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Texting for Better Care Project Final Report

Report prepared for Center for Care Innovations under a grant from the Blue Shield of California Foundation

This report consists of an analysis of SMS technology applications in healthcare with recommendations for design and implementation in the safety net.

Introduction

Text messaging has emerged as one of many new technological tools to help healthcare professionals provide quality care for medically underserved populations. Text messaging, or SMS, provides a relatively inexpensive, accessible way to strengthen patient-provider communication for supporting patients in achieving their unique health goals.

The Texting for Better Care Project examines what it takes to build text-messaging interventions for health care delivery in the safety net for underserved populations.

The individual use cases researched for this project include:

- Appointment reminders

- Diabetes self-management

- Hypertension monitoring and management

- Alcohol and substance abuse recovery

- Youth outreach on health enrollment

- Care transition to a patient-centered medical home (PCMH)

- Specialist referral loop closure

While researchers have demonstrated the effectiveness of text-messaging interventions for particular applications such as appointment reminders, generally evidence for SMS programs is limited in peer-reviewed literature. Published articles tend to focus on efficacy and outcomes rather than design and implementation. This report draws from peer-reviewed scientific literature as the foundation for analysis, but also includes pilot studies and qualitative interviews to address these gaps.

This report examines the following key components of designing and implementing SMS interventions:

- Recruitment
- Operational needs
- Technological specifications
- Content development
- Evaluation

Text-messaging interventions face significant barriers to implementation and adoption. Limited English proficiency (LEP) patients may be excluded without adequate access to medical translation. Both patients and providers may have low technological literacy. The costs of implementation and maintenance may prove prohibitive—especially for already resource-strapped safety-net providers. We hope this report will start to identify best practices for designing and implementing SMS programs that overcome these barriers.

Recruitment

Participant recruitment methods vary widely, from passive outreach tools such as flyers in waiting and exam rooms, to clinic staff actively enrolling patients.

Appointment Reminders

Patients may be enrolled in a SMS appointment reminder program when completing primary care intake by selecting text messaging as a preferred method of communication. Patients may also sign up to receive appointment reminders when scheduling a follow-up appointment with their provider.

Upon enrollment, we recommend sending patients a text message to welcome them and request a reply to ensure delivery of the message. This delivery verification also demonstrates patients' capability to use text messages effectively.[i]

Disease Management

Physician referrals are an effective point of entry for patients to begin hypertension self-management SMS programs. We recommend that the primary care physician or other healthcare professional discuss the purpose and potential health benefits of participation with patients.

In diabetes self-management programs, patients can be recruited through advertisements and exam room posters (written for low literacy comprehension) and through active outreach and referrals from diabetes educators, nutritionists, or other health care professionals.

Patients undergoing alcohol and substance abuse recovery may enroll in a text-messaging program to supplement an outpatient program or as a transitional tool after an initial 3-month recovery period.[ii] Texting has also been used to reduce the risk of developing alcohol and substance abuse problems among at-risk populations, such as young adults.[iii]

Youth Health Benefits Outreach

Peer-reviewed literature on texting for youth outreach in healthcare is sparse. Our recommendations for this use case rely largely on qualitative interviews from practitioners in the field.

Safety net providers can stratify their patient registry by age to deliver more targeted outreach to existing patients. Other methods of recruitment include social media, working with school resource officers, outreach to college student or young parent groups, and offers for health benefits enrollment assistance during the patient intake procedure.

Care Coordination

Care transition can be an inherently complex process for patients. Common barriers to compliance with discharge instructions among low-income patients include: feelings of powerlessness and abandonment after hospital discharge, misalignment of goals, apathy towards healthy behavior, socioeconomic constraints (such as inability to pay copays for follow up appointments), and loss of self-efficacy.[iv]

Where possible, involve patients in the discharge process to make sure they and their providers are on the same page about their treatment goals and discharge.[v]

Enroll patients in SMS programs for care transition at the point of discharge. We recommend that the hospital care team obtain consent for follow up with the patient via text messaging as part of the discharge process. For specialist referrals, enroll patients in SMS programs at intake with the primary care provider or upon receipt of the specialist referral from the primary care provider.

Patients with lower technological literacy may need a 1-on-1 tutorial before feeling comfortable using text messages.

