Implementation of a Mobile Health Contraceptive Decision Support Tool for Latina Adolescents in School Based Health Centers

Authors:

Kathleen Tebb, PhD, University of California San Francisco, Phone: 707-290-7829, Email: Kathleen.Tebb@ucsf.edu;

Sang Leng Trieu, DrPH, The Los Angeles Trust for Children's Health, Phone: 213-440-3144, Email: sang@thelatrust.org;

Rosario Rico, MPH, The Los Angeles Trust for Children's Health, Phone: 213-241-3511, Email: Rosario@thelatrust.org;

Robert Renteria, The Los Angeles Trust for Children's Health, Phone: 213-241-3511, Email: Robert@thelatrust.org;

Felicia Rodriguez, MA, University of California San Francisco, Phone: 415-514-1754, Email: Felicia.Rodriguez@ucsf.edu;

Maryjane Puffer, BSN, MPA, The Los Angeles Trust for Children's Health, Phone: 213-241-3846, Email: maryjane@thelatrust.org
Background

Health care providers are a trusted and accurate source of sexual health information for most adolescents. Further, clinical guidelines recommend that all youth receive comprehensive, confidential sexual health information and services. However, these guidelines are followed inconsistently. Providers often lack the time, comfort and skills to provide patient-centered comprehensive contraceptive counseling and services. There are significant disparities in the provision of sexual health services for Latino adolescents, which contributes to disproportionately higher rates of teenage pregnancy. To address this problem, we have developed Health-E You/ Salud iTu, an evidence-informed mobile health (mHealth) application (app) to provide interactive, sexual health and contraceptive information and individually tailored, patient-centered, contraceptive decision support in English and Spanish. It is designed to be used in conjunction with a clinical encounter to increase adolescents, at risk of pregnancy, access to patient-centered contraceptive information and services. Based on user input, the app provides individually tailored contraceptive recommendations and asks youth to indicate what method(s) they are most interested in. This information is then shared with the provider prior to the face-to-face portion of the visit. In this way, the app prepares youth for the visit and acts as a clinician extender to support the delivery of health education and enhance the quality of patient-centered sexual health care. Despite the promise of this app, there is limited research on the integration of such mHealth interventions into clinical practice.

Objective

The purpose of this manuscript is to describe efforts used to support the successful adoption and implementation of the Health-E You/ Salud iTu app in clinical settings and to describe implementation facilitators and barriers encountered to inform future efforts aimed at integrating mHealth interventions or other computer applications into clinical settings.

Methods

This study is part of a larger, cluster randomized control trial to evaluate the effectiveness of Health-E You/ Salud iTu on its ability to reduce health disparities in contraceptive knowledge, access to contraceptive services and unintended pregnancies among sexually active Latina adolescents at 18 school-based health centers (SBHCs) throughout Los Angeles County, California. App development and implementation was informed by the theory of diffusion of innovation, PCORI principles of engagement and iterative pilot testing with adolescents and clinicians. To assess implementation, the research team used multiple sources of data to identify facilitators and barriers including: monthly conference calls, monthly site visits, and quarterly in-person collaborative meetings.

Results

The implementation approaches used in this study enhanced the development, adoption and integration of Health-E You into SBHCs. Despite success, there were a number of implementation challenges that are important to understand when integrating mHealth interventions into clinical settings.
Conclusions

This study provides important insights that can inform and improve implementation and integration efforts for future mhealth interventions.

This study is registered with the United States National Institutes of Health. Trial ID: NCT02847858

This study is funded by the Patient Centered Outcomes Research Institute (PCORI) contract number AD-1502-27481 (https://www.pcori.org/). The statements presented in this publication are solely the responsibility of the authors and do not necessarily represent the views of the Patient-Centered Outcomes Research Institute (PCORI), its Board of Governors or Methodology Committee.

