FINAL PROGRESS REPORT

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STRUCTURED ABSTRACT

Purpose: To assess the feasibility of implementing a customized Personal Health Record (PHR) system to support church-based blood pressure (BP) monitoring programs.

Scope: Improving BP control leads to significant CV risk reduction in Blacks and can be achieved through evidence-based interventions targeting self-management behaviors. Despite the proven efficacy of these interventions, evidence of their dissemination to community-based settings is limited.

Methods: Pre-post design in which three predominately Black churches in NYC utilized a PHR system to track individual and aggregate changes in BP and health behaviors among 55 hypertensive Black congregants. A process evaluation was conducted with the RE-AIM framework. Clinical and self-report measures were assessed at baseline and 9 months with validated instruments.

Results: Analysis of utilization data showed that participants had an average of 11 BP readings in the PHR over the 9-month study (range: 1-26 readings). Overall, there was a significant increase in fruit and vegetable intake as well as in the mean number of physician visits attended in the previous 6 months overtime. While change in BP was non-significant for the total population, participants who were aged ≥65 and those with > 10 BP readings in the PHR exhibited a significant reduction in BP overtime. Qualitative interviews showed that the dashboard was regarded as a valuable resource to the church and offered many advantages over the traditional paper-based record system. Observational reports identified several challenges to the initial implementation and lessons learned for future dissemination.

Key Words: Hypertension, Black, Personal Health Record, Community-based Organization

PURPOSE

The primary aim of this study was to assess the feasibility of implementing a PHR system customized to enable Lay Health Workers (LHWs) in three predominately Black churches in NYC to track individual and aggregate changes in BP and health behaviors using a Congregational Dashboard among 55 Black congregants with HTN. The secondary aims were to evaluate the effect of the PHR system on changes in BP, physical activity, weight loss, fruit and vegetable intake, and number of visits to a primary care physician from baseline to 9 months.

SCOPE

Background: Poor blood pressure (BP) control is major contributor to the racial disparity in HTN among Blacks; the odds of poor BP control are 40% higher among Blacks as compared to Whites.[1] Improving BP control leads to significant cardiovascular risk reduction in Blacks and can be achieved through evidence-based interventions targeting self-management behaviors[2-7] that are coordinated with primary care in a "medical neighborhood".[8,9] Despite the efficacy of these interventions, they are not widely disseminated to community-based settings, or linked as "community resources" to primary care clinics. The challenge for local health departments is to redesign these evidence-based approaches to function sustainably at the level of resources and skills available in typical community-based organizations (CBO).[10] Health IT could build the capacity of CBOs to implement evidence-based models, allowing for broader translation of life-saving interventions, and lay a foundation for coordination of care for people with HTN.

Context: In order for evidence-based models to improve population health they must be translated to broader community-based settings. This will succeed only where the intervention is integrated into the regular work of the community volunteers, is supported by local skills and knowledge, and is sustainable over time.[10] Recent studies have suggested the effectiveness of translating similar evidence-based interventions to CBO for cardiovascular risk reduction.[10,66] However, one of the more onerous elements of adapting evidence-based interventions to real-world settings, and in particular those involving BP monitoring, is the management of information for feedback, decision-making and reporting.[67] Health information technology (IT) represents an important enabler of these advanced features of information management. Integrating health IT systems into CBOs can increase their capacity to manage and coordinate the multiple sources of health information, heightening the focus on improving health through effective chronic disease self-management.[68] However, to date, there has been no evaluation of the potential of consumer health IT to facilitate the effectiveness and sustainability of community-based interventions for chronic disease self-management. To address this need, the Community Insights project evaluated the feasibility of implementing a Personal Health Record (PHR) system with a Congregational Dashboard to support LHWs participating in the New York City Department of Health and Mental Hygiene (NYC DOHMH) Keep on Track program in three predominately Black churches in NYC.

Setting: This study was conducted at three predominately Black churches in New York City with an active Keep on Track (KOT) program, a volunteer-run, community-based BP-monitoring program developed by the NYC DOHMH that aims to lower BP through monitoring and educational programming.