Operational Needs

Nearly all text-messaging programs in healthcare will require operational changes. These changes range from training staff to administer the SMS platform to establishing institutional partnerships to facilitate secure, HIPAA-compliant data sharing and storage.

Appointment Reminders

It may be helpful to have a designated staff member periodically monitor incoming messages for potential patient questions or concerns.[vi]

Disease Management

Staff may need to conduct initial tutorials with patients in hypertension self-management programs to ensure adequate technological literary and foster motivation for participation. Hypertensive patients tend to be older, less technologically proficient patients. Additionally, these SMS programs will likely need nurses or an alternative healthcare professional to attend to individual cases that present with complications or serious concerns.[vii]

Diabetes self-management text messaging programs require staff to monitor outgoing and incoming

messages to respond to technical and medical issues in a timely manner. Patients new to the program may need follow-up communication soon after enrollment to make sure they understand the program, initially assess user satisfaction, and modify messaging and scheduling as needed.[viii]

Most substance abuse recovery programs require personnel to monitor incoming messages, manually respond to patients, and possibly intervene to prevent relapses. Ideally, a case manager, peer counselor or other health professional accustomed to working with alcohol and substance abuse would administer the SMS program.[ix]

Youth Health Benefits Outreach

Ultimately, an SMS program for youth health benefits outreach will rely on the safety net providers' capacity to answer questions and concerns on the enrollment process and offer assistance. Generally youth value convenience and clearly defined upfront benefits.

Staff should offer a number of follow-up options once youth opt into the program. These can include in-person enrollment, telephone outreach via a hotline, informational workshops, troubleshooting, remote scheduling and other options that allow youth to initiate and complete the enrollment process in a way that fits their communication style and needs.

For safety net providers less experienced in youth outreach, seek partners with ties to youth groups. There is a relatively low demand for communication in other languages than English among youth. Youth who have immigrated tend to have native or near native English proficiency.

Care Coordination

We recommend that the patient-centered medical home (PCMH) establish a partnership with one or more hospitals to establish the foundation for a seamless care transition process. This partnership should provide secure, HIPAA-compliant data sharing including discharge instructions and patient medical history. Ideally, hospital discharge will automatically notify the PCMH of the patient's discharge instructions.

Evidence for effective text-messaging programs for specialist referrals is limited at best. We recommend consulting with both primary care providers and specialists who will use the system to ensure the design meets clinical needs.

Specialist referral systems may consist of either a *patient-focused model* or a *provider-focused model*. A patient-focused model directs the patient to make the specialist appointment and encourage the specialist to share follow-up instructions with the primary care provider (PCP). Provider-focused models come in two types:

- Direct communication between the PCP and the specialist[x]

- Moderated consultation directed by a third party between the PCP and the specialist (such as the Health Leads model or San Francisco's eReferral system). [xi]

Regardless of the model chosen, primary care clinics should be matched with relevant specialists to ensure secure, HIPAA-compliant data sharing. If matching is not feasible, the efficacy of the referral system relies

on the patient to complete referrals and necessary follow up. This may be less effective, as observed with current specialist referral systems. To further support completion of referrals, allow patients to schedule their specialist appointment or indicate time and date preferences through the SMS program.

Technological Specifications

Text-messaging platforms fall into two categories:

- Stand-alone solutions

- Electronic health record (EHR)-integrated systems

Most of the interventions assessed from peer-reviewed literature were stand-alone solutions. Safety net providers will need to assess their internal capacity and budgetary constraints when considering implementation of an EHR-integrated system.

Appointment Reminders

Most, if not all, appointment reminder SMS programs will use an automated system to send standardized reminders on a predetermined schedule. This system can either be a stand-alone solution or an EHR-integrated system. Integration offers the capability to add automated reminders for screenings or lab tests.[xii]

Disease Management

At minimum, hypertension management SMS systems should remind patients to take medications as prescribed. Additional features include well-designed prompts to support patients' monitoring and reporting changes in blood pressure over time, storage of the medication intake schedule, and education about healthy lifestyle changes.

Diabetes self-management programs should allow healthcare personnel, with proper training, to review incoming and outgoing texts and easily create and edit texting schedules and content based on the patient's reported satisfaction and response to treatment.

