisfaction and acceptability, and feasibility of use in our target population. We have currently enrolled 9 participants in the primary care RCT and 7 participants in the ED RCT (target n=70 in each RCT) and preliminary evaluation results are forthcoming. Although the evaluation is ongoing, several lessons regarding the conduct of mHealth research within limited resource settings have been learned including overcoming recruitment and enrollment barriers, challenges associated with utilizing SMS-based interventions with low-income targeted mobile phone carriers, and strategies for retaining participants from baseline to one-month follow-up.
High Tuberculosis Treatment Adherence Obtained Using Mobile Phones for Video Directly Observed Therapy: Results of a Binational Pilot Study

Richard Garfein,1 Kelly Collins,1 Fatima Munoz1 Kathleen Moser,2 Paris Cerecer-Callu,3 Mark Sullivan,4 Ganz Chokalingam,4 Phillip Rios,4 Maria Luisa Zuniga,1 Jose Luis Burgos,1 Timothy Rodwell,1 Maria Gudelia Rangel,5 Kevin Patrick6

1UCSD, School of Medicine, Division of Global Public Health, San Diego CA 2San Diego County Health and Human Services Agency, 3ISESALUD, Secretaría de Salud del Estado de Baja California, 4UCSD, California Institute of Telecommunications and Information Technology, San Diego, CA, 5US/Mexico Border Health Commission, Tijuana, BC, Mexico, 6UCSD, Department of Family and Preventive Medicine, San Diego, CA

ABSTRACT

Over 8.8 million people become ill and 1.4 million people die annually from tuberculosis (TB). TB is treatable with antibiotics; however, poor adherence to daily medication regimens lasting >6 months promotes ongoing disease transmission, higher mortality, and development of drug resistance. “Directly observed therapy” (DOT) is recommended to minimize these problems. DOT healthcare providers watch patients take each dose of medication, hence DOT is costly, time consuming, invasive for patients, and is limited to patients who live near a health center. Informed by focus groups and expert opinions among patients and providers, we developed and pilot-tested a method called Video DOT (VDOT) whereby patients use mobile phones to record and securely transfer time-stamped videos of themselves taking their medications, which are then watched remotely by their provider. The study was conducted in San Diego, CA (n=43) and Tijuana, Mexico (n=9). To date, 38 patients have completed TB treatment using VDOT. Patient ages ranged from 18 to 86 years, 54% were male, and 77% were non-white. Overall, 90% and 97% of the expected videos were received on schedule from patients in San Diego and Tijuana respectively. Post-treatment interview responses were similar across cities. Patients and providers easily adopted the technology. Patients required only 3 training sessions on average before being able to perform VDOT independently. Overall, 89% of patients reported never or rarely having problems recording videos, 92% preferred VDOT over in-person DOT, and 81% thought VDOT was more confidential. All patients said they would recommend VDOT to other TB patients. Three participants were more compliant after switching to in-person DOT, suggesting the need for both DOT options. VDOT provides a promising mobile solution to the high cost and burden of in-person DOT for monitoring TB and other conditions that require strict treatment adherence.
Effect of Home Blood Glucose Telemonitoring with Self-Care Support on Glycemic Control in Pregnancy

Abstract

Gestational diabetes mellitus (GDM) and type 2 diabetes mellitus (T2DM) during pregnancy are associated with higher incidence of perinatal complications and neonatal death, and controlling blood glucose (BG) reduces these risks. We developed and piloted a home BG telemonitoring system without commercial support. BG readings from a Bluetooth-enabled glucometer are automatically transmitted by smartphone to application servers that immediately send results and self-care messages, based on pre-defined care paths, back to the smartphone. There was also a data viewing portal for both health care providers and patients. Nonadherence to the preset home BG measurement schedule automatically triggered a reminder to patients, and critical alerts were sent to patients and their health care provider. The present study tests the system’s effectiveness in a randomized controlled trial. Of 101 patients recruited, 81 had GDM (40 control, 41 test) and 20, DM2 (10 control, 10 test). GDM subjects in the test (telemonitoring) group demonstrated significantly better adherence to the BG measurement schedule (4 per day recommended) being 3.7 readings per day compared to 3.3 in the control group (p=0.014). The average BG value in the T2DM group was significantly lower in the test vs. control group (5.9 mmol/L vs. 6.1 mmol/L, p<0.0007). In a multivariate analysis adjusting for other covariates (day, BMI, weight gain, mothers’ age) the test group continued to have significantly lower BG values (p=0.0024). Because of the small sample size, health outcome measures including birth weight and incidence of perinatal complications showed no significant between-group differences. This study demonstrated that home BG telemonitoring with self-care support improved adherence to home BG measurement schedule in the GDM group and better BG control in the T2DM group. These benefits should result in improved health outcomes, but will require a large study population to show an effect. (Supported by unrestricted grant from the Ontario Ministry of Health)
Effect of Home Blood Glucose Telemonitoring with Self-Care Support on Glycemic Control in Pregnancy

