Final Progress Report

Engaging disadvantaged patients in sharing patient generated health data and patient reported outcomes through health information technology

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Structured Abstract

Purpose: This study assessed the feasibility of using commercial off-the-shelf (COTS) health information technology (IT) to collect and report patient generated health data (PGHD) and patient reported outcomes (PROs) from diverse, disadvantaged patients in an urban safety net health care system.

Scope: Good self-management is essential to high-quality care for chronic conditions. This is especially true for disadvantaged patients, who experience more severe impact of chronic disease. Monitoring PGHD and PROs over time can improve health outcomes for patients with chronic conditions. Patient-centered COTS health IT can improve self-management by facilitating collection of PGHD and PROs between clinic visits.

Methods: This was a sequential integrated mixed methods study with 3 phases: a qualitative formative phase, a randomized controlled trial (RCT) to assess PGHD and PROs data collection feasibility through COTS health IT solutions, and development of a data model, terminology map and set of FHIR resources to facilitate future data integration into clinical information systems.

Results: Patients preferred providers to recommend technology solutions for use versus self-selection. Providers preferred to receive summary PGHD and PROs data in proximity to clinic visits versus access to an information stream over time. A total of 300 patients between 18 and 81 years old participated in the RCT, of whom most were female and White or Hispanic/Latino. Patient engagement significantly improved over baseline, with a 4% increase at the highest level of engagement. Seventy-two percent of participants responded to text messages with weight data and 60% responded with PROs data through mobile app messaging.

Key Words: digital health, health information technology, patient engagement, chronic disease management

Purpose

The purpose of this study was to demonstrate the feasibility of using patient-centered commercial off-the-shelf (COTS) health information technology (IT) solutions to: 1) collect patient-generated health data (PGHD) and patient-reported outcomes (PROs) from diverse, disadvantaged populations, and 2) report PGHD and PROs in a way that will allow them to be integrated into clinical information systems and used to improve care.

Patient engagement is critically important in achieving good chronic disease management. Obtaining PGHD and PROs from engaged patients can help improve chronic disease management in primary care. This is especially important for disadvantaged patients, who are disproportionately affected by chronic disease. While health IT solutions have been shown to improve chronic disease self-management, adoption and use of costly, specialized technologies

among disadvantaged patients is lower than among higher-income populations. In contrast, COTS technologies such as mobile phones are more accessible to and widely adopted by disadvantaged patients.

The central research hypothesis for this study posited that 1) low-income, disadvantaged patients both could and would provide high quality PGHD and PROs through COTS-based health IT solutions, and 2) these data could be integrated into clinical systems and used to improve health care quality and delivery. The research team proposed to test this central hypothesis through a sequential integrated mixed methods approach that incorporated a qualitative formative phase and a randomized controlled trial.

This study had three specific aims. The first aim was to assess the needs and preferences of disadvantaged patients and the primary care providers who care for them regarding the use of health IT to collect PGHD and PROs. The second aim was to demonstrate the feasibility of PGHD and PROs collection through COTS health IT solutions in a randomized controlled trial of a patient-centered intervention for weight management. Finally, the third aim was to create an ontology mapping tool and a set of interoperability resources which can be used to support integration of PGHD and PROs into EHRs and other clinical information systems.

This work proposed to create a foundation that could be used to help circumvent barriers to health care access, improve chronic disease management for disadvantaged patients, improve communication and knowledge sharing between patients and providers, and support the collection and integration of actionable health data into clinical systems and big data infrastructures. By demonstrating the feasibility of PGHD and PROs data collection through COTS health IT solutions, this study showed the capability of engaged patients from priority populations to actively participate in their own chronic disease management. Furthermore, by providing a standards-based set of resources to facilitate integrating PGHD and PROs data into a multitude of clinical systems, this study created a tool to make these data actionable for use in improving health care quality and delivery.