Personalization is the key to effective SMS programs for substance abuse recovery. Ideally, patients should be able to develop user-generated messages to supplement programmatic messages, or co-develop the programmatic messages delivered through the system.[xiii] The ability to connect and communicate directly with either peers or health professionals will further support patient engagement and social support.[xiv]

Youth Health Benefits Outreach

We recommend that safety net providers tailor messages to youth as much as possible. Important considerations include zip code, key health concerns and benefits, reminders of prior connections/visits and enrollment deadlines. Ideally, youth should feel that messages are coming from a person who knows them rather than an automated system.

Care Coordination

We recommend transmitting the patient's discharge summary to the PCMH care team through an

automatic electronic notification. If this notification is not possible, the PCMH will need a HIPAA-compliant database to input and store the discharge summary to ensure continuity of care.

Safety net providers should develop standardized messaging templates and disease and treatment codes in cooperation with specialists and hospital care teams where possible for clarity in communication while ensuring privacy and security of personal health information.[xv]

Content Development

Good text message content incorporates language that will engage patients while providing effective knowledge and support for healthy behaviors. However, the evidence for validated text message content varies widely across different applications of SMS programs.

Appendix I contains tables with recommended content categories and messaging schedules along with specific language where available.

Appointment Reminders

Appointment reminder SMS programs should use standardized messaging templates, almost without exception. To encourage higher attendance, safety net providers may emphasize the importance of the scheduled visit by connecting attendance to beneficial health outcomes.[xvi] Additionally, it may be helpful to deliver two sets of appointment reminders:

- One message sent a few days before the appointment
- One message sent the day before the appointment.

A detailed schedule can be found in Table 1 in Appendix I.

Disease Management

One study concluded that visual and audio prompts were important factors in improving usage of hypertension SMS programs. Ideally, users should be able to specify the type of reminders they want to receive. For medication adherence, prompt patients to indicate "not taken," "taken," or "snooze" to temporarily turn off reminders. Other reminders include appointment reminders and reminders to monitor and report routine blood pressure readings. Content may also cover lifestyle modifications, such as dietary changes, physical activity and stress reduction. Table 2 contains an example schedule for hypertension management in Appendix I.

The American Diabetes Association has defined self-care recommendations that should inform messaging. Core content categories include:

- Medication adherence
- Foot care
- Appointment attendance
- Lifestyle changes

- Recommended physical activity

- Preventive health behaviors

- Blood sugar monitoring

Messaging frequency will depend on treatment goals identified by the patient and provider. For example, daily medication reminders may be necessary, unless the patient feels confident they do not need support for medication adherence. For other diabetic concerns like foot care, weekly reminders may suffice.

The ability to customize content is crucial. Patients should be able to specify what additional messages they would like to receive. Requiring patients to respond to questions may increase achievement of diabetes self-management goals.[xvii] Examples of specific text messages and schedules for diabetes self-management can be seen in Table 3 in Appendix I.

We recommend assessing the patient population as the first step of the message development process for alcohol and substance abuse recovery. Characteristics that may help to segment the audience and tailor messaging include:

- Age

- Gender

- Other demographic data

- Treatment history

- Harm appraisal

The Primary Appraisal of Harm Measure is one of several tools for harm appraisal.

Patients should be able to receive and respond to messages appropriate for each phase of recovery:

- Treatment entry

- After 90 days of being substance free

- High-risk of relapse

- Post-relapse

Patients tend to prefer messaging that emphasizes the benefits of remaining sober (gain-framed messaging) rather than the disadvantages of substance abuse (loss-framed messaging).[xviii]

We suggest sending one message in the late afternoon or evening, daily for 3 months.[xix] For more specific examples of messaging content categories and specific wording for alcohol and substance abuse recovery, refer to Tables 4 and 5.

Youth Health Benefits Outreach

Youth are typically considered "digital natives," a term that reflects their high level of tech literacy. Three factors that most affect youth interest in health benefits enrollment are personalization, affordability and

privacy. Messages should clearly state and reinforce the affordability of healthcare coverage for most young adults. Helpful resources such as a subsidy calculator and potential discounts should always be paired with incentives and perceived benefits to allow patients to personally assess how healthcare coverage would be beneficial and convenient to obtain.[xx]

For youth who may be undocumented immigrants, highlighting eligibility requirements can reduce fears and misperceptions. Youth also need reassurance that their personal health information is secure and only viewed by those with explicit permission, so address privacy matters clearly and thoroughly.

