PROMOTING CHRONIC CONDITION MANAGEMENT THROUGH MOBILE TECHNOLOGY

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Acknowledgments

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Summary of Discussion

- Overview
- Background & Significance
- Intervention
- Design & Methods
- Preliminary Results
- Discussion, Q&A

Overview

- Study Type: Proof-of-concept pilot study
- Objective: To evaluate the feasibility of improving care for adult diabetes patients in an urban safety net setting by providing between-visit appointment reminders and chronic disease support through cell phone text messaging
- Hypothesis: Patients will show improvements in attendance rates, perceived self-efficacy, and level of satisfaction with chronic disease management

Background & Significance

- Diabetes is spreading at epidemic pace worldwide, with tremendous associated health and financial impact.[1-4]
  - 20 million persons in US alone, 171 million worldwide
  - $174 billion in costs in 2007, projected to reach $192 billion by 2020
  - Vascular complications from diabetes are the leading cause of morbidity and mortality among patients and account for 1/3 of costs.
  - The vulnerable and medically underserved are disproportionately affected by chronic conditions, including diabetes.

Background & Significance

- Chronic disease management support is of critical importance in diabetes care.[5-17]
  - Associated with improved diabetic control, better health status, and better perceived self-efficacy at managing chronic conditions
  - Self-management is associated with delay and/or prevention of vascular complications
  - Patient-provider communication & patient knowledge of health information (e.g. lab values) are associated with improved self-management

Background & Significance

- Traditional disease management strategies are increasingly challenging.[18-19]
  - Limitations of provider-based visits
    - 20 minutes every 3 months
    - Multiple competing priorities
  - Self-management program implementation in a large, diverse population is both difficult and resource-intensive

Background & Significance

- HIT has proven beneficial in managing complex chronic conditions outside the clinic setting.[20-29]
  - 75% of patients with chronic conditions report that online information has affected their health care decisions
  - HIT combined with case management strategies has been shown effective at improving blood pressure and glycemic control
  - The underserved have indicated both desire for and receptivity toward technology-based information sharing with providers; however, the effect of the digital divide limits current information on HIT impact

Background & Significance

- Patient-centered mobile communications technology may help bridge the gap.[30-35]
  - Cell phone access has been associated with knowledge of health information
  - High rates of cell phone access are reported among US groups with low rates of computer and Internet use (e.g. 71% Blacks, 59% Hispanic/Latin@)
  - Text messaging is widely accepted both in the US (58% of cell phone users) and globally
  - Text messaging has been associated with improved glycemic control when used to assist with case management

Intervention

- The *P*atient *R*elationship *M*anagement System (PRM)
  - Sends SMS text to patients' cell phones
    - Blood Glucose Measurement Requests
    - Medical Appointment Reminders
  - Patients reply to message as prompted by return SMS text
  - System returns acknowledgement of received message (closed-loop communications)
  - Case coordinators review system-categorized responses and follow up by phone as needed

Intervention

- Blood Glucose Request Example
  - PRM: “Today is Mon, Nov 8. What is your fasting blood sugar today?”
  - Patient: “167”
  - PRM: “Your msg (167) was received. Thank you!”

Intervention

- Medical Appointment Reminder Example
  - PRM: “Your appt is on Mon, Nov 8 at 12:30 PM at Westside Clinic. Will you go? Reply Yes or No.”
  - Patient: “Yes”
  - PRM: “Your msg was received. Thank you! If you need to cancel, call Westside Clinic 303-436-4200 or Denver Health 303-436-4949”

Research Design & Methods

- Study Design
  - Prospective cohort
    - Adult diabetic patients with cell phones who receive primary care in an urban safety net
    - 47 patients enrolled
    - 3-month intervention period
  - Outcomes of Interest
    - Appointment attendance
    - Patient perceived self-efficacy
    - Patient engagement with intervention
      - Text message response rates
      - Mean text message response times
      - Common opinion themes

Research Design & Methods

- Population & Setting
  - Denver Health: an urban safety net
    - 150,000 patients with over 600,000 outpatient visits annually; 8 FQHCs
    - Provides care for 1 in 4 Denver residents and 35% of Denver's children
    - Approximately 65% of DH patients are below 185% of the federal poverty level
    - Over 50% of DH patients are uninsured
    - Over 70% of DH patients represent ethnic minorities

Research Design & Methods

- Population & Setting
  - Sam Sandos Westside Family Health Center
    - Largest clinic in DH Community Health Services
    - Over 12,000 adult patients (>46,500 visits in 2007)
    - Over 1,400 adult diabetic patients
    - 9 internists, 1 nurse practitioner, 4 RNs
    - 80% of Westside patients represent racial and ethnic minorities
    - 35% of Westside patients are uninsured
    - 51% of Westside patients are on Medicaid