AG Lagain,1 DS Feig,2 R Fung,3 I Bahinskaya,4 D Ng,5 P Picton,6 JA Cafazzo6

1Prosserman Centre for Health Research, Samuel Lunenfeld Research Institute of the Mount Sinai Hospital
2Departments of Medicine of the Mount Sinai Hospital and University of Toronto
3Department of Medicine, Toronto East General Hospital
4Institute of Health Policy, Management, and Evaluation, University of Toronto
5Institute of Biomaterials and Biomedical Engineering, University of Toronto
6Centre for Global eHealth Innovation, University Health Network, Toronto, Ontario, Canada

Abstract

The Office of Cyber Infrastructure and Computational Biology (OCICB) of the National Institute of Allergy and Infectious Diseases (NIAID) at the NIH has been developing a solution that complies with current guidance frameworks and regulatory requirements while leveraging the potentials offered by mHealth technologies for data collection. OCICB has designed an mHealth solution that maps to the paper processes developed over the past century for clinical research. We designed the system for use in regions of low to middle-income countries where the patients often have no other clinical record. For our pilot, we selected a natural history study that does not have the same regulatory requirements as an Investigational New Drug (IND) study. We retained our existing paper-based clinical data capture management system in order to compare quality control reports between paper-based and mobile electronic capture methods. The solution complies with regulatory frameworks and requirements such as Good Clinical Practices and 21 CFR Part 11, which requires full audit trails of the data collection process at the source and the validation stages. It also provides the capacity for workflows that support the data validation process within the field research framework. We expect to show that the accuracy of data collection improves using mobile source data collection. This will reduce the time and cost of validating the collected data before final analysis for clinical research while maintaining the regulatory framework that protects patient interests. The solution will further provide clinical monitors with the ability to remotely access the source data and thus reduce the cost of travel for monitoring as well as reducing the impact on patients due to mistakes made while entering the data.
Effect of Home Blood Glucose Telemonitoring with Self-Care Support on Glycemic Control in Pregnancy

Christopher Whalen

1Office of CyberInfrastructure and Computational Biology, National Institute of Allergy and Infectious Diseases, NIH

Abstract

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ABSTRACT

BACKGROUND Computer-based HIV education has been shown effective and is preferred over counselor-delivered education. Previous studies have shown significant increases in risk-reduction behaviors after participation in a computerized HIV risk reduction (HIVRR) intervention. Whether delivery of mobile HIVRR (mHIVRR) education via smartphone is also effective at increasing knowledge and decreasing risk behavior has yet to be determined.

PURPOSE To develop and deploy an interactive mHIVRR software program to deliver HIV/STD education on smartphones and determine whether it reduces HIV/STD-related risk via increased HIV/STD knowledge.

METHODS We developed mHIVRR modules using video components of pre-existing evidence-based programs. Each module consists of a 5-10-minute video component followed by an 11-item usability/acceptability questionnaire and a 3-item knowledge questionnaire. New modules were downloaded onto smartphones weekly. Participants completed questionnaires after each viewing of ≥75% of the video component. Prior week modules were moved to the “Library” and available for repeated viewing. Acceptability of mHIVRR modules was defined as a median score of ≤2.5 (1-very easy/effective to 5-very hard/not at all effective) for each usability/acceptability question. Effectiveness was defined as ≥80% of participants scoring >65% on the knowledge questions.