Participants

Churches: Church Health Ministries with active KOT program and that indicated their willingness to participate in the PHR customization and implementation were recruited to participate in the study. Once the churches were notified, the Program Manager arranged a meeting with the leadership of each church (including the Pastor and head of Health Ministry) and study team to sign a covenant of agreement outlining the specific roles and responsibilities of each partner. As part of the covenant, churches agreed to allow the study staff to have access to church facilities, at appropriate times, for training; to actively participate in the PHR Committee; and to support the PHR program by encouraging participation during church service announcements.

Participants: To be eligible, participants must have been age ≥18 years old; a member of the congregation at one of the participating churches; self-identify as African American/Black; and have a diagnosis of HTN (either by self-report or taking at least one antihypertensive medication). Exclusion criteria included the inability to comply with the study protocol (either self-selected or by indicating during the consent procedures that s/he cannot complete all requested tasks) or has a serious comorbid medical condition (e.g., psychiatric illness, cognitive impairment due to stroke, dementia, Alzheimer's, etc.).

Lay health workers (LHW) at the participating churches were trained to facilitate recruitment, retention and adoption of the church-based PHR. The Program Coordinator assisted LHWs in the development of a recruitment strategy tailored to their church through the church newsletter and announcements at services. During the recruitment events, the LHW, the Program Coordinator and PHR Technical Specialist met with the potential participants, individually and in groups, to explain the procedures, including that participants would have access to a PHR that tracks BP and other health behavior data and that this would be aggregated into a Congregational Dashboard which the trained LHWs could use to discuss self-management strategies such as goal-setting for BP reduction, and that they would be reimbursed for their time and travel to the church.

METHODS

Study Design: Using a quasi-experimental study design, this study evaluated the feasibility of implementing a church-based health IT system to track participants' BP and changes in health behaviors (e.g., fruit and vegetable intake, physical activity, weight loss, and health care utilization) through a PHR system.

Data Sources/Collection: Outcomes for the primary and secondary aims were assessed at the individual and church-level. A formative evaluation was conducted throughout the project period, highlighting necessary system modifications and programmatic refinements. A process evaluation was conducted with a modified version of the mixed-methods RE-AIM framework. BP was assessed with a validated automated BP monitor. Health behaviors and health care utilization were assessed with validated self-report measures; weight loss was estimated as the difference in weight between baseline and 9 months. We hypothesized that congregants who enrolled in the PHR system would exhibit a reduction in BP; an increased intake of fruits and vegetables and levels of physical activity; within-participant weight loss; and report a greater number of visits to their PCP at 9 months. LHWs were also be invited to participate in a focus group to comment on the effectiveness of the PHR program in fostering a sense of collective efficacy and group cohesion to promote collaborative goal-setting, work more effectively as a team to reach congregants in need of support, and improve the health of the church community. Finally, system logs were used as a process measure to record usage characteristics related to the level of participant engagement (e.g., volume of information logged into PHR, number of updates to the system, duration of access) to identify the features of the PHR that may influence changes in the physiological and behavioral outcomes.

Intervention: The customized PHR system, provided by the Dossia Service Corporation, was designed to support Health Ministries in the delivery of targeted health education drawing on superior management of recorded BP measurements. LHWs had access to a Congregational Dashboard displaying the BP data of all participants who have completed informed consent. The participants' PHR and the Dashboard shared a bidirectional interface such that BP data entered by the LHW into the Dashboard was available to the participant in his or her PHR, and vice versa. The Congregational Dashboard was designed to enable LHWs to target their outreach efforts to reach high-risk congregants, to collaboratively set goals with individuals and groups for improved BP control and adoption of health behaviors, and empower members to present primary care providers (PCP) with printed BP tracking reports; analogous to elements of the Chronic Care Model.

Measures

BP measurements: Blood pressure readings were taken using a well-validated automated BP monitor. We selected a validated blood pressure monitor that avoids observer bias, can take a series of readings while the patient is seated quietly, and has the capability of uploading the readings into the PHR. In keeping with AHA guidelines, patients were seated quietly with an appropriately sized cuff on the non-dominant arm. The device was programmed to take three readings at one minute intervals, after an initial rest period of five minutes.[16,117] The average of three readings was used as the BP measure for each visit. Weight was measured without shoes and with light clothes using a validated digital scale. Measurements were recorded to the nearest 0.1 kg. Height was measured at the baseline visit using a Seca stadiometer. These measurements were obtained according to the National Health and Nutrition Examination Survey (NHANES) procedures.[118]

Participant socio-demographics: A self-report instrument was used to collect socio-demographic data to describe the participants and examine effects of these factors on the reach and use of the PHR system. Variables included age, gender, ethnicity, education-level, income, marital status, employment status, health insurance status self-reported health, and presence of comorbid medical conditions.