Scope

Background and Context

Obesity is a complex chronic disease associated with increased mortality and higher risk for more than 20 other chronic diseases and health conditions, including hypertension (HTN), diabetes (DM), hypercholesterolemia, heart disease, stroke, and certain cancers (1-9). Fully a third of HTN cases can be attributed to obesity, and more than 80% of people with DM are overweight or obese (10). The lifetime risk of coronary heart disease is 7% higher among obese people than those of normal-weight (11). A total of 112,000 people die annually from obesity-related causes (8). In the last 30 years, obesity rates have doubled in the United States (US) among adults to 35% for men and 40% for women, and tripled to 17% among children (11-14). This affects 85 million people in the US and 500 million people worldwide (11-14).

The impact of chronic disease is much worse for disadvantaged patients. These are patients who are primarily served by the health care safety net (15), which is comprised of health systems and providers who care for patients regardless of their ability to pay. These patients represent racial and ethnic minorities, low-literacy populations, people with disabilities, children and the elderly, those living in rural areas, the uninsured, the underinsured, and those with low income. In the United States, disadvantaged patients are more greatly burdened by chronic disease (16-19) and also experience disparities in treatment. Significantly higher prevalence of chronic disease has been observed among blacks, Latinos, and Asians than among whites, as well as among those near or below the federal poverty level as compared to those 200% or more above it (20-22). Blacks and Latinos receive worse care than whites (40% and 60%, respectively) and have more difficulty accessing care (33% and 83% of the time, respectively), and the poor receive worse care and have worse access than those with higher incomes (22-24). As with other chronic diseases, the impact of obesity is much worse for disadvantaged patients (10, 12-14, 25). Black adults are one and a half times as likely as whites to be obese; 38.2% of black men and 57.2% of black women are obese, compared to 35.4% of white men and 38.7% of white women (13). Among Latinos, the fastest-increasing population in the US, 43% of adults are obese (10, 12, 13). Of the 10 states with the highest rates of obesity, (31.7% - 35.1% obese), 9 are among the poorest in America, with 30% or more of their population living in poverty (10, 26).

Experts have concluded that obesity is a complex chronic disease which requires long-term behavioral changes (27). Evidence-based strategies for weight loss success, according to recently-updated clinical guidelines (27, 28), include engaging in comprehensive lifestyle interventions that include regular contact with and support from trained interventionists (27-29). In contrast to treatment for short-term acute conditions, care for chronic disease depends on engaging patients in successful self-management of their conditions over time, outside the setting of the infrequently-occurring, traditional 20-minute primary care clinic visit (20). This is even more important for disadvantaged patients, who have less access to clinic settings and more severe burden of chronic disease (16-18, 22-24). As part of extra-clinical engagement, regular daily and weekly logging of patient generated health data (PGHD) such as fasting glucose levels, blood pressures, minutes of physical activity, and weight has proven beneficial in chronic disease management (30-32). Such logs not only give patients an ongoing picture of their health and success at self-management, but also give providers a valuable source of information that can be used to monitor disease trends and performance over time on key indicators. In addition to the value of PGHD logging, regular collection of patient-reported outcomes (PROs) measures, or PROMs, through administration of validated instruments can provide critical ongoing information about a patient's overall health status, quality of life, co-occurring conditions, "activation" or engagement in care, activities of daily living, and perceived self-efficacy at chronic disease management (33-37). Having this information readily available to providers through integration into clinical workflows and EHRs makes it actionable for use in care planning and during clinical visits, thus improving the quality of care.

Patient-centered commercial off-the-shelf (COTS) health IT solutions can facilitate collecting PGHD and PROs from disadvantaged patients between clinical visits. Patient-engaging health IT

solutions have proven effective in chronic disease management (38), with results that include improved blood pressure control in patients with HTN (39, 40), improved glycemic control in patients with DM (41, 42), and improved medication adherence in asthmatic patients (44). Such solutions have likewise proven effective for weight loss, with outcomes that include clinically significant decreases in weight, better-sustained weight loss, and positive social support (45, 46). Despite a still-pervasive belief that disadvantaged patients are not effective users of technology, disadvantaged patients have shown clear receptivity to and interest in patient-centered health IT solutions (47-55). Studies among patients at Denver Health (DH), an urban integrated safety net health care system that predominantly cares for a diverse population of low-income, disadvantaged patients, have demonstrated patient engagement with reporting PGHD to the health care system by text message (56-58), and have shown improvements in weight loss outcomes among patients participating in a text-message based intervention aligned with the Centers for Disease Control and Prevention's (CDC) evidence-based Diabetes Prevention Program (57, 59). This offers significant potential for health interventions using technologies that have reached the point of widespread commercial availability. These commercial off-the-shelf (COTS) solutions (60) are ideally suited for collecting PROs and PGHD from patients due to their high degree of adoption and integration into daily use.