Lastly, basic education on premiums and copays may be necessary following enrollment, in addition to premium payment reminders. The recommended messaging frequency is twice monthly.[xxi] Examples of content categories and schedule for youth health benefits outreach can be seen in Tables 6 and 7 in Appendix I.

Care Coordination

Messages for care transition should either focus on a subset of discharge instructions dedicated to adherence (eg. medication and appointment adherence) or delivery of a tailored intervention focused on self-management goals for a specific medical condition under treatment (eg. heart failure).

For interventions targeting adherence, the automated text-messaging system should be occasionally monitored for responses that indicate potential concerns with additional phone follow up conducted as needed. Self-management interventions should be closely monitored 24 hours daily for signs and symptoms of complications that could contribute to avoidable ER visits and readmissions. Patients should be able to directly contact a member of the care team or a designated proxy if necessary.[xxii]

We suggest using standardized messaging templates and algorithms for adherence interventions medication reminders and prompts for patients to report if they are taking medications as prescribed. Medication reminders should be tailored according to the prescribed medications and dosages found in the patient's discharge summary. Medication intake should be kept in a HIPAA-compliant database alongside all messages sent and received from patients or as part of the patient's EHR.[xxiii]

Self-management content may also educate patients about signs of serious complications, symptom management, lifestyle changes, and how to navigate the healthcare system. For more specific examples of messaging content categories and delivery schedule for care transition, refer to Table 8.

As with care transition, text messaging for specialist referrals should use standardized messaging templates along with defined disease and treatment codes. For more specific examples of messaging content categories and delivery schedule for specialist referrals, refer to Table 9.

Evaluation

Because text messaging is still in its infancy for some applications, thorough evaluation is essential to define best practices. Evaluation should include process measures that assess if the intervention is delivered as intended as well as outcome measures that assess whether the intervention improved patient outcomes.

Process Measures

Program process measures should include the refusal rate (the percentage of patients who refused to participate compared to patients who were invited or approached to participate) as well as the participation rate. Other program process measures include the program completion rate and the attrition rate.

Messaging process measures include the percentage of successfully delivered messages, the message open rate, patient response and non-response rate, and the opt-out rate.

SMS programs should also include both quantitative and qualitative user and staff feedback.[xxiv]

Outcome Measures

Outcome measures for SMS programs will vary based on the particular application or use case. Some of the most common outcome measures are included in Table 10 in Appendix I.

Conclusions and Insights

Text messaging holds great promise to support and extend communication between medically underserved populations patients and safety net healthcare professionals. To continue building the field, keep in mind the following key considerations for scaling and sustaining successful SMS interventions.

Patient Barriers

In both peer-reviewed literature and qualitative interviews, we noted that the high rate of turnover of phone numbers among patients may pose a problem for sustained participation in text messaging programs. Patients in low income, underserved communities tend to own inexpensive handsets, which are replaced often due to wear and tear, loss, theft and other reasons. Furthermore, patients may not have unlimited text messaging plans for their phones, which may make participation cost-prohibitive.[xxv]

Individual technological literacy varies widely among patients. Youth tend to be both technologically savvy and interested in using technology to manage their health, while other populations may shun the use of technology. Healthcare providers should aim to understand how to segment their patient population with regard to technological interest and ability to determine how to effectively recruit and engage patients in a text-messaging program.

Cost

Financial costs to consider are the direct and associated costs to the healthcare facility for sending and receiving text messages. While text messaging is inexpensive to set up and operate for small- to medium-sized populations, outreach to large populations may substantially increase the program costs.

Additionally, the administrative costs of personnel to monitor and respond to incoming messages should be considered in the context of a cost benefit analysis that weighs the cost of operating the intervention compared to the savings due to improved patient outcomes and patient experience, and increased efficiencies in care delivery.[xxvi]

Clinical Workflow

Implementation will likely require changes to clinical workflow. Personnel will need to monitor incoming messages and respond to patient inquiries in addition to improving performance of the intervention over time.