Acknowledgements

The authors would like to thank the following people and institutions for their contributions to implementing this research: female youth from the Monroe High School Health Squad and Hollywood High School Planned Parenthood Los Angeles Peer Health Advocates for their input on the application and contributions to creating multimedia; students from other Los Angeles area high schools who provided feedback to the research team; participating wellness and school based health centers; Rebecca Dudovitz MD and Veronica Mesheriakova for their support in pilot testing the app and providing ongoing consultation. We would also like to acknowledge the contributions of all members of the investigative team including: Drs. Loris Hwang, Claire Brindis, Lance Pollack, Sally Adams, and Elizabeth Ozer. The Ahmanson Foundation funded the purchase of iPads on which the computer application was distributed.
Introduction

Despite the widespread use of mobile technologies (smartphones, tablets, and computers) among adolescents, and the rapid proliferation of mobile health (mhealth) applications, few studies have examined how to implement and integrate such technologies into clinical settings. Adolescents use computers and access the internet more than any other age group [1] and the use of computers to deliver behavioral health interventions is rapidly expanding [2-5]. Further, computer-based sexual health risk assessments have been found to be acceptable to adolescents and to improve the disclosure of sexual health risk behaviors [3-7]. They have also been found to address psychological aspects of behavior in ways that teens perceive to be less judgmental than advice from a health educator or clinician [7]. However, interventions to inform adolescents’ selection and use of effective contraceptive methods are much more limited. There are a few web-based contraceptive decision support tools designed to improve adolescents’ and young adults’ knowledge and use of contraceptives [8-10]; however these web-based programs require a user to take the initiative to seek-out these resources and according to our pilot testing efforts, adolescents perceived them to be more suited for older, young adults. In addition, most Latino and heterosexual adolescents do not actively seek out sexual health information online [11]. Furthermore, while youth find the privacy, anonymity and ease of access to such information appealing, there is a vast amount of inaccurate sexual health information on the internet [12, 13].

Health care providers are a trusted and accurate source of sexual health information for adolescents [14] and while clinical guidelines recommend that all adolescents receive comprehensive, confidential sexual health information and services [15, 16]; these guidelines are followed inconsistently [17, 18]. Providers often lack the time, comfort and skills to provide patient-centered comprehensive contraceptive counseling and services [19-21]. To address this health care gap, we have developed an evidence-informed mobile health application (app), Health-E You/ Salud iTu. This app is interactive, individually tailored, and provides patient-centered, contraceptive information and decision support in both English and Spanish. This is an internet-enabled app that can be used on a range of mobile devices (iPads, smartphones, or computers). It is designed to be used in conjunction with a clinical encounter to support the contraceptive decision making process, increase access to patient-centered, evidence-based contraceptive information and services, and ultimately reduce disparities in contraceptive knowledge, access and unintended pregnancies among Latina adolescents.

Health-E You/ Salud iTu was developed with significant input from Latina adolescents and health care providers. It is designed to individualize the educational experience by responding to a patient’s unique needs, attitudes, experiences and risk profiles. The app provides tailored health information and messaging based on the user’s inputs and supports them in selecting a contraceptive method that is a good-fit for them. When used in conjunction with a clinical visit, the app aims to 1) prepare adolescent patients for the visit and encourage them to ask about and/or advocate for contraceptive services that are of interest to them, and 2) act as a clinician extender to support the delivery of health education and enhance the quality of patient-centered care.
As noted previously, this app is designed to be integrated into the clinical delivery systems; however, there is limited evidence on how to best utilize mHealth technologies, such as this, to support effective interactions between adolescent patients and healthcare providers [22]. To our knowledge, there are only two studies that designed and evaluated a contraceptive decision support tool for use in a clinical setting [23, 24]. While both of these studies improved contraceptive knowledge and use, they were limited in that they were both conducted in family planning clinics. The one study, focused exclusively on adolescents was an older study and limited to oral contraceptives [23]. The most recent study did not report findings specific to the adolescent population, which comprised less than 14% of the study sample [24]. Furthermore, these studies are focused on outcomes and provide little details on how the app was implemented, including the strategies used to support its integration. With the rise of mHealth interventions aimed at enhancing the delivery of health education and services, there is a tremendous need to better understand processes to ensure effective implementation and integration into the clinical context; yet, there is a paucity of research on this topic [25]. The purpose of this paper is to describe efforts to improve the successful adoption and implementation of the Health-E You app in clinical settings and to describe implementation facilitators and barriers that may be relevant to other types of computer applications being integrated across different clinical settings.