Fruit and vegetable intake was assessed using the 36-item measure developed by Resnicow et al. and validated in a large sample of Black adults participating in the Eat for Life church-based trial.[119] The measure is based on the Health Habits and History Questionnaire and was tailored to foods commonly eaten within the Black population. Participants were asked to indicate number of times that they ate each item in the last seven days and the amount of food (1/2 cup, 1 cup). Portion size is fixed to a medium serving size.

Physical activity was assessed with the 7-item International Physical Activity Questionnaire (IPAQ)-short version.[120] The short-IPAQ assesses the amount of health-related vigorous and moderate-intensity physical activity as well as sedentary behaviors in adults over a one week period. The number of hours and minutes per day participants report spending in various types of physical activity is multiplied by the average metabolic

equivalent (METs) of each category and summed to calculate energy expenditure as kcal/kg/minutes/week. The IPAQ's reliability and validity is well-established in diverse populations.

Number of visits to a PCP was assessed with a validated survey developed by the Stanford Research Center.[121] The measure is designed to serve as a proxy for healthcare utilization in the past 6 months and will assist in determining whether the PHR program facilitated coordination of care across the community and clinic settings. Participant that report seeing their PCP will also be asked if they shared their PHR BP tracking reports with the physician.

Participant Satisfaction was assessed with a modified version of the 18-item Wellness Portal User Satisfaction Survey – Patients, originally developed for the Oklahoma Physicians Resource/Research Network. This measure assesses individual's experience and satisfaction with the Wellness Portal website, which provides patients with access to personalized health information to help improve their health. The survey is comprised of both structured and open-ended questionnaires. Responses for the 14-item structured questionnaire is based on a 4-point Likert scale (1 = strongly disagree; 4 = strongly agree). Questions address the ease of use, patient perceptions of portal importance and usefulness, and potential impact. The four open-ended questions are used to capture information on the overall portal quality. We modified the questionnaire to assess participants' satisfaction and experience with the PHR system in this proposal.

Health Literacy was assessed with the Rapid Estimate of Adult Literacy in Medicine—Short Form (REALM-SF).[122] The REALM-SF is a 7-item brief screening instrument, derived from the 66-item REALM instrument designed to provide a valid short assessment of patient health literacy. In field testing, the REALM-SF demonstrated excellent agreement with the original REALM grade-level assignments when dichotomized at the 6th grade (88% agreement, K= .75, P< .001) and 8th grade levels (84% agreement, K= .67, P< .001).[122]

Understanding and Experience with Computers [literacy] was assessed with the Computer Understanding and Experience (CUE) Scale.[123] The 12-item CUE was designed to assess one's self-reported knowledge of computers and the ability to use computers in order to determine the breadth of one's computer experience. Responses are given on a 5-point Likert-type scale ranging from strongly disagree to strongly agree. Questions assess participant's knowledge of various uses for computers, the extent to which they used computers for particular reasons, and how good they perceived themselves to be at using computers. Sample items include "I know how to install software on a personal computer" and "I regularly use a personal computer for word processing." Higher scores on the CUE scale indicate that the individual understands how to use computers and perceives that s/he has the ability use them. Cronbach's alpha for this measure was 0.93 in a sample of undergraduate college students, adult vocational students and adults employed in the IT field.[123]

Limitations

Selection bias: This occurs when eligible individuals who decline participation in the study differ in meaningful ways from those who consent. A major component of this study is training LHWs to use computerized health records to collect and track participant's BP and health behavior data to provide tailored feedback for goal setting. As a result, a selection bias may be present whereby LHWs and participants with low levels of computer literacy or poor vision may be underrepresented.

Lack of a control group: The lack of a control group limits our ability to attribute changes in participant's BP and health behaviors exclusively to the PHR program. While the best method to address this study limitation would be to randomly assign participants to a control condition, this was design was not acceptable to the participating church leadership. Moreover, we do not know of any study that has implemented a PHR system into churches in order to facilitate coordination of care across clinic and community-based settings. Thus, the primary focus of this proposal is to assess the feasibility of implementing such a system in a church setting for chronic disease self-management to develop the evidence for larger randomized control trials.