Staff may require training to administer the system and healthcare organizations will need to plan for anticipated temporary changes in productivity as staff incorporates use of text messaging into their workflow.

Technological Integration

An important technological decision when designing a text-messaging intervention is whether to implement a stand-alone solution or integrate a text-messaging package into the existing EHR and patient portal.

Advantages of a stand-alone solution include:

- Greater ease of technological implementation
- Less training and support needed
- Greater clarity of patients' technological literacy and satisfaction

Disadvantages include:

- Lack of shared health data and information with patient records
- Potentially more disruptive changes to clinical workflow if plans are made to integrate the stand-alone solution into the EHR at a later date.

Based on the literature review and research, it seems that best practices for transitioning from a stand-alone solution to an integrated solution have not yet been identified.

An integrated solution is advantageous for its stability and sustainability as well as potential to further improve patient outcomes by integrating data into existing systems. However, implementation of an integrated solution may require more significant changes to clinical workflow.

Policies and Incentives

Lastly, policy changes and incentives have emerged to support scaling and sustaining text-messaging programs.

Some safety net providers are actively seeking to partner with health plans to for incentives to partially or completely cover the costs of supporting the text-messaging platform, often through pay-for-performance reimbursement linked to patient outcomes. The Centers for Medicare and Medicaid have an Electronic Health Record (EHR) incentive program that provides safety net clinics with incentives for demonstration of attainment of meaningful use of certified EHRs.

[i] Gurol-Urganci I, de Jongh T, Vodopivec-Jamsek V, Atun R, Car J. Mobile phone messaging reminders for attendance at healthcare appointments. Cochrane Database of Systematic Reviews 2013, Issue 12. Art. No.: CD007458.

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[xviii] Muench F, Weiss R, Kuerbis A, et al. Developing a Theory Driven Text Messaging Intervention for Addiction Care With User Driven Content. Psychology of Addictive Behaviors 2013; Vol. 27, No. 1: 315-321.

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[xx] Interview with Tobin Van Ostern, Young Invincibles.

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Appendix I:

Tables

Appointment Reminders Messaging (Table 1)

Text #	Schedule	Example Message Content
1	- Deliver the reminder no later than 24-72 hours before the appointment - Send reminders for morning appointments at 8-9 am - Send reminders for afternoon appointments at 4-5 pm - Send reminders for Monday appointments on the Friday before	- You have an appointment at \<name of practice\> \<today/tomorrow\> at \<time\>. Please call \<number\> if you can't make it. - Reminder: Physical therapy appointment at [site] on \<day\>, \<date\> at \<time\>. Please call \<number\> ONLY if you cannot attend. - This is a reminder for your appointment at…
2	Send no later than 24 hours before the appointment	Rigorous and regular follow-up is essential to timely and successful management of childhood cataract.

Source: Gurol-Urganci I, de Jongh T, Vodopivec-Jamsek V, Atun R, Car J. Mobile phone messaging reminders for attendance at healthcare appointments. Cochrane Database of Systematic Reviews 2013, Issue 12. Art. No.: CD007458.

Hypertension Management (Table 2)

Schedule	Response Type	Message Content
Daily	- Taken - Not Taken - Snooze	Picture of medication with text information to remind patient.
As needed	- Will go - Will not go	You have an appointment on December X, 20XX

Source: Patel S, Jacobus-Kantor L, Marshall L, et al. Mobilizing Your Medications: An Automated Medication Reminder Application for Mobile Phones and Hypertension Medication Adherence in a High-Risk Urban Population. J Diabetes Sci Technol 2013 7: 630.

Diabetes Self-Management (Table 3)

Schedule	Response Required?	Message Content
Daily	Yes or No	Did you take your diabetes medications today?
Daily	Yes or No	Have you checked your blood sugar?
Weekly	Yes or No	Have you checked your foot's condition this week?
Monthly	Yes or No	You have a scheduled appointment on December X, 20XX.

