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TEXT MESSAGING SUPPORT FOR URBAN ADOLESCENTS AND YOUNG ADULTS USING INJECTABLE CONTRACEPTION: OUTCOMES OF THE DEPOTEXT PILOT TRIAL

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INTRODUCTION

While there have been major declines in teen pregnancy in the United States, many urban communities continue to report significant birthrates amongst adolescents and young adults. In Baltimore, Maryland, the rate of births to teen girls 15–19 years of age was 60.6 births per 1000 girls in 2012, which represents a 123% difference between the city and the statewide rate. There are also significant health disparities facing Baltimore youth. African American girls have a birth rate of 73 per 1000 and Latino girls 102 per 1000.¹ Though Baltimore is located in a ‘wealthy’ state, data from the census bureau indicate that 1 in 5 individuals in Baltimore lives in poverty.² Teen pregnancy contributes to the number of children growing up in poverty because of the limitations it places on adolescent and young adult health and development.³ The children of adolescents are also at risk for a number of health and developmental outcomes that dramatically alter family dynamics and increase the costs to society.⁴ While the factors that contribute to teen pregnancy are complicated by poverty, family structure, and other psychosocial factors, experts agree that access to and effective use of contraception is a key contributor to the decline in overall national teen pregnancy rates.⁵ Working with sexually active adolescents in segregated, impoverished

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urban communities to increase effective contraception use has the potential to improve outcomes on an individual and community level.

One of the core strategies being utilized by the city to reduce the rates of teen births in Baltimore towards the goal of 29 births per 1000¹ has been to increase the number of sexually active teens who utilize highly effective long-acting reversible contraceptives (LARCs) such as intrauterine devices (IUDs) and/or implantable contraceptive methods.⁶ Use of LARC products in this community is not new and prior use in teens was fraught with politics and community backlash.⁷ As such, the process of increasing access and acceptance of LARC methods by teens will require removal of practical access barriers as well as community engagement. Even if the point is reached where parents overwhelmingly support LARC use for teens and practical access barriers are removed, the city must also consider that about 30% of adolescents who do not select a LARC method choose a Moderately-long Acting Reversible Contraceptive (MARC) (e.g. Depo-Provera) and /or more cumbersome and slightly less effective methods for contraception (e.g. condoms, oral contraceptive pills, patches, rings).⁸ Therefore, use of adjunctive public health strategies that optimize the use of MARCs, which have played a major role in reducing teen pregnancy in the United States, should also be employed in the context of adolescent choice and the goal of reducing unplanned pregnancies among youth.

Use of technology may be an important, but under-utilized, strategy to increase contraceptive adherence. As early as 2004, a nationally representative survey of adolescents in the Pew Internet and American Life project indicated that American adolescents are “technology rich and enveloped by a wired world.” At that time, 84% of the adolescents surveyed owned at least one personal media device such as a computer, cell phone, or personal digital assistant and 44% owned two or more devices.⁹ Newer data suggests that cell phone penetration amongst teens continues to increase with 75% of teens owning a cell phone and 85% of late adolescent girls owning a cell phone in a 2011 Pew survey.¹⁰ In our previous research with girls managing reproductive health issues, adolescents expressed that not really understanding the instructions for self-care and concerns about privacy were key barriers to effective self-management. Adolescent girls who reported successful sexual health self-management, however, described having a supportive medical environment as an intrinsic part to their success.¹¹

Utilizing Geser’s sociological framework for understanding the innovative potential of cell phone technology, urban adolescent’s use of cell phones may be an important transitional step in managing the observed reproductive health-related disparities. Geser postulates that emerging technologies simultaneously increase the individual’s empowerment, personal responsibility, and social controls.¹² Using a text-messaging intervention with adolescents managing contraception would both enable provision of self-management reminders, serve as a source of empowerment for adolescents to better self-manage, and provide the desired privacy for managing reproductive health issues. The aim of this proof-of-concept pilot project was to determine the feasibility and acceptability of a text messaging reminder system for communicating sexual health messaging to urban adolescents using Depo-Provera.