RESULTS

Analysis of the Primary Aim: The primary aim was assessed at the church and individual-level using process and formative evaluation methods as outlined in the Evaluation Toolkit for Health Information Exchange Projects.[124] Data collected from the formative evaluation was implemented on an ongoing basis to make necessary system modifications and continuously refine the program. [13,14] The process evaluation was conducted with a modified version of the RE-AIM (Reach, Effectiveness, Adoption, Implementation, Maintenance) framework[15] using a mixed-methods approach.

Formative Evaluation: At the outset of the study, we conducted a pre-implementation environment analysis and resource inventory that documented workflow processes that are currently in place to determine how the PHR system may complement rather than disrupt this process. Semi-structured interviews with church leaders and congregants were also utilized to determine the church's readiness to adopt new technologies, pilot test the data collection instruments, and identify any organizational practices that may inhibit implementation of the PHR system as intended. Throughout the project, we collected observational notes by study staff as well as short surveys and interviews with participants to provide ongoing evaluation of the usability and usefulness of the PHR. These data were used to make ongoing adjustments to the program. We also formed a PHR Committee with church leadership in the first three months of the project to assist in planning, implementation, and ongoing evaluation of the PHR.

Process Evaluation:

Reach assesses the proportion of the target population who volunteer to participate in the PHR Insights program. Characteristics of the participants versus non-participants were collected to determine the representativeness of the study sample to the larger target population. Baseline rates were calculated to determine the ratio of eligible participants invited to participate vs. those that enroll in the study. Reasons for not enrolling in the program were documented. As done in other church-based studies utilizing RE-AIM,[125,126] we also asked church leadership to estimate the total congregation size, number of congregants that attend Sunday services, and number of congregants that participate in the BP monitoring program.

Effectiveness assesses both the change in participant outcomes and process outcomes including positive and negative aspects of the program. The PHR system was designed to track participants' BP and changes in health behaviors (e.g., fruit and vegetable intake, physical activity, weight, and PCP visits). Specifically, changes in systolic BP and diastolic BP were tracked through data entered with a well-validated automated BP monitor based on the AHA guidelines.[16] Changes in health behaviors were tracked with data entered from well-validated measures (see Measures). In addition to these outcomes, we assessed the participants' experience with the PHR using a modified version of the AHRQ Wellness Portal User Satisfaction Survey to assess their acceptability and satisfaction with the program and to acquire feedback with respect to barriers and facilitators of implementation.

Adoption assesses the proportion of eligible sites willing to implement the PHR system. Characteristics of the churches that volunteered to participate (adopters) versus those who did not (non-adopters) will be compared to determine the representativeness of the study sample to the larger target population. Due to our involvement with churches in other projects, aggregate data are available to examine differences in characteristics (e.g. size of congregation, existing programs available to members) of the adopting and non-adopting churches. A semi-structured interview created by the research staff, was also conducted with LHWs at the participating churches to identify the delivery barriers to and facilitators of adopting the PHR system. Interview questions inquired about staff and space requirements, changes in workflow that can be attributed to the implementation of the PHR (e.g., the % increase in targeted outreach to congregants with elevated BP compared to those reached prior to the PHR), modifications that were made to the initial PHR program that are needed to support and maintain it after the proposed study has ended, and suggestions for improvement. The information collected will be used to refine future efforts to implement PHRs in community-based settings.

Implementation assesses the extent to which the intervention at the site was delivered consistently across LHWs and sites, and the time and costs of the program. To ensure consistency in program delivery, all LHWs participated in trainings on the use of a PHR system for chronic disease management. Data collected through usage statistics, system logs, session attendance sheets and observational notes by the study staff were used to compare consistency of the program implementation across the sites.