**Methods**

This study is part of a larger, cluster randomized control trial (CRCT), being conducted in 18 SBHCs throughout Los Angeles County, California to evaluate the effectiveness of Health-E You/ Salud iTu on its ability to reduce health disparities in unintended pregnancies among sexually active Latina adolescents [26]. The app was implemented in nine of the SBHCs randomly assigned to implement the intervention. All clinics are SBHCs that operate and are managed independently, cover a very large area of Los Angeles County, serve a large proportion of Latina students and are centered in areas with high rates of sexual health morbidities according to the Los Angeles County Department of Public Health. The Institutional Review Board (IRB) for Protection of Human Subjects of the University of California, San Francisco approved this study (IRB Approval #: 10-02730).

This study was funded by the Patient Centered Outcomes Research Initiative (PCORI), which emphasizes the importance of patient-engagement and shared decision making in health care. Stakeholder engagement (adolescents, providers, clinic staff and community members) is a central component of all aspects of this study including: app development, study design, implementation of the app, evaluation and dissemination. The study team consists of an interdisciplinary group of investigators from UCSF, UCLA and The Los Angeles Trust for Children’s Health (The L.A. Trust) which includes developmental and behavioral health psychologists, health services researchers, a pediatrician specialized in adolescent medicine and contraceptive care, reproductive health policy experts, biostatisticians and Spanish-English bilingual project director and research assistants. The L.A. Trust is the leading, community-based, non-profit organization focused on child and adolescent health and the implementation of student health programs in Los Angeles County Specifically, The L.A. Trust strives to improve and advance the school-based Wellness Centers (SBHCs) throughout this region. The L.A .Trust
team includes the executive director, program director, two bilingual research associates/community outreach workers, a community advisory board and The L.A. Trust’s Youth Advisory Board which includes student representatives from most of the SBHCs along with the medical director of the school-based health programs and organization facilitators whose role it was to coordinate partnership development and coordinate activities to promote the SBHCs. UCSF, The L.A. Trust, and the medical director set up formal memorandums of understanding with each of the participating SBHCs that outlined the expectations of the collaboration, participation in the research study and incentive structure.

**App Development and Pilot Testing**

A youth-centered design approach [27] was used to develop and test the app. In this approach, youth are engaged in all aspects of design, prototyping and pilot testing and revision to achieve the final design of Health-E You/ Salud iTu. The result was a product that incorporated design features, content, and messaging that was relevant for Latina adolescents. Health-E You / Salud iTu supports their understanding of sexual health risks and the process of making informed decisions around contraceptive use. The app was pilot tested in three SBHCs, which showed that Latina adolescents found it acceptable and it improved their knowledge and intentions to use effective contraception and health care providers/staff agreed that it was feasible to implement [28]. Upon completion of the pilot study additional feedback was gathered to inform revisions to the app to further enhance the user-experience, prior to implementing the CRCT.

**Implementing the App into Clinical Practice**

The implementation of this app into clinical practice was informed by Roger’s theory of diffusion of innovation [29, 30]. This theory posits that an innovation is more likely to be adopted if they provide value or benefits to potential adopters, fits in well with existing systems, utilizes opinion leaders/champions who can influence others by spreading information about the innovation within and outside the organization, and addresses contextual/managerial factors within an organization [31]. Stakeholder engagement also helps to ensure intervention approaches are youth-centered and useful for adolescents and clinicians to further improve the uptake of the app in clinical practice. The implementation approaches used in this study also adheres to PCORI’s six principles of engagement: (1) reciprocal relationships between the roles and decision-making between the development team, community and clinical partners; (2) co-learning between the research team, community liaisons and clinical partners; (3) the time and contributions of patient and other stakeholder partners are valued and demonstrated in fair financial compensation, as well as in reasonable and thoughtful requests for their time commitment; (4) transparency; (5) honesty, and (6) trust [32].