RESULTS 78% of video modules attempted were completed. Average usability/acceptability questionnaire responses were all ≤2.5 (range 1.3 to 2.1). Video module length was “just right” according to 72% of participants. Only 16% thought the mHIVRR module information would have been better suited for printed material and 28% for computer-based delivery. 25% of participants would have preferred a text-based smartphone module compared to the video-based smartphone module. 100% of participants scored >65% on the knowledge questions, with an average overall knowledge score of 82%.

CONCLUSIONS Video-based mHIVRR education delivered via smartphone appears to be acceptable, and may increase HIV/STD risk reduction knowledge. Future studies, with pre-intervention assessments of knowledge, are needed to confirm these findings.
Evaluation of a Mobile Diabetes Self-Management Platform: A Pilot Case Study with Pediatric Users

This study summarizes a multidimensional, scalable pilot evaluation of a diabetes self-management platform combining mobile technology with social networking to capture four key metrics of diabetes self-management, associated social interactions, and gaming features providing targeted feedback to 8 pediatric users. Based on their 2-month interaction with the application, we analyze click-stream data from interactions, key metrics, text comments, and usability and satisfaction surveys to evaluate engagement with the platform and effectiveness in controlling blood glucose.

INTRODUCTION

According to the American Diabetes Association, increasing pediatric obesity leading to diabetes requires effective interventions to be designed and implemented to counteract the long term negative health outcomes and high costs associated with the disease. Market growth for mobile applications to facilitate chronic disease management has resulted in increasingly innovative solutions, including social media, to increase compliance with best practices and engagement with disease self-management. Recognizing the cost savings potential and opportunity for improvements in health status for diabetes patients through wide spread adoption and use of a diabetes self-management mobile application, Patient Health Recording for Quality of Life (PHRQL) has developed a unique application for smart phones that offers an innovative platform for recording and capturing essential diabetes self-management information while also continually engaging users through social networking and gaming components. Eight pediatric users were enrolled in a pilot study to evaluate PHRQL along three key dimensions of product, process, and program, to assess and understand the usage, effectiveness and value of the platform [1].

METHODS

Product evaluation assessed the usability and functionality of the application via benchmarking and technology assessment. Process evaluation mapped the status quo and desired process models underlying the use of PHRQL and measured impact of the application on the self-management habits of a user, while also developing a "best-practice" use model for the application. Finally, the program evaluation assessed the overall value of PHRQL in controlling diabetes along two different dimensions - user engagement and effectiveness at lowering blood glucose variability. We analyzed click-stream data of user interactions with the application, their documentations of key metrics and sharing of this information with peers via social networking and gaming using descriptive statistics, first order Markov models, and multidimensional scaling and annealing methods.

RESULTS

The product evaluation identified game mechanics and social media features as key factors driving user engagement. The process evaluation detected high variability in users' interactions with the application and a lack of compliance with best practices, likely due to the short time span and small number of participants, but a reassuring trend towards better self-management habits over the duration of the study. Due to the limited number of study participants, while the program evaluation could not conclusively demonstrate that PHRQL usage decreased users’ blood glucose levels, positive trends were observed in user engagement and blood glucose variability, and increased satisfaction with their diabetes management. Ongoing studies with a larger user population will use this framework to draw actionable insights about the use of the application as an intervention and self-management tool with pediatric as well as adult users.
Acknowledgement

We are grateful to the entire PHRQL team for the opportunity to study this innovative platform.

References

TAILored Rapid Interactive Mobile Messaging (TRIMM) for Weight Management Among Underserved Adults

ABSTRACT

BACKGROUND While obesity continues to escalate as an important clinical and public health problem, it remains a challenge for physicians to help obese patients lose weight. Most existing therapeutic options are limited in impact due to cost and accessibility.

PURPOSE Our purpose was to develop a cost-effective, proven, and scalable obesity intervention that can be deployed as a sustainable treatment option for obesity.

METHODS We designed TRIMM as an automated, 6-month text message program that tailored itself in two main ways to offer individualized interaction and content for weight control. First, we targeted relevant behaviors at the opportune times by personalizing the program to each individual’s weight control challenges and daily routine. Second, we engaged participants with daily interactive messages that asked participants a question regarding their weight, motivation level, or health behavior. Upon receiving a participant’s response, we delivered finely-tailored feedback automatically, promoting accountability and self-monitoring. The study is a two-arm randomized controlled trial of 118 overweight or obese adults recruited from inner city Baltimore churches. With the control group, we aimed to capture the standard care for an obese patient. Participants in this group received an initial clinic assessment and follow-up at months 3, 6, and 12 at the Johns Hopkins Weight Management Center. The intervention group received daily TRIMM text messages in addition to standard care.