Study Setting and Participants

This study was conducted at Denver Health (DH), an urban integrated safety net health delivery system that serves as the primary health care safety net for the city and county of Denver, Colorado. DH serves approximately 175,000 individuals per year. The majority of DH patients are low-income and represent members of racial and ethnic minority groups. DH includes a 525-bed acute care hospital with an academic Level 1 Adult and Pediatric Level II Trauma Center, ten federally qualified community health centers, sixteen school-based clinics in the Denver public school system, a 100-bed non-medical detoxification facility, correctional care services for Denver's jails, a health maintenance organization, the 911 medical response system, a 24-hour nurse line, the Rocky Mountain Poison and Drug Center, and the Denver Public Health department.

Patient participants for this study were recruited from among DH overweight and obese adults (BMI 25.0-39.9, 18+ years) who were considered to be at medium health risk according to a risk stratification algorithm developed by DH and used in its 21st Century Care model to tailor care to patients according to level of need (61, 62). Risk stratification was based on a combination of clinical criteria, a patient's diagnostic score (63), and health care utilization (63, 64). Participants in provider interviews were identified from among credentialed and licensed primary care providers employed by and affiliated with DH.

Methods

Study Design

The overall design of this project was a sequential integrated mixed methods study consisting of three phases, one for each specific aim: (1) a qualitative formative phase to refine

intervention design; (2) a randomized controlled trial to assess the feasibility of collecting weight management-related PGHD and PROs data through COTS health IT solutions; and (3) the creation of a data model, ontology mapping tool and set of FHIR resources to support integration of PGHD and PROs data into clinical information systems.

Phase 1/Aim 1. This qualitative formative phase was conducted through interviews with providers and focus groups with patients. These sessions were designed to elicit in-depth information in order to obtain a rich contextual understanding of needs and preferences for COTS health IT-based PGHD and PROs reporting, including perceived self-efficacy at doing so and an assessment of gaps in current systems. Semi-structured protocols were used to guide discussion in both interviews and focus groups. Purposive sampling was used to recruit overweight and obese adult patients in focus groups stratified by two domains: primary language (English or Spanish) and self-reported technology use (high or low).

Phase 2/Aim 2. This phase of the study was conducted as a randomized controlled trial. Recruited participants were randomized to one of two arms, intervention or control. Both intervention and control groups participated in a 16-week program where they received regular health promotion messaging about (a) food, nutrition, and diet; and (b) exercise and physical activity. Both intervention and control groups were asked to send their weights in response to a health promotion message on a weekly basis. Intervention patients were asked to track PGHD elements related to weight management through a mobile health app loaded on their phones (MyFitnessPal), and to share that information with the research team through the mobile app. Intervention patients were also asked to reply to PROM survey questions on a weekly basis. The mobile app was available in both English and Spanish, on both iOS and Android phones.

Phase 3/Aim 3. An enhanced entity-relationship (EER) data model was created for the common set of PGHD elements and PROMs identified and collected in Phase 2. The model was used to create a set of FHIR resources which can be used for future implementation to facilitate interoperable data transfer between FHIR-compliant mobile health IT solutions, EHRs and other clinical information systems.

Data Sources, Collection, and Outcome Measures

Phase 1/Aim 1. Focus groups were conducted by trained facilitators in the patients' primary language, with the assistance of a bilingual observing note-taker. Provider interview participants were identified as key informants by their peers as individuals with particular knowledge about the subject of interest. Interview and focus group sessions were recorded and professionally transcribed. Content analysis of transcript and note data was conducted to identify topics and themes emerging from discussion.

