JACOBS PUBLISHERS

OPEN ACCESS

Jacobs Journal of Community Medicine

Research Article

Identifying, Training, and Monitoring Community Health Workers in A Community-Based Diabetes Prevention Study

Joyce M. Sydell MEd, RD, LDN[1], Donna Kernodle MPH, RD, LDN, CDE[1], Caroline S. Blackwell BS[2*], Mara Z. Vitolins DrPH, MPH, RD[2]

[1]*Wake Forest Baptist Medical Center, Joslin Diabetes Center, Medical Center Boulevard, Winston-Salem, NC 27157, USA*

[2]*Wake Forest School of Medicine, Division of Public Health Sciences, Department of Epidemiology and Prevention, Medical Center Boulevard, Winston-Salem, NC 27157, USA*

**Corresponding author: Caroline S. Blackwell BSCCRP, Wake Forest School of Medicine, Division of Public Health Sciences, Department of Epidemiology and Prevention, Medical Center Boulevard, Winston-Salem, NC 27157, Tel: (336)713-4061;*

Email: cblackwe@wakehealth.edu

Received: 04-01-2015

Accepted: 05-23-2015

Published: 06-17-2015

Abstract

The Healthy Living Partnerships to Prevent Diabetes (HELP PD) study is designed to translate the Diabetes Prevention Program (DPP) lifestyle intervention into a community-based setting using trained community health workers (CHWs) promoting lifestyle change.Registered dietitians were responsible for training, continuing education, and supervision of the CHWs who were recruited from the patient population of the Diabetes Care Center of Wake Forest Baptist Health. 10 CHWs were recruited and trained and 8 of these led at least one two-year intervention group.CHW training included training in group facilitation, use of a peer mentoring model, and continuing evaluation and education.

Keywords: Diabetes prevention; translational research;community health worker;lifestyle change;group facilitation

Abbreviations

HELP PD: Healthy Living Partnerships to Prevent Diabetes;

DPP: Diabetes Prevention Program;

CHW: Community Health Worker;

T2DM:Type II Diabetes Mellitus;

RD: Registered Dietitian

Introduction

Type 2 diabetes mellitus (T2DM) continues to be a prominent public health issue in the United States.According to the current CDC estimates for adults age 20 years or older, there are approximately 26 million people with diabetes and approximately 79 million with pre-diabetes, also referred to as "at risk for diabetes"[1].The risk of developing long term complications including cardiovascular disease, renal disease, blindness, neuropathy, lower extremity amputations, and depression is greater for people who have diabetes [1]. Results from clinical trials such as the Diabetes Prevention Program (DPP) have demonstrated great potential for preventing T2DM through lifestyle programs which promote physical activity, healthy eating patterns, and weight loss [2,3]. As these programs involved intense behavioral interventions delivered by professionals, the challenge remains to implement these interventions in sustainable, real-world settings [4]. Although numerous interventions have been conducted using community health workers (CHWs) across a variety of conditions, including diabetes education and management, no previous studies have used CHWs to deliver a lifestyle intervention for diabetes prevention [5-8].

The Healthy Living Partnerships to Prevent Diabetes (HELP PD) is a translational study designed to implement a community-based diabetes prevention and weight-loss intervention utilizing trained CHWs, promoting changes to lifestyle behaviors to achieve modest and sustainable weight-loss in adults at risk for diabetes. The identification, training, monitoring, and retention of these CHWs are the focus of this article.

Materials and Methods

Details on the design and rationale of HELP PD have been published elsewhere [9].Adults with pre-diabetes were randomized to receive either a CHW-led lifestyle intervention or an enhanced usual care comparison condition.Approximately 300 participants were enrolled during the recruitment period, approximately 60 percent of whom were female and more than 25 percent reported a race or ethnicity other than white. The mean age at baseline was 57.3 years [10]. The HELP PD intervention was modeled after the intensive lifestyle intervention used in the DPP and was designed to elicit modest weight loss of 5-7 percent body weight through a reduction in caloric intake and an increase in moderate intensity physical activity [9,11].Participants in the lifestyle intervention attended group sessions coordinated and facilitated by the CHWs for 24 months.Participants attended one group session per week during the initial six-month intensive phase, and one group session per month during the 18-month maintenance phase. Additionally, they received three individual nutrition sessions with a Registered Dietitian (RD) during the first six months. Participants randomized to the enhanced usual care comparison condition received monthly newsletters and two individual nutrition sessions in the first six months. Participants in both treatment groups were seen at six-month intervals over a 24-month period to assess study outcomes, including cardiovascular risk factors, health-related quality of life, social cognitive variables, healthcare utilization and cost.At one year, mean weight loss in the lifestyle intervention was 7.3 percent, relative to a mean weight loss of 1.3 percent of body weight in usual care participants. Lifestyle intervention participants also saw a mean reduction of 4.2 mg/dl in fasting glucose at one year, compared to a mean reduction of only 0.3 mg in the usual care condition [12].These results were largely maintained at 2 years[13] and cost analysis determined that HELP PD could be delivered for less than one third the per capita cost of the DPP[14].