RESULTS We have captured our primary outcome data, 6-month weight loss, and we’ll share our preliminary analyses here. Complete case analysis (42% of participants) indicates that the TRIMM group achieved more weight loss than the standard care group (8.0 lb vs 1.3 lb, p<0.03). The TRIMM group also achieved greater percent body weight loss (3.7% vs 0.6%, p<0.02). Participant engagement with TRIMM, as measured by the percentage of days in which a participant responded to the daily interactive messages, averaged at about 60%. Each additional percentage of engagement predicted about an additional 0.25 lb weight loss at 6 months. Participant satisfaction with the 6-month TRIMM program averaged at 4.4 on a 5-point scale. Final results from this study will be available early spring 2013.

CONCLUSIONS Our small pilot study has limitations. The duration of the TRIMM program was only 6 months, and our study population was recruited exclusively from Baltimore churches. While 80% of participants returned for the intended 6-month follow-up, this trial had low rates of follow-up occurring within our protocol defined 6-month window due to challenges in scheduling of the follow-up visits during clinic hours and participants’ transportation to the clinic; this resulted in an underpowered study. For those participants who returned for their 6-month follow-up visit on time, our entirely automated program (that requires no personnel efforts beyond enrollment) resulted in significantly more weight loss when added to standard care. And, we observed encouragingly high levels of participant engagement and satisfaction with TRIMM. These results suggest that TRIMM can help some fraction of overweight and obese individuals lose weight. TRIMM’s low cost (< $1/week for an individual), scalability, and reach (no smartphone required) further supports its potential as a tool in the battle against obesity.
The study was funded by a McKesson Foundation Mobilizing for Health grant. The authors conduct research at the Johns Hopkins Weight Management Center.
- Michael K. Lin is a Johns Hopkins medical student on hiatus and is supported by the Doris Duke Clinical Research Fellowship. Disclosures: team member, Reify Health, LLC.
- Lawrence J. Cheskin, MD is Associate Professor of Health, Behavior & Society at the Johns Hopkins Bloomberg School of Public Health and Director of the Johns Hopkins Weight Management Center. Disclosures: Stockholder, Scientific Advisory Board member, Medifast, Inc; stockholder, National Advisory Board member, Vivus, Inc.
Tailored Rapid Interactive Mobile Messaging (TRIMM) for Weight Management Among Underserved Adults

ABSTRACT

BACKGROUND Smoking rates are higher among young adults, especially in Quebec where 30% of 18-24 year-olds smoke. In 2010-2011, the Canadian Cancer Society (CCS) Quebec Division launched Phase I of SMAT (Service de Message texte pour Arrêter le Tabac), which utilized proactive and reactive text messaging to promote cessation. Based on the success of Phase I, CCS Quebec launched Phase II in December 2011 adding live expert text chat.

PURPOSE To test feasibility and outcomes of a proactive and reactive text messaging smoking cessation service including live text chat support by trained Quit Specialists.

METHODS Text and Chat Integrated (TaChI) enabled telephone Quit Specialists to simultaneously coach multiple participants.

RESULTS Out of 994 participants 51% were male (n=508). 40.5% (n=403) were between 18-24 and 22.1% were full time students. On average, participants smoked 17 cigarettes per day for 12.3 years. A total of 42,613 algorithm-based proactive messages were sent to participants.

65% (n=651) of participants used the reactive keyword text service, with equal usage by men and women. Keyword users tended to be younger (28 years) than non-keyword users (34 years), with the most popular keywords “distraction”, “envie” (translation: craving), and “stress” sent 825, 791 and 690 times, respectively. A total of 1,099 text-chats occurred, with 38% (n=374) using the text-chat service at least once. Slightly more women 52% (n=196) than men 48% (n=178) chatted with a Quit Specialist. Complete self-report cessation data is being collected. To date, 28% of respondents (8% of total participants) indicated via text survey that they had quit smoking.