Analysis of the Secondary Aims: Analysis of Change in BP and Health Behaviors: To test the secondary aims, conducted linear regression models to examine whether the average baseline BP readings were significantly different from the average BP readings at 9 months. Separate models were also performed for a) the summary measure of physical activity, b) weight, c) the summary measure of intake of fruits and vegetables and d) total number of PCP visits in the past 6 months. Because changes in weight tend to be proportional to baseline weight, we followed the widely-utilized strategy of analyzing the percent change in weight. Subgroup analyses were also conducted with the subset of participants that exhibit uncontrolled HTN at the baseline visit to determine the impact of the program on BP control in this high-risk priority population. Uncontrolled BP is defined as an average SBP ≥ 140 or DBP ≥ 90 mmHg, or SBP ≥ 130 mm Hg or DBP ≥ 80 mm hg (for those with diabetes or kidney disease) based on JNC-7 criteria.[32] We also analyzed the data

separately for participants aged 65 or older and based upon the median number of BP entries in the dashboard over the study period.

Principal Findings and Outcomes

Baseline Characteristics: Baseline characteristics of the study sample are shown in Table 1. The mean age of participants was 69.3 (Standard Deviation [SD] ±11.1) years, 79% were women, 52% had income ≥ $40,000/year, and 42.5% had a college degree. Mean baseline BP was 135.5 (19.6)/82.2 (12.4) mm Hg and mean weight was 190.6 lbs. On average, participants reported eating 2.39 (1.53) servings of fruits and 2.40 (1.7) servings of vegetables per day at baseline and reported walking as their predominant type of physical activity (mean 1393.9 (2465.1) MET min/week). The mean health literacy score was a 5.98, which corresponds to a 7-8th grade reading level. On average, participants rated themselves as possessing an average level of knowledge and experience with using computers (mean score 3.0 [0.3]). Finally, participants reported attending an average of 1.6 physician visits in the past month.

Formative Evaluation

Project staff maintained structured notes from discussions during site visits meetings with LHWs. Key themes from these notes include:

a) The identification of opportunities to improve the Dashboard interface and functionality

b) The importance of drawing new members into health ministries with computer skills to assist with data entry, navigation and the interpretation of data

c) The logistical barriers to printing out charts for participants

d) That it is valuable to be able to show participants the trend in their blood pressure chart as a catalyst to conversations about changes in behavior and life events over time

e) That tracking blood pressure using a database caused participants to be more attentive to their health and to more regularly attend health ministry monitoring events

f) That it is empowering to be able to give the Pastor aggregate reports on participant engagement using the Dashboard, and that doing so builds institutional support for the ministry

PHR Council: Meetings with the PHR Council were convened throughout the study period to address some of the challenges documented in the observational reports. Two key topics discussed by the committee included the importance of identifying a member of the health ministry with specific responsibility for using the Congregational Health Dashboard and the desirability of being able to track not only health outcomes but a participant's progress in adhering to behavior change. The committee also made the following suggestions to improve the Dashboard usability: having less crowded registration interfaces; having more user-friendly workflow for assigning "tags" to participants and viewing tagged participants, and the need to design a more compact interface that does not require the user to scroll to access important content. At the final meeting with PHR council, the members indicated that they were all running exercise or nutrition programs at their churches.

Process Evaluation

Data on program reach: To assess program reach, we asked each participating church to complete a survey that estimated the total congregation size, number of congregants that attend Sunday services, and number of congregants that participate in the BP monitoring program. On average, it was estimated that the total congregation size across the three participating churches was 716, of which approximately two-thirds (n=470) of the congregations regularly attend services. Further, of the regular attendees, it was estimated that approximately 10-25% (range: 47 to 117 congregants) attend church health programs such as the BP monitoring. A total of 69 congregants at the participating churches were approached to enroll in the PHR system and research study, of which 55 (79.7%) enrolled into the program. Primary reasons for not enrolling included not being interested (n=7; 50%), not having a HTN diagnosis (n=4; 28.6%), and not a member of the congregation (n=3; 21.4%). There were no differences between enrollees and non-enrollees in terms of socio-demographic characteristics (i.e., age, gender, race/ethnicity).