METHODS

Setting and Participants

This research study was conducted in a large urban academic General Pediatric and Adolescent Medicine Practice in Baltimore, Maryland between October 2011-February 2012 that primarily serves low income African-American families from the neighboring East Baltimore community. Adolescents and young adults in Baltimore have high rates of unplanned pregnancy and sexually transmitted infections [STIs]. This clinical program provides confidential, adolescent-centered sexual and reproductive health services to young persons who are uninsured, underinsured, and seeking confidential services and is easily accessible by public transportation. More than 80% of primary care patients served by the clinic participate in a Medicaid Managed Care Organization. At study initiation, there were approximately 250 individuals enrolled in the Depo-Provera MARC program, but adherence to scheduled appointments required significant nurse case management reminders and follow-up to ensure adherence to family planning appointments.

Study Procedures

Adolescents who were enrolled in the Depo-Provera MARC program were recruited during clinic appointments and via phone contact with the nurse case manager. Inclusion criteria were age 13–21 years, willingness to be randomized, currently using Depo-Provera, and having a cell phone with text-messaging capability for personal use. Adolescents were excluded if they did not have a cell phone for their own personal use and/or had significant cognitive impairment that prevented use of cell phone texting features unaided by a parent or other family member.

All participants received standard of care according to the existing clinical protocol for management of Depo-Provera. During “Depo-Provera visits” all patients received a nursing assessment, medical assessment if indicated, counseling, their next injection (if no contraindications), and an appointment card with the date of the next injection. As a part of the standard clinic policy, patients also received automated clinic appointment reminders via their home phone. After enrollment, participants completed a baseline web-based survey to provide demographic, reproductive health history, sexual behavior, and technology use data and were followed for up to 3 injection cycles. Youth assigned to the DepoText intervention arm also received a welcome text message, daily text appointment reminders using the Compliance for Life (CFL)TM short messaging system (SMS) platform starting 72 hours before the clinical visit with the option to cease messages by responding (yes or no) with their plans to attend the visit. [Figure 1] If the patient responded “no” to appointment reminders, then an email was automatically sent to the nurse case manager who contacted the patient to reschedule the appointment. Intervention adolescents also received scheduled health messages regarding condom use for STI prevention, healthy weight management, encouragement to call the nurse for problems, and an STI screening reminder. All message signatures indicated that they were from the nurse case manager to build relationships with the clinical team. [Figure 2] Control participants received standard of care, which included patient-initiated support and contact for missed appointments. Participants received \$10 remuneration for survey completion and \$5 for notifying the nurse case manager of changes

in contact information. All communication with the nurse case manager, including changes in contact information, was documented in the electronic medical record. The Johns Hopkins Institutional Review Board approved this study.

Sample Size & Data Analysis

Given the short duration of the recruitment phase and the need to follow patients over a 9-month period, the minimum recruitment target was set at 100 patients as a practical pilot milestone to demonstrate feasibility and acceptability. Primary outcomes emerged from recruitment, patient safety, and CFL text message delivery and patient responsiveness data. The study was not powered for efficacy; however, we evaluate preliminary efficacy based on available data and final sample size.

The CFL system recorded all outgoing and incoming communication, and adjustments to appointments did not affect adherence status if made before the scheduled date. Appointments and completed visit data were monitored using an electronic tracking database. Baseline data was merged with tracking and CFL adherence data for analysis. Feasibility was measured by eligibility data and acceptability was measured by enrollment data. Descriptive analyses were performed to evaluate recruitment, demographics, personal reproductive health history, and technology access data. The log-transformed number of days off schedule was analyzed using linear regression as the primary study outcome with STATA v 12.1 (Stata Corp, College Station, TX, 2012).