CONCLUSIONS Interactive features of the SMAT program (reactive messaging and text chat) were especially engaging, particularly among younger demographics. In order to remain relevant and efficient, cessation services must quickly react to the rapid adoption of new technological modalities. Limitations and future directions will be discussed.
Using social networking technologies for mixed methods HIV prevention research

ABSTRACT

BACKGROUND Rapid growth in social networking usage, especially among at-risk populations, enables these technologies to be used as tools for mixed (qualitative and quantitative) methods HIV prevention research. We seek to analyze quantitative and qualitative data from a study-recruited social networking group to determine 1) participants willingness to use social networking technologies for HIV prevention research, 2) the topics and content discussed on social networking groups, and 3) the relationship between online discussions about HIV-related behaviors and actual HIV behavior change, among men who have sex with men (MSM).

METHODS Participants, primarily African American and Latino, were invited to join a “secret” Facebook group where participation was voluntary. Peer leaders, trained in HIV prevention, posted HIV-related content. Participant public group conversations were qualitatively and thematically analyzed. Multivariate quantitative methods tested associations between qualitative data, participants’ demographic information, and likelihood of requesting a home-based HIV testing kit.

RESULTS Latino and African-American participants (N=57) voluntarily used Facebook to discuss the following HIV-related topics (N=485 conversations): Prevention and Testing; Stigma; Knowledge; and Advocacy. Older participants more frequently discussed Prevention and Testing, Stigma, and Advocacy, and younger participants more frequently engaged in HIV Knowledge-related discussions. The proportion of messages related to Prevention and Testing and HIV Stigma increased during the course of the study. Results showed that participants posting about HIV Prevention and Testing (compared to those who did not) were significantly more likely to request an HIV testing kit (OR 11.14, p = 0.001).

CONCLUSIONS Social networking technologies are engaging platforms that can be used for increasing HIV prevention-related conversations behaviors. Data from these technologies can be analyzed used both qualitative and quantitative methods.
Are We Sure That Mobile Health Is Really Mobile?

Brie Turner-McGrievy, Deborah Tate

Department of Health Promotion, Education and Behaviour, Arnold School of Medicine, University of Southern California

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Abstract

The “m” in mHealth is often thought of as the ability to receive health information and monitor behaviors on the go. The term “wireless” stands in for smartphones, tablets, etc. that can travel through time and space; while “wired” is the traditional desktop access method. Little is known about how people actually use mobile vs. traditional access methods. This study examines the results of 2 mobile weight loss interventions (Pounds Off Digitally (POD 1 and 2)) where participants were required to own a mobile device (POD1: Mp3 player; POD2: smartphone) for study entry and received weight loss information delivered via podcast. In POD1, participants were randomized to theory-based podcast (TPB) (n=41) or general weight loss podcast (n=37) conditions. In POD2, participants were randomized to either TPB (n=49) or TPB+mobile (a diet/PA app and Twitter app) (n=47). Examining data from both studies in aggregate, despite a mobile delivery method, 75% of participants accessed the podcasts at their home or work, 65% were sitting when listening, and 55% used a non-mobile device to access the podcasts (desktop computers). Examining objective download data for POD2, 49% of downloads (2889/5944) originated from non-mobile delivery methods (e.g., QuickTime) vs. mobile platforms (3055/5944). At 3 months, 46% of posts to Twitter originated from the web site (n=665 posts) vs. an app (n=540; 38%) or dashboard tool (e.g. TweetDeck) (n=233; 16%). Combining POD1 and 2, use of a mobile device for podcasts access was not related to % weight loss or podcasts downloaded at 3 months, but number of podcasts downloaded was related to % weight loss ($\beta=-0.13; P<0.01$). In conclusion, providing people with multiple platforms may be more important than providing only mobile options. Future studies should examine why people choose wired over wireless methods and how we can tailor delivery method to optimize use.
A Qualitative Analysis of Emergency Department Patients’ Experiences with TExT-MED, a Text-message Based mHealth Program to Improve Diabetes Management

Elizabeth Burner,1 Sanjay Arora,1 Elena Taylor,2 Michael Menchine1
1Keck Medical School of USC Department of Emergency Medicine 2USC Memory and Aging Center

ABSTRACT

BACKGROUND In the United States, diabetes plagues Latinos, and their diabetes can be difficult to manage due to cultural, language and access barriers. The extent of benefits from mHealth technologies to improve the management of diabetes among low-income Latinos is currently unknown. Understanding the complex changes to self-efficacy and health beliefs can be difficult to measure quantitatively, especially in minority populations were traditional health belief models may not translate well culturally.