Source: Dick, J. J., S. Nundy, M. C. Solomon, K. N. Bishop, M. H. Chin, and M. E. Peek. "Feasibility and Usability of a Text Message-based Program for Diabetes Self-management in an Urban African-American Population." *National Center for Biotechnology Information*. U.S. National Library of Medicine, 1 Sept. 2011. Web. 10 Feb. 2014.

Substance Abuse Recovery (Tables 4 and 5)

Risk Management (Table 4)

Risk Group	Content Categories	Example Text
Non-risk group	• Drinking and body weight/fitness • Resisting peer pressure • Pros of sensible drinking • Motivation to maintain sensible drinking	Hi Sarah. You are not just a follower who drinks alcohol to fit in. Awesome! This shows strength of character and can even impress others. Only do what you think is right.
Low-risk group	• Drinking and body weight/fitness • Resisting peer pressure • Pros of sensible drinking • Motivation for sensible drinking • Alcohol-related problems • Maximum number of drinks on a single occasion and related risks • Risks of binge drinking • Importance of reducing alcohol consumption • Biweekly text messages sent on the individual's typical drinking day and time that included	Hi. You would like to drink less alcohol. That's a smart decision for you! If you consume less alcohol, you will feel better and have more energy the next day.

	strategies to reduce alcohol consumption and motivation for sensible drinking practices	
High risk group	- Drinking and body weight/fitness - Resisting peer pressure - Pros of sensible drinking - Motivation for sensible drinking - Alcohol-related problems - Maximum number of drinks on a single occasion and related risks - Risks of binge drinking - Importance of reducing alcohol consumption - Local outpatient services for alcohol counseling - Biweekly text messages sent on the individual's typical drinking day and time that included strategies to reduce alcohol consumption and motivation for sensible drinking practices	Hey Mike. You recently had 14 drinks on one occasion. Your blood alcohol concentration was about 0.34% at that time. With that amount of alcohol in your blood, you can experience unconsciousness, loss of memory, shallow breathing, a reduction of body temperature and loss of reflexes. Watch out!

Source: Haug S, Schaub MP, Venzin V, et al. A Pre-Post Study on the Appropriateness and Effectiveness of a Web and Text Messaging-Based Intervention to Reduce Problem Drinking in Emerging Adults. J Med Internet Res. 2013 September; 15(9): e196.

Content Categories for Alcohol and Substance Abuse Recovery (Table 5)

- Support for helping relationships (fostering social support either from a group or individual) - Self and environmental reevaluation - Motivation/self-liberation - Spirituality - General encouragement and self-efficacy	- Cognitive reframing - Behavioral counterconditioning - Consciousness raising - Reinforcement management - Stimulus control - Alcoholics Anonymous (AA) "pearls" (slogans such as "one day at a time" or "easy does it.")

Source: Muench F, Weiss R, Kuerbis A, Morgenstern J. Developing a Theory Driven Text Messaging Intervention for Addiction Care With User Driven Content. Psychology of Addictive Behaviors 2013. Vol. 27, No. 1, 315–321.

Youth Health Benefits Outreach (Tables 6 and 7)

Example Schedule for Youth Health Benefits Outreach (Table 6)

Text #	Schedule	Example Message Content
1	Deliver before the eligible birthday	• Hi <Name>! Because you have visited <Provider Name>, we wanted to offer to help you receive the healthcare coverage that you deserve. To receive more information, please reply YES. • Hi <Name>! Because <Provider Name> cares about your health, we wanted to offer to help you receive the healthcare coverage that you need. To receive more information, please reply YES. • You have <XX> days left to sign up for healthcare coverage. To receive more information, please reply YES.
2	Deliver after opt-in	• Healthcare coverage is more affordable than you think! If you make less than $15k, you can get free or low-cost coverage. For more info, text INFO. • Healthcare coverage allows you to get free birth control. For more info on enrollment, text INFO.
3	Deliver after request for more information	• You can apply at Healthcare.gov. Have questions? Call our hotline, text HELP to schedule an appointment with a community health specialist, or visit our FAQ at <insert link>

Sources: Interviews with Tobin Van Ostern, Young Invincibles; Becky Lee and AJ Titong, APIAHF

Content Categories for Youth Health Benefits Enrollment (Table 7)