Data on the effectiveness of the PHR System (Secondary Outcomes): Results of the secondary outcomes are shown in Tables 2 and 3. A total of 48 participants (87%) had complete data at the baseline and 9-month visits. Reasons for drop-out included being too ill (n=2), unable to reach despite multiple attempts (n=4), and moving

out of NYC (n=1). In unadjusted analyses, there was a non-significant -2.1/1.5 mmHg reduction in BP from baseline to follow-up (p=0.41 and 0.36, respectively). These results remained unchanged when adjusting for participant age, gender, education, income, and baseline BP in linear regression models. There was also no change in average weight (mean change= -0.1, p=0.96) from baseline to 9 months. However, there was a significant increase in daily fruit (mean: +0.53 servings/day, p=.02) and vegetable intake (mean: +0.71 servings/day, p=.002) from baseline to 9-months. While walking decreased overtime (-305.8 METS, p=.12) there was an increase in vigorous physical activity (165.2 METS; p=.54), albeit both relationships were non-significant. Finally, the mean number of physician visits attended in the previous 6 months increased significantly from the baseline to 9-month follow-up (mean: 1.6 vs. 3.4, p=.003). We also conducted subgroup analyses of the BP data with the subset of participants aged ≥ 65 years, those with uncontrolled HTN at baseline, and based upon the median number of BP entries in the dashboard over the 9-month study (see Table 3). These analyses showed a significant decrease in systolic and diastolic BP among participants aged ≥ 65 years and those with greater than 10 BP entries in the dashboard. Specifically, among participants aged ≥ 65 years, the mean reduction in systolic BP was -2.18 (95% Confidence Interval [95CI]: -4.04, -0.31, p=.02) in adjusted analyses. The mean reduction in diastolic BP was -1.54 (95CI: 12.11, -.98, p<.001). Participants with >10 BP entries exhibited a mean reduction in systolic BP of -2.02 (95CI: -3.49, -0.55, p=.01) and diastolic BP of -1.25 (-1.82, -0.69, p<.001). Contrary to what was expected, participants with controlled BP at baseline (BP≤135/85) exhibited a reduction in BP whereas BP increased non-significantly among those participants with uncontrolled BP at baseline.

Finally, acceptability and satisfaction with the program was assessed at the 9-month follow-up. The majority of participants agreed that the dashboard was a valuable resource to their church community (87.5%), helped them to improve their health (87.5%) and to be more active in their health care (91.8%). Ninety-eight percent of participants also agreed that the BP readings in the dashboard were presented in an easy-to-understand format. In open-ended questioning, participants commented that the dashboard made them look forward to getting their BP read and that viewing the BP trends motivated them to improve their health. Several participants suggested modifications for improvement including: adding reminders to use the PHR at home, creating a phone app for the PHR to increase likelihood of use, holding church workshops on how to use the PHR (i.e., logging in and entering data), and designing a child-version focused on the prevention of HTN.

Data on adoption of the Dashboard: Overall, LHWs across the three participating churches reported being highly satisfied with the congregational dashboard. They felt that the dashboard offered a faster, more efficient and organized method for monitoring participants' BP and enacting targeted outreach efforts for those who demonstrated elevated readings, without an additional time burden. Moreover, they found that it was easier to discuss lifestyle changes with participants when they were able to show them the graphs that depicted changes in their BP overtime. Additional benefits of the dashboard included increasing a sense of fellowship among congregants, legitimizing the LHWs role as health educators, and engaging more youth in the Health Ministry. The LHWs also discussed challenges with registering participants due to privacy and security concerns. Modifications to the registration process by the vendor as well as targeted communication efforts by the LHWs helped many participants overcome these concerns. A second limitation of the dashboard mentioned by the LHWs was the difficulty in printing reports for participants and their limited usability. This was bolstered by participant survey data, which showed that 98% of participants said they did not receive printouts of their dashboard readings despite wanting this data. Based on this feedback, future iterations of the system will improve the ability to create reports and the clarity of the data presented. In addition to the congregational dashboard, participants were also offered a web-based PHR for chronic disease management that included the ability to track BP readings and patient education materials. Adoption of the PHR was low with 67% and 88% of participants indicating that they never logged into their PHR or entered any readings outside the church, respectively.

Data on implementation of the Dashboard: Over the course of the 9-month study, the LHWs accessed the Congregational Dashboard a total of 1,233 times (range: 176-617 uses per church). Approximately, 60% of the usage was attributed to data entry, 28% was attributed to logging into the system, and 12% to participant registration. The median number of times the Dashboard was accessed (i.e., registration, logon, or data entry) per participant was five (range: 1-122). Participants had an average of 10.9 (5.1) BP readings entered into the Dashboard over the 9-month study period (range: 1-26 readings). Seventy-five percent of participants commented that the LHWs discussed their BP readings when they were entered into the Dashboard.