Phase 2/Aim 2. The PGHD requested included self-monitoring elements previously shown to be successful at encouraging obesity-related behavioral change (129), such as calorie intake, food logging, minutes of physical activity, and weight. Provider interviews (Phase 1) further informed final selection of data elements for tracking. Both intervention and control patients were weighed on a clinic scale and asked to complete three PROMs pre- and post-intervention. These

included the short form of the Patient Activation Measure (PAM-13), which is a validated PROM that assesses an individual's knowledge, skills and confidence in self-management behaviors (35, 36); the Health Related Quality of Life (HRQOL-4) measure, which is a validated PROM that assesses patients' overall physical and mental health status over the prior 30 days (37); and the Healthy Days Symptoms Module, which is a validated PROM that assesses physical and mental health symptoms which may have affected patients' lives over the prior 30 days (37). Both intervention and control groups received daily health promotion messaging and were asked to send their current weight every week. Intervention patients were also asked to complete the three PROMs once each per month over the course of the 16-week intervention. One PROM was collected per week, to avoid overburdening patients while ensuring a monthly collection of PROM data. The fourth week consisted of a simple check-in request to maintain the weekly communication pattern.

The primary outcome of interest for the randomized controlled trial was patient engagement. This outcome was measured by patient response rates to data requests; by the frequency of unprompted messages sent by patients to research personnel; and by performance on the PAM-13. Secondary outcomes included weight loss and performance on the HRQOL-4 and Healthy Days Symptoms PROMs pre- and postintervention. Weight loss was assessed as change in body mass index (BMI) and absolute percent weight. Descriptive statistics were computed for participant demographic characteristics (e.g., age, gender, race/ethnicity). Logistic regression and the Chi-square test of proportions were used to test differences in response rates and PROM scores between intervention and control groups. Weight loss was analyzed using the most appropriate and parsimonious multivariable regression technique, based on the nature of the outcome variable.

Phase 3/Aim 3. The PGHD elements and PROMs used in Phase 2 were reviewed for confirmed feasibility by members of the research team and used to establish a final, feasible set of data elements that were perceived to be valuable to patients and providers engaged in obesity-related chronic disease management. The data model schema and ontology mapping were documented as FHIR resources. The term "resource" is used to refer to all exchangeable content, and each FHIR resource includes: 1) common definitions and representations based on data types with reusable patterns; 2) a common metadata set; and 3) a human-readable part to aid user interpretation.

Results

Eight focus groups, 4 in English and 4 in Spanish, were held with a total of 55 patient participants (33 Spanish-speaking, 22 English-speaking) to ascertain needs, preferences, and an understanding of the PGHD that patients were interested in and willing to collect and share with providers to help with weight management. Patients were willing to share weight data, physical activity data, and food logging data through a mobile app. In addition to data identified by patients, interviews with providers revealed interest in tracking mood data and sleep data. After reviewing options among available mobile applications, the consensus among patients was that they preferred providers to select and recommend a mobile application for their use,

rather than preferring to choose one themselves. After additional review of mobile application options by the research team, MyFitnessPal was selected as the mobile application for the study, due to its availability in English and Spanish, security features, overall user interface, in-app messaging feature, and ability to track the majority of the data elements of interest.

A total of 300 patients participated in the study. Participant ages ranged from 18 to 81 years, with an average of 45 (± 14) years. The majority of participants were female (221 female, 77 male, 1 non-binary), spoke English as their primary language (64%), and were White (81%) or Hispanic/Latino (61%). Figure 1 depicts recruitment and enrollment flow for the study, and Table 1 describes participant demographics in additional detail.