Research Design & Methods

- Population & Setting
  - Denver Health Diabetes Registry
    - Dynamically maintained as part of the DH data warehouse; data updated once per week
    - Registry Inclusion Criteria:
      - Adult patient (18+)
      - Active patient (at least 1 primary care visit at a CHS clinic within the previous 18 months)
      - Diabetes diagnosis (ICD-9 code of 250.xx, 357.2, 362.0x, 366.41, or 648.0x)

Research Design & Methods

Demographics of DH Adult Diabetic Registry Patients

	DH		Westside*	
	N = 7,484	%	N = 1,485	%
Age				
18-29	253	3.38	50	3.37
30-39	704	9.41	114	7.68
40-49	1,386	18.52	272	18.32
50-59	2,088	27.90	390	26.26
60-64	997	13.32	214	14.41
>65	2,051	27.41	445	29.97
Race/Ethnicity				
White	1,368	18.28	199	13.40
Black	1,290	17.24	42	2.83
Latino	4,191	56.00	1197	80.61
Asian	129	1.72	3	0.20
Other/Unknown	506	6.76	44	2.96
Gender				
Male	3,026	40.43	585	39.39
Female	4,458	59.57	900	60.61
*eligible for intervention based on inclusion/exclusion criteria				

Research Design & Methods

- Enrollment
  - Patients selected from the diabetes registry who meet criteria:
    - Are between 18 and 76 years old
    - Primary language of English or Spanish
    - Ownership of qualifying cell phone (SMS text capable); or caregiver/support w/ cell phone
    - Ownership of glucometer
    - Consent to participate

Research Design & Methods

- Data Collection & Analysis Plan
  - Mixed-methods approach
  - Quantitative (frequency, rate, logistic regression):
    - Appointment no-show rates
    - Message response rates
    - Message response times
    - Patient perceived self-efficacy pre and post intervention
  - Qualitative (content analysis):
    - Provider interviews
    - Patient focus groups
    - Unstructured feedback/comments from patients during study exit session

Preliminary Results

- PRM messages: July 7 – December 7
  - Staggered enrollment
    - 47 patients total
      - Three-quarters Latin@ (76.6%)
      - Two-thirds female (65.9%) to one-third male (34.0%)
      - One-third in their 50s (36.2%); one-quarter in their 40s (27.6%)
    - Each group sent messages over 3 months
    - All patients receive both types of messages
      - Blood Glucose Measurement Requests
        - 3 times per week between 7:00 – 7:30 AM (M, W, F)
      - Medical Appointment Reminders
        - 7 days, 3 days, and 1 day prior to each appointment
        - Sent for all appointments, not only diabetes-related

Preliminary Results

- Message Response Rate*
  - Total requests sent: **1585**
  - Total responses: **1080 (68.14%)**
    - Average time: 2 hr, 59 min, 55 sec
  - "Recognized" responses: **1066 (67.26%)**
    - Average time: 2 hr, 56 min, 11 sec
  - Response rate range: **2.94% - 100%**
  - Average time range: 20 sec – 23h:36m:27s

*Data to date, unadjusted

Preliminary Results

- Patients are willing to engage with PRM in sophisticated/detailed responses
  - Offering greetings & message signatures
  - Explaining possible reasons for glucose levels
  - Providing information for multiple persons
  - Requesting additional engagement or information from the system

Preliminary Results

- PRM can facilitate early intervention
  - Patient X submitted multiple out-of-bounds blood glucose measurements in succession
  - Each out-of-bounds measurement received automatically activated a flag to draw the attention of the care coordinator
  - Follow-up by phone allowed the care coordinator to discern that Patient X had recently undergone a change in medication
  - Appointment was recommended with Patient X's PCP for resolution prior to emergent issues

Preliminary Results

- PRM can facilitate increased patient engagement in diabetes care behaviors
  - Patient X is a ‘complex patient,’ with multiple chronic conditions
  - Due to competing priorities, has previously been less engaged in diabetes care during clinic visits
  - Has text message response rate of 100%
  - PCP reports Patient X is now more invested in diabetes care and has excellent blood sugar control

Discussion

- Limitations, Lessons Learned, & Future Concerns
  - Study still in progress
  - 3-month period insufficient to show change in health outcomes
  - Enrollment challenges
  - Variation among mobile service providers
    - Message delivery
    - Message time-out/expiration
    - Message formatting & additional attached data
    - Little service provider turnover noted among patients
  - Preventing message fatigue
  - Protecting health information and patient privacy
- Future Direction
  - Expand scale beyond pilot scope of intervention; economic evaluation, health outcomes analysis
- Q & A

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