Observational notes were also taken at each site in order to identify any modifications churches made to the program to adapt it to that church's environment and culture as well as any challenges to implementation. Several key differences were noted across the sites. First, engagement of the LHWs was crucial to implementation. In one church, the leader of the ministry was very active in the program and was the main driver of member participation. Alternatively, in another church, competing church activities made it difficult for the LHWs to invest time in the dashboard thus, participation rates, number of BP monitoring sessions, and use of the dashboard was low. Each of the churches also made modifications to their existing BP monitoring program to accommodate the dashboard. For example, one church added an extra 'station' to allow time to show participants their data in the dashboard and conduct brief lifestyle counseling while another added regular assessments of participants' weight during their monitoring. The churches also used different approaches to motivate participants to use the dashboard. For example, one church handed out NYC DOHMH healthbucks, which could be redeemed for fresh fruits and vegetables at farmers' markets.

There were also commonalities in how the church's modified the program. For example, all churches experienced difficulty with real-time data entry either due to discomfort with the program interface or poor internet connectivity. This caused the churches to develop an alternative data management process whereby data would be collected via paper reports and later transferred to the dashboard. Moreover, due to the initial unfamiliarity with the dashboard, churches focused primarily on data entry when using the dashboard and to less extent as a tool to proactively manage participants' BP.

This latter observation lead to the collaborative development of a process and manual for conducting effective health promotion within the context of the Dashboard. This process, called Data into Wisdom into Action is a version of cyclical quality improvement that incorporates insights from Positive Affect theory and the Positive Deviance methodology. The process has three main steps: 1. sorting the BP Progress Report Column "Avg Last 90 Days" to identify participants who haven't recorded a reading in the last 90 days, and making an outreach plan; 2. sorting by the "BP Trend" column to identify participants who have seen a substantial improvement, and identifying factors for this success, and then asking these participants if they would be willing to tell their story to the health ministry group to inspire others and 3. sorting by the "BP Trend" column to identify participants with rising or persistently high blood pressure, and then describing perceived barriers, and discussing potential programs with project staff to meet these needs

CONCLUSION: Findings indicate that the PHR system was beneficial in increasing participants' fruit and vegetable intake as well as the number of visits to the physician in the past 6 months. Moreover, a significant reduction in BP was found among those participants who were aged 65 years and older and had greater than 10 BP entries in the dashboard over the 9-month study period. Finally, the PHR system was perceived by the participating churches as a beneficial addition to their BP monitoring programs and offered many advantages over the traditional paper-based record system.

SIGNIFICANCE: Increased awareness of high blood pressure outside of the medical realm, and through regular measurement in the faith-based community provided feedback to people about their health, which may have encouraged them to adopt healthful behavior changes, lower their BP, and increase the frequency that they visited their doctors.

IMPLICATIONS: LHWs in church health ministries can record a substantial number of BP readings for congregants using a web application. The differences in BP measurement volume reveal differences in the independent capacity for self-management support between CBOs that would otherwise be difficult to observe, and may lead to strategic partnerships to expand community-based resources for chronic disease management and prevention that leverage existing social institutions and social networks outside of the clinical setting.

List of Publications and Products

- Community Insights Training Guide: Navigating the Community Health Dashboard (Electronic Resource)
- Data in Action Guide: Translating Data into a Community Engagement Plan (Electronic Resource)
- Schoenthaler, A, Cannell, T, Omar-Miller, H, Foster, V. An EHR for a Church? The uses of health information technology in faith-based cardiovascular health promotion. New York City Epidemiology Forum, New York 2014 (Poster Presentation)

- Practical Playbook Success Stories: New York Monitors Blood Pressure with EHRs. https://www.practicalplaybook.org/success-story/new-york-city-faith-based-blood-pressure-program-uses-ehrs
- Cannell, T. (2014) A Dashboard for Church Health. *Church Reader. http://chreader.org/.*
- Applying health IT to community-based settings for chronic disease management (in preparation)
- The Uses of Health Information Technology in Faith-Based Cardiovascular Health Promotion: Results of the Community Insights Study (in preparation)