**Data Collection to Assess Implementation of the App**

This study used multiple sources of data to assess implementation facilitators and barriers including: monthly conference calls, monthly in-person site visits, and quarterly in person collaborative meetings. The research team hosted monthly conference calls with The L.A. Trust and representatives/champions from each of the nine SBHCs implementing the Health-E
You/Salud iTu app. Two community-based, bilingual research associates (RAs) from The L.A. Trust, both of whom had prior experience working for and/or with the various SBHCs, conducted in-person visits to each clinic at least once a month. In addition, The L.A. Trust team gathered data from the quarterly collaborative quality improvement (QI) meetings in which the clinic champions, principal investigator, and project director attended.

Overview of App Implementation

According to the study protocol [26] (developed with input from clinicians and clinic staff) clinic staff are to provide all adolescent girls who come into the clinic, for any reason, an iPad. Upon receiving the iPad, the “user” selects their language preference (English or Spanish) and the app is launched. First, the app provides a brief explanation of the research study, informs them of their confidentiality rights and protections, and obtains voluntary consent. If an adolescent is interested in participating in the study, the app assesses eligibility by collecting basic demographic and health history information that is part of the routine adolescent health care visit. Next, eligible adolescents who agree to participate complete a computerized questionnaire to assess their baseline knowledge of contraception (via a myth-busters style game) and their self-efficacy to obtain sexual health care and use contraception. Users are then asked to complete a series of questions to help assess which contraceptive method(s) is the “best choice” for “you”. The contraceptive recommendation algorithm used in the app is based on adolescents’ preferences and attitudes that could affect their choice and use of contraception as well as concerns for potential side effects (see Tebb 2017 for details about the computer algorithm) [26]. Based on the youth’s responses, the app determines which method or methods may be the “top choice(s)” for an individual. At that point, youth are given the opportunity to learn more about the recommended method(s) and/or any other contraceptive method of their choosing. For each method, the app provides basic contraceptive information along with two YouTube style videos: one of a provider and another of a Latina adolescent each talking about the specific method selected.

When app users are finished reviewing the various contraceptive methods, they are then asked to select the method(s) they are most interested in using. The app then generates a "print preview" screen that includes the users confidential ID; the contraceptive method(s) that the user is interested in; the contraceptive method(s) that the app recommended; and any potential contraindications that the user reported. The medical assistant gives the print-out to the clinician prior to the face-to-face encounter with the patient. The patient concludes the app by completing a post knowledge assessment, framed as “let’s review what you’ve learned.” They also receive a reminder to use condoms to protect against sexually transmitted infections and information about emergency contraception/Plan B. After completing the app, the patient proceeds to the face-to-face encounter with the clinician who has reviewed the print-out from the app.
Results

The app was successfully integrated into the clinical workflows of SBHCs and this study identified a number of factors that supported its integration into clinical workflows, which is described in the following section. In addition, there were a number of implementation challenges, which are also presented.

Successful Strategies

Engagement of Key Stakeholders in App Development

Youth engagement was essential and youth have been engaged in all aspects of app development and implementation activities. Specifically, youth were engaged through the ongoing convenings of The L.A. Trust Youth Advisory Board (YAB), community advisory boards (CABs), and student advisory boards (SAB) at each clinic site. Specifically, youth guided both the content and design of the app to ensure that it would appeal to their peers. They also provided insights on the reading and comprehension level of the language used in the app. The youth helped develop scripts for YouTube style video vignettes on each of the contraceptive options and served as actors in these videos. It was then pilot tested at several SBHCs to identify and address barriers to prepare for a larger scale implementation project. Youth, clinic providers, and staff champions were engaged as the project was scaled up and implemented at nine
SBHCs as part of the CRCT. Engaging both youth and clinicians in the app development and iterative pilot testing helped ensure that the ultimate product was developed in a way that was meaningful and of value to both youth and clinicians.