Figure 1. Study Recruitment and Enrollment

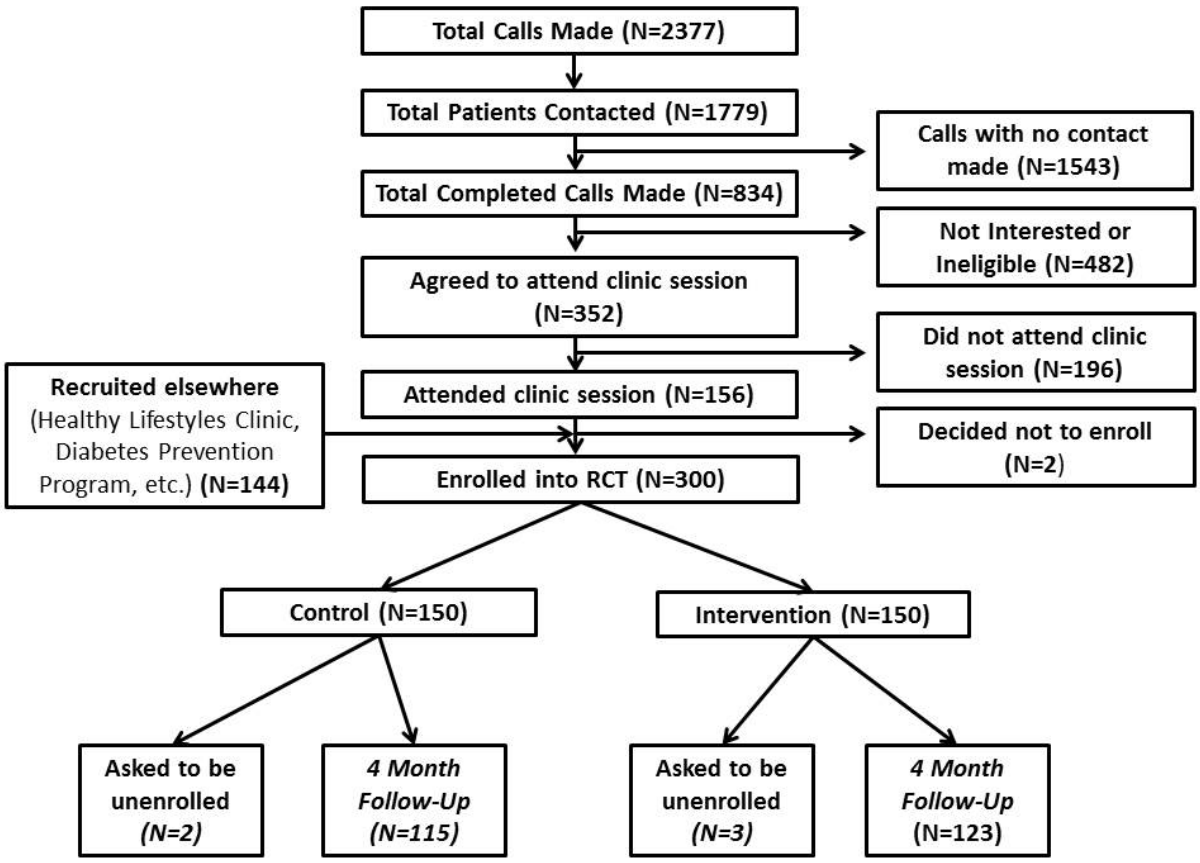

Table 1. Demographics

	Intervention n (%)	Control n (%)	Total n (%)	
Gender				p=0.3956
Female	114 (38.13)	107 (35.79)	221 (73.91)	
Male	35 (11.71)	42 (14.05)	77 (25.75)	
Non-binary	1 (0.33)	0 (0.00)	1 (0.33)	
Ethnicity				p=0.04
Hispanic/Latino	68 (26.56)	88 (34.38)	156 (60.94)	
Non-Hispanic/Latino	51 (19.92)	35 (13.67)	86 (33.59)	
Unreported	5 (1.95)	9 (3.52)	14 (5.47)	
Race				p=0.1382
Black/African American	18 (7.03)	16 (6.25)	34 (13.28)	
White	97 (37.89)	110 (42.97)	207 (80.86)	
Other*	9 (3.51)	6 (2.34)	15 (5.86)	
**Other includes Asian, Native Hawaiian, American Indian/ Alaska Native, and Unreported*				
Age				p=0.6344
	45.12 (+- 13.85)	44.30 (+- 14.14)	45.76 (+- 13.96)	
BMI				p=0.4969
	32.64 (+- 5.17)	32.20 (+- 5.44)	32.44 (+- 5.36)	
Language				p=0.8099
English	95 (31.67)	97 (32.33)	192 (64.00)	
Spanish	55 (18.33)	53 (17.67)	108 (36.00)	
DH Employee				p=0.6896
No	82 (38.14)	85 (39.53)	167 (77.67)	
Yes	22 (10.23)	26 (12.09)	48 (22.33)	
Phone Type				p = 0.5064
iPhone	52 (19.48)	54 (20.22)	106 (39.70)	
Android	85 (31.84)	75 (28.09)	160 (59.93)	
Other	1 (0.37)	0 (0.00)	1 (0.37)	
Cell Phone Carrier				p=0.3022
Verizon	19 (6.35)	11 (3.68)	30 (10.03)	
AT&T	12 (4.01)	9 (3.01)	21 (7.02)	
T-Mobile	50 (16.72)	50 (16.72)	100 (33.44)	
Cricket	24 (8.03)	19 (6.35)	43 (14.38)	
Sprint	23 (7.69)	21 (7.02)	44 (14.72)	
MetroPCS	10 (3.34)	21 (7.02)	31 (10.37)	
Boost Mobile	7 (2.34)	11 (3.68)	18 (6.02)	
Other	5 (1.67)	7 (2.34)	12 (4.01)	