As HELP PD was designed to be a community-based translational study, the intervention was implemented in a local diabetes education program via two licensed RDs, one of whom is a Certified Diabetes Educator. The RDs were employed at Wake Forest Baptist Medical Center's outpatient Diabetes Care Center and were responsible for the initial training, continuing education, and ongoing monitoring and supervision of the CHWs.Additionally, they monitored each intervention group, conducted protocol-dictated individual visits with study participants, and provided additional support as needed.The RDs were trained and supervised by members of the study investigative team and staff, which included physicians and experts in nutrition, physical activity, and behavior change.

Selection and Training of CHWs

CHWs were recruited from the patient population of the Diabetes Care Center for participation in HELP PD by study investigators and staff. All potential CHWs were members of the local community and were expected to maintain good control of their diabetes, have previous leadership experience, have the ability to devote ten hours per week to the study, and to maintain a regular exercise program. Basic demographic characteristics of the CHWs are included in Table 1. Potential CHWs who expressed an interest in participating in HELP PD were interviewed by members of the study team and, if appropriate, invited to attend training. Of the 21 potential CHWs identified, 12 were invited to attend training and 10 completed the training process. The CHWs' were responsible for facilitating participant group meetings, placing reminder calls to study participants prior to group meetings, completing make-up sessions for missed group meetings, providing regular updates to the RDs, and attending monthly meetings with the intervention team.The CHWs were compensated financially for their time, receiving $100 per week during the intensive phase and $200 per month during the maintenance phase.

Table 1. Selected CHW demographic characteristics (of 10 who completed training).

Characteristic	N (%)
Gender	
Male	2 (20%)
Female	8 (80%)
Race	
African American/Black	7 (70%)
White	3 (30%)
Marital Status	
Married	7 (70%)
Divorced	2 (20%)
Widow	1 (10%)
Employment Status	
Currently Employed	7 (70%)
Retired/Not Currently Employed	3 (30%)

Initial CHW training was conducted in two groups; each group consisted of five potential CHWs.The first group was trained at the outset of participant recruitment and the second group was trained approximately eight months later. Since some of the CHWs were employed during the work day, the training was conducted in the evening.Two to three hour training sessions were held twice a week on Tuesday and Thursday evenings for a total of 36 hours of initial training over the course of six to nine weeks.CHWs were initially provided with training manuals that included session materials and lesson plans for the 24-weekly sessions conducted during the first phase of the study.Session topics focused on key nutrition, activity, and behavioral concepts.A complete list of session topics is included in Table 2.As a component of the community-based design, some sessions were presented by community representatives, including sessions on selecting appropriate foot wear for walking or running, community recreation sites, safe exercise practices, food shopping, and eating out.Furthermore, DVDs were developed and included in the materials to standardize the educational content of other sessions and reduce the knowledge burden on the CHWS.

Key Components of CHW Training

CHWs in the HELP PD study were trained to serve as facilitators for their groups, which allowed them to be involved and interactive in the training process.Training sessions were structured to allow CHWs to experience the intervention sessions as group members, with the RDs modeling the CHW role.Up to three intervention sessions were presented at each training session, with the first session conducted as an actual intervention session and the second and third sessions presented in didactic format to cover the major education components of each session. The RDs differentiated their role as the "facilitator" when their role was the CHW or the "trainer" when they were presenting intervention concepts.During the second wave of intensive training, a two-sided sign was developed to make this differentiation more obvious. The sign was labeled "HELP Group Facilitator" on one side and "Training Session" on the other side to denote which role was being modeled.

Table 2. List of lifestyle intervention sessions (initial six-months).

Week #	Session Title
1	Welcome to HELP PD
2	Nutrition 101
3	Physical Activity 101
4	Footwear
5	Troubleshooting/Q&A
6	Calorie Balance
7	Mindfulness
8	Portion Sizes
9	Troubleshooting/Q&A
10	Community Exercise/Nutrition Resources
11	Problem Solving
12	Physical Activity Hands On
13	Troubleshooting/Q&A
14	Emotions and You
15	Healthy Eating
16	Stretching/Injury Prevention/Strength Training
17	Troubleshooting/Q&A
18	More about Healthy Eating
19	Food shopping/eating out
20	Creating an Environment for Success
21	Troubleshooting/Q&A
22	Weight Loss Maintenance
23	Q&A/Preparation for Independence
24	Transition

The intervention was designed so that every CHW-led group meeting followed a structured outline. At each training session, the outline was written on a marker board to highlight the importance of consistency in group presentation and the importance of time-budgeting, in order to begin and end the group meetings in the allotted one hour format. This outline is included in Table 3. CHWs were encouraged to adhere to the following principles when facilitating their groups:maintain confidentiality, consistently show respect, develop group

support, model healthful lifestyle behavior, use motivational interviewing techniques (asking open-ended questions, affirmation, reflective listening, and summarization), model self-management skills of goal setting and self-monitoring, and focus all study participant interaction on the participants, not the facilitator.