**Engagement of Key Stakeholders in Implementation Efforts**

The L.A. Trust YAB, CAB and the SABs provided feedback on a regular basis to inform outreach efforts to improve student utilization of the SBHCs and enrollment in the study. While there were a number of site-specific engagement strategies (posters, student referral cards, lunch time tabling, clinic outreach, etc.), the YAB also coordinated women’s health presentations at each of the SBHCs to educate young girls on services offered at the SBHCs and to stimulate conversations around reproductive health and life planning. On average, approximately 25 students attended each of these presentations. There was usually a clinic staff member present to schedule appointments for interested students.

The engagement of healthcare providers and clinic staff was equally critical. The RAs identified champions at each site who had a special interest in adolescent health and were excited about using the app. The RAs nurtured these relationships through monthly site visits and regular email and phone communications. They also worked to build relationships with the other providers and staff at each site through expressing a sincere desire to learn what was working well along with challenges/implementation barriers they faced. The establishment of trust between clinicians, staff, RAs and researchers enabled SBHC staff/clinicians to feel comfortable in expressing their challenges and concerns. The research team followed-up on successes and challenges faced at individual sites through the group QI calls. During these calls, champions from each of the participating SBHCs described their implementation efforts and challenges encountered in a supportive, non-judgmental context. This process enhanced the disclosure of barriers and allowed for collective problem solving and sharing of strategies that supported more effective implementation.

**Partnership Structure, Compensation and Reciprocity**

Reciprocity between the university investigators, community partners at The L.A. Trust, YAB and clinicians/staff further enhanced implementation efforts. The PCORI contract was awarded to UCSF, but provided fiscal support for the partnerships through a formal subcontract with The L.A. Trust that supported The L.A. Trust staff and the youth and community advisory boards and their activities. As a “backbone organization” to support the Wellness Network, The L.A. Trust facilitates on-going communications with the field. Learning collaborative meetings are convened quarterly, which brings all stakeholders together so that members can capitalize on each other’s resources and skills and share best practices. These meetings identified topics that were considered important to increasing students’ access to the SBHCs. A number of experts (including the study PI) were identified and presented on reducing stigma in SBHCs and understanding the State’s minor consent and confidentiality laws. Immediately following each learning collaborative, we held special “strategy meetings” to allow for a more concentrated, site-specific problem solving session with clinic champions/staff who reviewed study recruitment data and developed QI plans to increase recruitment of Latina patients.
Clinic administrators submitted letters of support articulating the need for and enthusiasm of such a project, strengthening the funding application and reinforcing their commitment to the project. In addition, formal memorandums of understanding (MOUs) were established with each SBHC at the onset of the project to formalize the relationship between the academic partner and community clinic agencies. The MOUs articulated the role of clinic staff members, recruitment goals and specified the financial stipend each site would receive for their participation. Specifically mentioning the recruitment goals in the MOU was helpful as a benchmark to discuss individual clinic’s progress towards reaching those goals and as a means of discussing implementation barriers and improvement strategies. It also served as a gentle reminder that the success of the project depended on collective efforts and a sense of ownership by all.

It is also important to note that beyond financial compensation, each partner (university and The L.A. Trust) was valued equally and shared their strengths and expertise with one another through formal presentations, manuscripts, and planning QI efforts to support implementation of the app.

The contributions of the Latina adolescents were also valued and acknowledged through financial stipends, gift cards and formal acknowledgement of the participation through certificates of participation.

**Co-Learning to support integration into clinical workflows**

In order to successfully implement a project of this size and scope within the “real-world” clinical setting, understanding the process and flow of the clinic operations was key. Each SBHC had their own unique clinical workflows, procedures and protocols for serving adolescents including the provision of reproductive health care. Members of The L.A. Trust met with the clinic leadership, clinicians, clinic managers, medical assistants, and front line staff at each SBHC to obtain buy-in, understand the delivery of clinical services for adolescents and to gather input from all levels of staff feedback on the best ways to integrate the app into each SBHC. The L.A. Trust RAs also observed clinic operations and workflows prior to actual implementation. After these activities were completed, The L.A. Trust generated a “process map” that detailed how the app would be integrated into each individual clinic’s unique workflow (see Figure 1). The draft process map was shared with each site and revised based on additional input prior to implementation. This effort helped to ensure that the study team considered the individual needs and perspectives of staff within each clinic and increased the likelihood of successful integration and implementation of the app. As part of the QI process, the team modified the process map to address any unanticipated issues that arose during initial implementation effort.