The primary outcome of interest for the randomized controlled trial was patient engagement, measured by patient performance on the Patient Activation Measure (PAM-13) pre- and post-intervention and by patient response rates to data requests.

Overall patient activation increased slightly for all study participants, but there were no significant differences between intervention and control groups. Table 3 describes overall patient assignment to an activation level based on their overall PAM-13 score. Activation levels range from Level 1 (least engaged) to Level 4 (most engaged).

Table 2. Change in Patient Activation Measure score

	All	Intervention	Control
Baseline	69	70.3	67.6
Follow Up	71.5	72.7	70.2
	*p<0.001	p=0.8179	

Table 3. Patient Activation Level

	Baseline (n, %)	Follow Up* (n, %)
Level 1	32 (10.67)	16 (6.69)
Level 2	26 (8.67)	22 (9.21)
Level 3	75 (25)	60 (25.1)
Level 4	167 (55.67)	141 (59)
** 61 lost to follow-up*		

A total of 72% of participants responded to health promotion text message prompts for weight data over the course of the study. No significant differences were found between intervention and control groups. Responses received were generally of high quality (95%), indicating that patients were able to successfully transmit weight data through text message. As an example, if a patient's baseline weight was 145 lbs, a high-quality response to a prompt for an updated weight might be 144 lbs, where a low-quality response could be 14 lbs or 44 lbs, representing a likely data entry error. Table 4 shows response patterns among study participants.

Table 4. Text message response rates

p=0.1688	Intervention N (%)	Control N (%)	Total N (%)
responded less than prompted	104 (34.67)	93 (31.00)	197 (65.67)
responded as many times as prompted	7 (2.33)	3 (1.00)	10 (3.33)
responded more than prompted	4 (1.33)	8 (2.67)	12 (4.00)
did not respond	35 (11.67)	46 (15.33)	81 (27.00)

PROM surveys were administered to the intervention group weekly through the MyFitnessPal app, using the in-app messaging feature. Despite the perceived usability of the application, we received feedback from participants that they found it difficult to complete survey responses in the app. Overall, 60% of intervention patients responded or attempted to respond to at least one survey during the 16-week intervention period. Among this 60%, the average response rate was 47%. Table 5 describes overall response rates during the 16-week intervention, including both participants who did not respond at all as well as the distribution among those that did. Among responses received, 92% of questions were answered, indicating that the primary barrier was responding at all through this modality, but that those who did engage were able to complete their responses.

Table 5. Response rates for PROM surveys

Response Rate (%)	N (%)
0	59 (40)
1-25%	39 (26)
26-50%	17 (11)
51-75%	15 (10)
76-99%	11 (7)
100%	9 (6)

Secondary outcomes included weight loss and performance on the HRQOL-4 and Healthy Days Symptoms PROMs at baseline and follow-up. Weight loss was assessed as change in body mass index (BMI) and absolute percent weight. Intervention patients reported higher energy than control patients, but no other significant differences were found. Table 6 depicts results for the HRQOL-4 and Healthy Days Symptoms measures, while Table 7 describes weight loss outcomes.