METHODS A text-messaged based educational and motivational program designed to improve disease knowledge, self-efficacy and glycemic control among low-income, inner-city Latinos was piloted for feasibility. Self-efficacy, diabetes knowledge and frequency of healthy behaviors were measured at the start and end of the trial. Focus groups were then convened to explore patient experiences with the program, and the program’s impact on patients’ self-efficacy and health beliefs. The findings of these sessions were used to reanalyze the quantitative data measured previously in the study.

RESULTS 23 patients were recruited for the feasibility study. Through qualitative analysis, we found that men and women had different information sources and differing self-efficacy towards diet management. Using this knowledge, the quantitative data gather was stratified by gender, and differential changes were noted between genders in diabetes knowledge, self-efficacy and healthy food choices.

CONCLUSIONS Men and women have differences in self-efficacy towards diet management and information sources. These differences may affect the effectiveness of mHealth interventions to improve diabetes. Gender and culture should be considered when designing interventions to achieve maximal impact.
**Prescribe Wellness Automated Digital Intervention (ADI) Effectiveness to Increase Medication Adherence**

**ABSTRACT**

Medication non-adherence is pervasive within all areas of the U.S. health care system. Non-adherence has been estimated to range between 17 and 80%: involving 38% of patients on short-term treatment, 43% of patients on long-term treatment, and 75% of patients instructed to make a lifestyle change (DiMatteo, 1994). Approximately 133 million Americans, almost half of the country’s population, live with at least one chronic disease (CDC, 2010). It is estimated that by 2020, 164 million people will be diagnosed with a chronic disease, and 24% of all Americans will have two or more chronic conditions (CDC, 2010). Improving medication adherence can have a great potential to contribute to effective chronic disease state management and overall better health outcomes.

PrescribeWellness, LLC partnered with leading local pharmacies in the Greater Los Angeles area to create a supplemental Automated Digital Intervention (ADI) to be used with patient-centered Medication Therapy Management (MTM) sessions. This proprietary first generation ADI template, aimed to increase medication adherence through the pharmacy’s intervention process, sends out appropriate motivational, behavioral, and educational messages through timely and relevant communications using the Voice of Authority (VOA).

The purpose of this quantitative study was to determine whether a relationship exists between the PrescribeWellness’ ADI and patient medication adherence. The relationship between variables was examined by implementing descriptive statistics and Chi-squared analysis. Pharmacy patients (n=12) were taken through a standard MTM session followed by ADI voice messaging during the subsequent 90-day period. Results showed there was an association between PrescribeWellness’ ADI and patient medication adherence, as medication adherence rates increased from 66.7% to 85.7%. Additional findings showed there was an increase in adherence rates for those patients with chronic conditions of hyperlipidemia (60% to 93.3%), hypertension (76.2% to 90.5%) and diabetes (47.6% to 57.1%).
RESULTS OF COMMUNICATION ENHANCEMENT USED IN eIMCI DECISION SUPPORT FOR THE TREATMENT OF CHILDREN UNDER FIVE IN TANZANIA

Seneca Perri¹, Bethany Hedt², Thomas Routen³, Amani Shao⁴, Clotilde Rambaud-Althaus⁵, Ndeniria Swai⁶, Marc Mitchell²

¹University of Utah, Salt Lake City, UT, United States, ²Harvard School of Public Health, Boston, MA, United States, ³Thingsprime, Freiburg, Germany, ⁴National Institute of Medical Research, Dar es Salaam, United Republic of Tanzania, ⁵Swiss Tropical and Public Health Institute, Basel, Switzerland, ⁶City Medical Office of Health, Dar es Salaam, United Republic of Tanzania

ABSTRACT

The use of standardized decision support protocols have been shown to improve the quality of health service delivery in pediatric patients of low-resource populations if appropriately followed. However, even when clinical services are good, low levels of health literacy levels among caretakers of children may compromise the fulfillment of treatment plans. This study examines whether the use of mobile technology can improve the impact of counseling of children’s caretakers and result in better understanding of what needs to be done at home after the clinical visit and whether this results in better care of the child.