While there was a desire to implement a universal workflow that would ask all female adolescents to participate in the study and for the providers to have a conversation with the student about birth control options, unique workflows had to be established. For instance, some SBHCs were designed to have two separate waiting rooms (one for community patients and one for student patients), others had to share one congested waiting room for both type of patients. The RAs together with the clinic staff came up with solutions to address the privacy of the students while using the app. For example, one SBHC with a shared waiting room had a large health education room that was made available for patients to use the app in privacy,
while another clinic allowed students to take the iPad with them so they could use the app during vitals.

**Ongoing Quality Improvement (QI)**

As noted previously, there were monthly group QI meetings held via WebEx with SBHC champions, The L.A. Trust team and the UCSF principal investigator and project director. At each QI meeting, the study team provided the SBHCs with data that included the estimated number of youth who visited the clinic (where available), estimates of the numbers of youth who used the *Health-E You* app as well as the number of youth who were eligible to participate in the study and the numbers of youth who ultimately enrolled in the study by site. Using a Plan-Do-Study-Act QI approach [33, 34], the study team and SBHCs identified and discussed implementation challenges, successful student engagement and recruitment strategies, and brainstormed ideas for overcoming the challenges. Having staff champions that represent various staff roles (i.e. front desk, medical assistants, health educators, clinic managers) contributed to a holistic discussion of the challenges and successes within and across sites. This approach contributed to increased buy-in and seamless continuity even in the face of staff turnover. Furthermore, this approach also empowered staff that would not normally be given an opportunity to contribute to research projects of this scale.

**Technical Assistance**

The L.A. Trust RA's conducted monthly site visits to see how app integration/implementation was working at the field level, to provide technical assistance as needed, and to address questions and identify topics for group QI calls. The amount of technical support and in-person engagement with clinic staff was greater than expected. The vast geographic distance between the SBHCs across Los Angeles made it difficult to identify individual clinic's ongoing needs or challenges and provide them with immediate support, regular communications and updates. An online and telephone TA support system was implemented to address the logistical challenge of in-person visits. However, this system was not widely used by clinic staff and issues were more readily identified and addressed via in-person visits.

**Transparency, Honesty, and Trust**

The UCSF, The L.A. Trust, and Advisory Boards worked together through a shared decision making process. The UCSF and The L.A. Trust team met on a weekly basis through WebEx meetings to jointly develop the agendas for QI calls, team work plans and action items. Student advisory boards met on a quarterly basis and more frequently if needed. There was a strong commitment to open and honest communication with one another, which was exemplified in the QI process.

**Celebrating Success & Expressing Appreciation**

The study team also provided an appreciation party for youth who helped develop the videos used for the app and distributed participation certificates and “Oscar” style awards. In addition, many clinicians and staff exceeded our engagement expectations and initiated strategies to improve clinic and app utilization. To express gratitude for this effort, staff was given additional
thank you gifts (e.g. gift baskets, lunch for clinic staff and other tokens of appreciation). These gifts were greatly appreciated and seemed to boost morale and engagement, especially in the context of under-resourced clinical settings where front-line staff and medical assistants may feel under-appreciated for their contributions to clinical operations.

Challenges

Despite the extensive efforts to support implementation, there were a number of noteworthy challenges.