Text #	Content Categories
Pre-enrollment	• Affordability • Eligibility • Ease of enrollment • Deadline for enrollment
Enrollment	• Resources to assist enrollment • Calculation of discounts and subsidies
Post-enrollment	• Education about premiums and copays • Payment reminders for premiums

Sources: Interviews with Tobin Van Ostern, Young Invincibles; Becky Lee and AJ Titong, APIAHF

Care Transition (Table 8)

Adherence Content Categories	Self Management Content Categories

• Medication adherence
    o Name of medication
    o Dose
    o Frequency
    o Duration
• Appointment adherence
    o Date
    o Time
    o Request for appointment confirmation and attendance
	• Medication adherence (daily reminders and messages about the importance of adherence)
	• Dietary compliance (educational messages)
	• Appointment adherence
	• Signs and symptoms of common complications recognition
	• Symptom management
	• Healthcare navigation (getting in touch with the physician, medication pickup and refills, dealing with complications of paying for meds)

Sources: Nundy S, Razi RR, Dick JJ et al. A Text Messaging Intervention to Improve Heart Failure Self-Management After Hospital Discharge in a Largely African-American Population: Before-After Study. J Med Internet Res. 2013 Mar 11;15(3):e53. Suffoletto B, Calabria J, Ross A, et al. A Mobile Phone Text Message Program to Measure Oral Antibiotic Use and Provide Feedback on Adherence to Patients Discharged From the Emergency Department. Acad Emerg Med. 2012 Aug;19(8):949-58.

Specialist Referral Loop (Table 9)

Patient-Focused Model			
Text #	**Sender**	**Receiver**	**Content Categories**
1	PCP	Patient	• Reason for referral • Specialist name • Specialist contact information
2	PCP	Patient	• Confirmation of appointment completion • Request to contact specialist to send notes to PCP
Provider-Focused Model: Direct Communication			
Text #	**Sender**	**Receiver**	**Content Categories**
1	PCP	Specialist	• Patient initials, date of birth, sex • Reason for referral (symptoms) • Specialist name • Specialist contact information • Preferred appointment time (optional)
2	Specialist	PCP	• Patient ID • Diagnosis • Treatment • Advice for follow up

3	PCP	Patient	• Confirmation of appointment completion • Request to contact specialist to send notes to PCP

Provider-Focused Model: Third Party

Text #	Sender	Receiver	Content Categories
1	PCP	Third party	• Patient initials, date of birth, sex • Reason for referral (symptoms) • Preferred appointment time (optional)
2	Third party	Specialist	• Patient initials, date of birth, sex • Reason for referral (symptoms) • Preferred appointment time (optional)
3	Third party	Patient	• Appointment time • Request for confirmation
4	Specialist	Third party	• Patient ID • Diagnosis • Treatment • Advice for follow up
5	Third party	PCP	• Patient ID • Diagnosis • Treatment • Advice for follow up

Sources: Garg A, Sarkar S, Marino M, et al. Linking urban families to community resources in the context of pediatric primary care. Patient Educ Couns. 2010 May ; 79(2): 251–254. Dusabe J, Nnko S, Changalucha J, et al. Design of a community-based mobile phone text message referral intervention in Tanzania. *J Telemed Telecare* 2013 19: 295.

Outcome Measures (Table 10)

Use Case	Measures
Appointment reminders	• Appointment attendance rate • No show rate • Cancellation rate • Time to third next available appointments
Hypertension management	• Medication adherence • Appointment adherence • Patients with controlled blood pressure • Percentage of patient self-management goals achieved • Clinical indicators (blood pressure monitoring, LDL, weight loss)
Diabetes self-management	• Percentage of patient self-management goals achieved • Clinical quality indicators (eg. A1C, LDL, blood pressure, foot exams, retinal exams)
Substance abuse recovery	• Patient self-management goals achieved • Program completion rate • Relapse rate • Patient self-efficacy
Youth health benefits enrollment	• Percentage of youth who seek additional information • Percentage of youth who enroll for healthcare coverage
Care transition	• Readmission rate • Appointment attendance rate • No show rate • Medication adherence • Closure time for specialist referrals
Specialist referral rate	• Appointment attendance rate • Completed referral rate

Appendix II:

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7. Youth outreach for health enrollment

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Tobin Van Ostern, Young Invincibles
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