RESULTS

Participants

The majority of participants were African American (96%), resided in low-income (75%), single parent, mother-headed households (66%). Participants had high rates of parental knowledge and support for contraceptive use, as 92% of parents knew that they were using Depo-Provera and 87% of parents had spoken to them about sex. Access to technology and added burden for study texts was not an issue as 92% of girls had unlimited text message and the other 8% thought the service was sufficiently valuable and manageable at the time of consent that they enrolled in the study. Eighteen percent of participants had an STI history. The finding that 18% of participants had a prior STI history reinforced support for the decision to include STI-prevention messaging related to condom use.

Acceptability

Ninety-five percent of the 116 girls who were approached for the study were eligible (N=110) for the trial (i.e. were using Depo-Provera and had a cell phone for their personal use). Ninety-one percent (N=100) of eligible patients were recruited for the study. [Figure 1] The recruitment target /pilot capacity was reached within 3 months of opening study enrollment. The rate of recruitment and low refusal rates are both evidence of acceptability amongst urban adolescents enrolled in the program.

Feasibility

The Welcome Message was generated immediately after enrollment and the CFL system tracked delivery of the intervention messages and patient responsiveness over time. The CFL system indicated that 100% of welcome messages and subsequent appointment reminders and support messages were delivered to active participants. The overall responsiveness to study generated appointment messages was 76% (e.g. Are you going to your appointment on [date]? If yes, reply 1 If no, reply 2) and 68% for informational messages (e.g. Condoms prevent STDs, Stop by the clinic if you need some. -Mrs. Kathy, Text 1 if you got this message) amongst study participants over the course of study, as evidence of both feasibility and intervention fidelity. There were also no adverse events such as confidentiality breeches or conflict with parents/sexual partners reported by participants related to receipt of text-messages and/or study participation, as evidence of patient safety.

Preliminary Efficacy

Eighty-seven percent completed Depo-Provera injection cycle 1, while 77% and 69% completed injection cycles 2 and 3. Complete on-time visit adherence declined over time with 51 % for the first visit, 47% for the second visit, and 43% for the third visit. The proportion of intervention adolescents compared to controls who returned on time for their appointment was higher for the first (68% versus 56%) and second cycles (68% vs. 62%); but not the third (73% vs. 72%). Linear regression analyses reveal that adolescents in the intervention arm returned sooner post-scheduled appointment than their control peers for the first ($B = -0.75$ days 95% CI: $-1.4-0.06$), $p=0.03$), but not the 2nd and 3rd cycles. There was no overall difference in those who received injections within the on-time 69–90 day Depo-Provera Injection window because the nurse case manager provided additional telephone outreach to all patients who missed their Depo-Provera appointment visits per the existing Depo-Provera quality assurance protocol as a standard of care practice.

DISCUSSION

This pilot study demonstrates that the DepoText intervention is both a feasible and an acceptable clinical support tool for adolescents and young adult women choosing MARCs for family planning. Access to technology and added burden for study texts was not an issue as 92% of girls had unlimited text messages and the other 8% thought the service was sufficiently valuable and manageable at the time of consent that they enrolled in the study. The CFL system had on-time delivery of text messages and participants responded to 67% of text messages sent. The finding that 18% of participants had a prior STI history reinforced support for the decision to include STI-prevention messaging related to condom use. The absence of reported confidentiality breeches, complaints, and/or other adverse events demonstrates that use of text messaging for person-based communication about sexual and reproductive health information be safely executed.

The study also supports the preliminary efficacy of DepoText for improving clinic attendance at family planning visits for the first two visits. While there was some waning efficacy by visit 3, there was no overall difference in the number of adolescents who received Depo-Provera during the optimal injection window. It is unsurprising that

adolescents so readily embraced the opportunity to receive HIPAA-compliant text message support for self-management of clinic attendance for Depo-Provera adherence. Prior research has shown promising results for the role of technology-based interventions for management of human immunodeficiency virus treatment adherence, pregnant teen mothers, asthma symptom monitoring, and depressive symptoms between clinical visits.^{13–18}