Utilizing mobile technology, we attempted to address the gap in communication during pediatric health care visits by incorporating specific, customized communication prompts into an eIMCI mobile decision support protocol. We utilized a randomized cluster design to include 310 participants from six municipal clinics in Dar es Salaam, Tanzania. The test arm of the study (electronic arm) included a 25-second video formatted for the mobile phone aimed at educating caretakers on relevant health information, embedded prompts within the protocol containing important messages for caretakers, and a customized summary screen compiling the results of the clinical encounter. The control arm (paper arm) provided equivalent information to the electronic counseling messages in written text as part of the protocol. The counseling delivered by health workers and resulting caretaker knowledge were evaluated by an observer and a short questionnaire of the caretakers after the clinic visit. Our research demonstrated that clinicians provided significantly more counseling to caretakers when using the electronic mobile protocol and caretakers were overall better able to recall what they were supposed to do when they returned home. We believe these results are highly valuable to the greater mHealth community seeking to improve the chain of health service delivery for low-resource populations.
SMS Text Messages to Monitor the Coverage during Polio Supplementary Immunization Activities in Karachi, Pakistan

Abstract

Background
Karachi is the only major city in the world that has not been able to interrupt wild type polio transmission. Supplementary Immunization Activities (SIAs) are an important tool by which countries have sought to increase polio immunization coverage. However, more than 50 SIAs have so far failed to interrupt the transmission of poliovirus in Karachi. Cell phone use has seen a tremendous rise in Pakistan with more than 110 million subscribers. In this study, we are using the wide network of cell phone to monitor the coverage rates during SIAs in Karachi, Pakistan.

Methods
3535 children less than 5 years old from all over Karachi and three high risk towns where included in the baseline data. The baseline survey included information on basic demographics, short message service (SMS) language preferences and household’s GPS coordinates on a smart phone. After each SIA, a randomly selected 840 households are contacted via SMS inquiring if the vaccinator came to their house and whether their child received vaccine dose or not. In case there is no reply by SMS, same information is captured by phone call. The study will continue till 2013.

Results
A total of 3562 children consented for the baseline study. Out of 840 SMS sent after the first second and third SIA 62 (7%), 189 (23%) and 158 (19%) respectively replied to the SMS. 561 (67%), 374 (44%) and 394 (47%) respectively replied to phone call and 217 (27%), 277 (33%) and 288 (34%) respectively did not reply to SMS or phone call.

Conclusion
The coverage data obtained through the SMS text and phone call replies matches with the data collected through ground team monitoring and other methods like LQAs. SMS based surveillance can be a way to determine population level coverage of polio immunization in a very short time period and this system can be upgraded to country level.
Use of SMS text for Maternal and Child Health Surveillance in resource constrain setting

Abstract

Background Department of Paediatrics and Child Health, Aga Khan University, Karachi, conducts active demographic surveillance system (DSS) for maternal and child health at a peri urban site of Karachi, covering an area of 8.1 sq. miles and having a population of around 275,000. The maternal mortality rate (MMR) is around 200 per 100,000 live births. There are around 300 neonatal and 150 post neonatal deaths in the study catchment area. We introduced a two way SMS based pregnancy and birth registration system in the surveillance catchment area.

Method Community health workers (CHWs) visit household on quarterly bases in the study catchment area to identify new pregnancies and follow the pregnant woman until their pregnancy outcome. As soon as CHW identifies a pregnant woman, she sends a SMS message to the server. Based on this registration, system generates follow up details of each pregnant woman; giving priority to third trimester. Once live birth identified CHW sends a SMS to the server which alerts the team to examine the neonate.

Results This system helps in early identification and monitoring of pregnant woman and newborns. Also by sending unique structure identifier through SMS to the server, our CHWs and study staff can get desired information of the pregnant woman and children less than 5 years of age in the study surveillance area.

Conclusion Through SMS registration we have an extra layer for identifying maternal death and pregnancy outcome. Identifying a woman / child information through SMS is also quite helpful.