IT infrastructure: Internet Access and Wireless Connectivity

Technology issues and staff capacity to troubleshoot problems related to technology were the most significant challenges. The app is a web-based platform, which required Wi-Fi to transfer data captured electronically on the app to the secured back-end data storage system. Prior to implementing the app, The L.A. Trust RAs met with clinic staff to assess technology infrastructure. All sites reported having Wi-Fi; however, the connectivity, reliability, and strength of the signal varied across all sites and these issues did not come up during the pilot testing phase but emerged as the app was being used across more sites. To address this, the study team purchased mobile Wi-Fi devices (hotspots) to obtain internet access and set up the connection through a local internet service provider. In other cases, we purchased iPads with cell service capability and set up a data plan with a mobile phone company to access the internet. The specific approach had to be tailored to site specific needs.

A key feature of the app, to enhance adoption and usability, was the ability for clinicians to see some of the user’s input on the app prior to the scheduled face-to-face portion of the clinic visit. Clinicians prioritized three data points for the app to capture and share with them: the contraceptive method(s) the user was interested in, the method(s) the app recommended, and potential contraindications. Another challenge was developing a system to share data captured from the app with clinicians. In the pilot testing phase, clinicians requested to have this information emailed to them to avoid a paper trail and to move toward an electronic system. However, in developing the clinic workflows for the clinical trial, clinicians at each of these new study sites request to have the app user’s information printed instead of e-mailed as originally designed. The app had to be redesigned to accommodate this request and it added a new integration challenge. Printers, compatible to the iPad were purchased, placed in a private area of the clinic, and set up so they could connect wirelessly to the iPads.

Again, site-specific solutions were necessary to ensure there was a reliable connection to the internet and between the iPad and printers. Even with these solutions in place, several clinics continued to report intermittent problems with connectivity to internet and the printers’ wireless connections. Few clinics had IT staff available to address issues that arose so The L.A. Trust RAs assumed this responsibility.

Protecting Patient Confidentiality and Data Security

There was a great deal of concern among providers about protecting patient confidentiality. The data system that stored users’ input was housed on a secure network (encrypted,
password protected and accessible to only essential research staff). The app informed users that their information was confidential; however, providers and clinic staff in turn needed to remind and assure patients that their information was confidential. Two sites expressed security concerns about using clinic Wi-Fi for the app and the protection of patient confidentiality. At one site the MOU needed to be modified to articulate the measures taken to assure data privacy and security (e.g. protocol for the protection of patient confidentiality, data encryption, security of UCSF's back-end data system, etc.), at another we provided our approved protocol of the protection of human use in research.

**Communication**

Despite formal MOUs, monthly site visits and QI calls, we identified communication barriers between clinic executives and staff that presented additional, unanticipated challenges to app implementation. For example, initially, information about the project was shared with clinic executives (e.g. info from MOUs, site incentives, initial QI data); however, upon conducting site visits, the RAs learned that this information was not universally shared with clinic providers and/or staff. The L.A. Trust team had to take extra efforts to ensure all stakeholders received necessary information. In addition, the vast distance between the clinic sites made it difficult to identify and address individual clinic's technical assistance needs in an immediate fashion. The distance did not allow a constant and “real-time” dialogue, even with the use of communication tools such as email and telephone. Often times, staff was often too busy or the challenge was not as much a priority as other pressing clinic issues/responsibilities, so these issues were not discovered or addressed until the in-person RA site visits occurred.

**Staff Turnover**

Many SBHCs struggled with high staff turnover, impacting their ability to implement the app. This is a problem not unique to this study and is common with many Federally Qualified Health Centers (FQHCs) who operate clinics in under-served, under-resourced communities [35]. FQHCs are the primary medical sponsors for most of the participating SBHCs in this study. Frequent in-person site visits helped identify staff changes and provide orientation to new staff. In addition, extensive time and effort invested in cultivating relationships with key staff at the clinics improved the extent to which the RAs were informed about staff changes. However, in many situations, staff vacancies remained in place for several months, which impacted the clinic's capacity to fully utilize the app.