The findings from this study must be considered in light of several general limitations. This study has limited generalizability given the focus on low income, mostly African-American youth. However, this group represents a key target for clinic- and community-based pregnancy prevention strategies and is in line with the public health goals for the city.¹ This is a pilot study and so was not powered to measure longitudinal efficacy; however, the preliminary data are promising and support expansion of this program to assist all girls enrolled in the Depo-Provera MARC program. Cross contamination between groups was minimized because of the nature, vehicle, and field location of the intervention, but the clinic culture may have changed resulting in heightened provider support for MARCs resulting in atypically increased provider education during clinical visits. Data on duration of Depo-Provera use was not captured in enrollment data and there may be differences in text-message responsiveness between experienced and new users. Fortunately, we anticipate that differences in culture change and/or patient background factors (e.g. duration of use prior to enrollment) would be similar in both groups due to the randomized controlled study design. Finally, the non-receipt of messages is a possibility, but this would be due to patient-related cell phone management as CFL provided weekly reports of text messages delivered to study participants. Further, most cell phone numbers are portable with a change in cell phone carriers, and small incentives were used to facilitate capture changes in patient cell phone data to update the CFL system before their next wave of reminders were due.

IMPLICATIONS & CONTRIBUTION

Depo-Provera has played a major role in reducing unplanned pregnancy among adolescent and young-adult women over the last two decades and remains a core option for family planning among patients requiring a method with high efficacy and minimal effort, those who have contraindications for combined estrogen-progesterone methods, and/or those who do not want an implantable or intrauterine device. While LARC methods are now being heavily promoted to adolescent girls and young-adult women for family planning due to an overall increase in efficacy secondary to reduced self-management burden associated with typical use, few adolescents nationwide are currently using LARCs.^{19, 20} Further, some young women continue to choose Depo-Provera after comprehensive education and removal of all barriers for LARC access.⁸ Our study supports the notion that cell phone technology has enabled low income, minority adolescents in urban communities to overcome the digital divide using cell phone technology with texting and internet data capacity.¹⁰ Use of technology for person-based communication may further improve the effectiveness of MARCs given the high efficacy rate with perfect use.²¹ Additional research exploring the cost-effectiveness and longitudinal prevention effectiveness for DepoText as an adjunctive family planning tool in the prevention of unplanned pregnancy and strategies for integration into existing electronic medical record systems and/or institutional communication platforms for medical providers is warranted.

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Abbreviations

LARC	Long-Acting Reversible Contraceptive
MARC	Moderatelylong Acting Reversible Contraceptive
STI	Sexually Transmitted Infection

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Depo-Provera has been critical for reducing teen pregnancy. While long-acting methods have resurfaced, until widely adopted Depo-Provera remains an important contraceptive option. This study supports the potential for person-based communication using cell phone technology to improve attendance at family planning appointments and to increase typical efficacy for Depo-Provera use.

Figure 1.
Overview of DepoText Study Design and Recruitment Outcomes

Figure 2.

Figure 3. Legend		All		Excluding outliers	
Injection cycle	Group	N	Min, Max	N	Min, Max
1	Control	43	(-7, 137)	40	(-7, 25)
1	Intervention	44	(-6, 18)	39	(-5, 8.75)
2	Control	39	(-8, 127)	31	(-6, 10)
2	Intervention	38	(-2, 126)	32	(-2, 10)
3	Control	36	(-6, 28)	29	(-6, 7.5)
3	Intervention	33	(-8, 77)	22	(-1.5, 2.5)
Medians = 0 for all					
Excluding outliers (any points that are outside "adjacent values" in box)					
Plots with all data points as defined below					
Upper adjacent value = 75th %ile + 1.5*(75th %ile - 25%ile)					
Lower adjacent value = 25th %ile - 1.5*(75th %ile - 25%ile)					
In above table, if the lower adjacent value was < the minimum, then I let it stay at the minimum					

Figure 3.

Boxplot of days from scheduled appointment to Depo-Provera injection by intervention and control status per study visit.