Table 6. Secondary PROM outcomes

	Intervention (n=121)	Control (n=113)	p-value
HRQOL-4 (mean difference in score)	0.09	1.59	0.3911
Healthy Days Symptoms (mean difference in # of days)			
Pain	-2.18	-1.06	0.314
Sad	-1.38	-1.31	0.9325
Anxious	-1.57	-1.97	0.7257
Sleep	0.54	-1.4	0.1615
Energy	5.03	1.84	0.0315

Table 7. Weight loss outcomes

p=0.2909	Intervention n=125 % (std dev)	Control n=108 % (std dev)
Absolute percent weight	0.65% (5.00%)	-0.29% (8.00%)
BMI	0.78% (5.14%)	-0.32% (8.05%)

The PGHD elements and PROMs identified in Phase 1 and used in Phase 2 were reviewed with a team of EHR interoperability expert consultants to develop a data model, a terminology and concept map, and a set of FHIR resources. These tools are intended to guide future integration of PGHD and PROM data into health information systems. All three tools are included as supplemental materials to this report.

Conclusions and Discussion

Both focus group and randomized controlled trial results indicate that patients are interested in and willing to use commercial off-the-shelf technology to interact with their health care providers, and in particular to share patient generated health data. The statistically significant increase in patient engagement observed through patient activation scores between baseline and follow-up among all participants is consistent with the results of previous studies conducted at Denver Health, which show that text messaging is a well-accepted method for patient engagement between clinic visits. The high quality and consistency of response data clearly indicates not only patient willingness, but also patient ability to engage using widely-adopted technologies for digital health purposes.

However, the lack of significant difference between intervention and control groups on patient activation scores indicates that use of the MyFitnessPal mobile application in this study was insufficient to increase engagement over and above the text message effect. When considered in context of patient feedback about the difficulty of using the in-app messaging feature to communicate responses to patient-reported outcome measures, it seems likely that although willingness was evident, repurposing aspects of commercially available solutions that lack interface design appropriate for the intended purpose may be less effective than desired. This finding is particularly important given the rapidly-growing interest in and number of digital health solutions focused on patient data collection for chronic disease management, and emphasizes the importance of incorporating tailored, user-centered design to achieve specific needs and purposes.

One limitation of this study was that patient usage data from the mobile application was not directly accessible or viewable by members of the research team, but was limited to what patients chose to share through social media-style activity feed updates within the app.

Updates were limited for patient privacy purposes. This limitation can be overcome in future studies through more direct integration with the electronic medical record, which may be aided by the FHIR resource set, terminology mapping, and data model tools developed as part of this study. However, it is worth noting that during interviews, providers expressed a clear preference for access to patient generated and patient-reported data to be made available for use only in summarized, structured fashion, citing concerns about data volume, ease of interpretation, and provider burden. Integration of these data for use at the point of care will need to be designed for provider utility beyond simple availability.

Future Directions

The results of this study suggest that appropriate mobile technology can be used to increase engagement among disadvantaged patients, with the potential to improve chronic disease management. Future work in this area that incorporates a solution specifically designed for the purpose of collecting patient generated health data and patient reported outcomes measures is expected to further increase that anticipated benefit. In addition, expanding the number of intervention options to include testing of the solution with and without text message implementation would enhance understanding of both isolated and joint effects. Finally, pursuing integration of these data into health system EHRs with a standards-based approach will enable delivery to the point of care and assessment of both the feasibility and the potential impact of using this information in clinical decision making to improve chronic disease management.

List of Publications and Products

Borland H, Collings A, Gutierrez-Raghunath S. “Engaging patients in data sharing through health information technology.” August 28, 2019. Conference presentation. Public Health in the Rockies; Keystone, Colorado.

Moore SL, Collings A, Durfee MJ, Davidson AJ, Gutierrez-Raghunath S, Borland H, Steele A, Fischer HH. (2020). Engaging patients in data sharing through health information technology. Manuscript in preparation.

Data Model Diagram for Patient Generated Health Data and Patient Reported Outcomes Measures. 2020. Tool provided with final report; manuscript in preparation.

FHIR Resource Set for Patient Generated Health Data and Patient Reported Outcomes Measures. 2020. Tool provided with final report; manuscript in preparation.

Terminology Mapping for Patient Generated Health Data and Patient Reported Outcomes Measures. 2020. Tool provided with final report; manuscript in preparation.

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