**Time to complete app**

The app was designed to be completed in approximately 15 minutes; yet at the same time, allows for a user-driven educational experience. Actual time to complete the app ranged from 12 to 29 minutes with an average completion time of 20 minutes. Because the app is part of a research study, completion time included the time to obtain study consent and participation eligibility. Most clinics adapted their workflows to account for this variation and reported that extra completion time was acceptable because the app helped to “offset” some of the time a clinician would otherwise have to spend providing contraceptive education. Even so, a couple of clinics reported that the time patients needed to complete the app prior to seeing the clinician
remained a challenge especially during busy clinic hours when patients needed to see the clinician as soon as one became available. The research team with input from the CAB and YAB discussed the possibility of using the app prior to the clinic visit at home or school, but these approaches were not feasible to implement for a number of reasons. App use outside the clinic setting restricted the ability of providers to receive a print-out summary, and they did not want to use an alternative form of electronic communication; it could compromise patient confidentiality; and there were multiple barriers to obtaining school-administration approval for use during school.

Conclusion

Despite the promise of mHealth interventions to enhance the quality of care, there is limited research on the effective integration of such technologies into clinical settings -- especially apps designed to promote behavior change among adolescents including, but not limited to, the delivery of reproductive health information and contraceptive services. To address this gap, the purpose of the current study was to describe the framework used to integrate Health-E You/Salud iTu, a contraceptive decision support tool, into the routine delivery of adolescent health care at nine SBHCs in Los Angeles County. Implementation was informed by Roger’s theory of diffusion of innovation [29, 30], PCORI principles of engagement and previous pilot testing. This study found that this implementation approach enhanced the development, adoption and integration of the app into clinical practice at SBHCs. In particular, engagement of both Latina adolescents and clinic providers helped to create a product (app) that addressed a shared health priority area and the needs of both stakeholders. In addition, other factors that enhanced integration included: significant engagement with clinic staff to meet clinical workflow needs and address technology related barriers that arose during implementation; engagement with Latina adolescents to identify and address barriers to clinic utilization; promote app usage and study participation; a strong partnership between university investigators, community partners at The L.A. Trust and SBHCs that included formal subcontracts, fiscal support and a sense of equity, trust and mutual respect for each other’s roles and expertise; a commitment to understanding local needs and adjusting protocols to fit with clinic specific workflows; an ongoing quality improvement system; regular in-person technical assistance; and celebrating the successes and expressing appreciation for the commitment and effort of the partners, especially clinic staff and youth. We also found that developing strong, positive relationships with front-line clinic staff, medical assistants and health educators and valuing them as equal partners in the research process was also key to our success.

Even with this study team’s strong approach to successful implementation and extensive experience with clinical interventions, implementing clinical practice changes and QI, there were a number of implementation challenges. The most significant challenges pertained to limitations with the technology infrastructure of SBHCs, which included intermittent internet access and reliable wireless and/or cell service connectivity; assuring adolescent confidentiality and data security; communication across multiple levels within a clinic system; staff turnover; and time required for all youth to fully engage in and utilize the multiple features of the app.
There are also several noteworthy study limitations. This study focused on an mHealth app aimed at addressing a specific and sensitive health need for sexually active adolescents who seek care at SBHCs. Thus, generalizability to other mHealth apps on different topics and used in other clinic settings may be limited. Furthermore, SBHCs are inherently designed to support sexual and reproductive health needs of adolescents and may have been more receptive to the Health-E You app than other, less adolescent-friendly, clinical settings. Our partnership with The L.A. Trust is also unique, which was an additional benefit for this study. Despite these limitations, this study provides important insights that can inform and improve implementation and integration efforts of future mHealth clinical interventions. It is especially important to consider the time restrictions, especially in busy clinical practices, and generate alternative ways of leveraging technology within and outside the clinical setting to improve access to health information and services to support health promoting behaviors among adolescents.
References

Archived at: http://www.webcitation.org/6zJWPQwAI

DOI: https://doi.org/10.1016/j.jadohealth.2009.11.190


22. Aranda-Jan CB, Mohutsiwa-Dibe N, Loukanova S. Systematic review on what works, what does not work and why of implementation of mobile health (mHealth) projects in Africa. BMC Public Health. 2014 Feb;14:188. PMID: 24555733