Table 3. Structured CHW-led Group Outline.

1.	Objectives
2.	Preparation of needed supplies before the session
3.	Confidential weigh-in
4.	Progress check/discuss homework as a group
5.	Overview of session content
6.	Video (if part of session material)
7.	Session topic presentation
8.	Wrap-up with summary and homework assignment

Experiential learning was used extensively during the CHW training process. For example, to supplement the session material and video for the session on portion sizes, the RDs used bowls, a measuring cup, and dry cereal to demonstrate the potential discrepancy between actual and perceived portion sizes.Working in pairs, the CHWs took turns measuring the volume of cereal they poured in a bowl and comparing it with their usual serving size. Similarly, while covering the session on mindfulness, the CHWs were asked to close their eyes and put a small piece of candy in their mouth.The CHWs were asked to be mindful and savor the candy for a few minutes before biting into it, then to describe the texture and flavor sensations they experienced.Both of these demonstrations not only addressed key lifestyle change concepts, but offered the CHWs an additional opportunity to develop rapport with each other and ideas for similar activities in their own groups.

Training in Dyads; Developing Community

Additional opportunities for experiential learning occurred later in the CHW training process, after the intervention materials and concepts had been covered. The CHWs met in groups of two to discuss relevant intervention topics such as recognizing barriers to healthy eating or getting adequate exercise. They provided and received feedback from their partner and then indicated that the self-discovery aspect of working with another person, as opposed to hearing a lecture on these topics, improved their willingness to make behavior changes.As part of the intervention-group session structure, each participant would complete a progress sheet, identifying areas of success or difficulty in meeting the goals set the previous week. The responses received during these progress checks were shared within the group and eventually among the CHWs. Some CHWs were more likely to report successes than failures, but each internalized the concept that making progress was not a linear process.The success of one group member could serve to encourage the gradual progress of others by providing a specific example.

The rationale for having the CHWs in training work in dyads was to assist them in the development of a sense of community.During the upcoming 24 months, this camaraderie would be essential as the CHWs faced the challenges and enjoyment of working with peers.As noted above, having a tangible model for positive health behaviors reinforced the nutrition, activity, and behavioral concepts central to the intervention. As the CHW training included a condensed version of the lifestyle intervention that participants would experience, the CHWs were able to discover that reliance on others within the group was not a weakness, but strength, achieved through synergy.

Selection of CHWs and Group Initiation

During the first wave of CHW training, a process was developed for identifying those CHWs most ready to begin leading the first group of randomized participants. Study recruitment goals allowed for the formation of one intervention group of 8-12 participants every six weeks, based on the randomization of approximately 16-25 individuals in that timeframe [10]. The following qualities were considered essential in determining which CHWs would begin facilitating groups: having adequate time for weekly preparation of session materials, being comfortable speaking before a group, initiative, and reliability.The first facilitator selected to lead a group was extremely enthusiastic about the study and was willing to have another CHW apprentice with her.This peer-mentoring technique proved to be very successful as both CHWs were engaged in the process of group work and the less experienced CHW gleaned valuable insight from the facilitator.This process was continued until the final group of participants was matched with the remaining CHW. The CHW assigned to facilitate the final group was able to assist and observe another group for several months, promoting her continued engagement in the process until her group was ready to begin. All CHWs trained in the first wave were assigned to their own group within 6 months.

The second group of CHWs provided a sufficient number of facilitators for the remaining recruited participants.As part of their training process, these CHWs were paired with experienced CHWs from the initial training group for observation. Because of this, they were able to observe ongoing intervention groups at various stages.In addition to receiving valuable insight into the working aspects of groups, the second group of CHWs was able to bond with the first as colleagues.

Presentation of Sessions

After completion of training for each group of CHWs, each CHW was asked to present a session topic of their choice to the RDs and to their peers, who served as a mock group.Each member of the mock group was asked to withhold critiques until the end of the presentation.Upon completion of the topic, the group used a rating scale to evaluate the presentation, the CHWs facilitation skills, and the overall effectiveness of the session. As expected, some CHWs were more comfortable with

speaking before a group of peers, while others found it daunting.Interestingly, the fellow CHWs gave more critical feedback to their peers than the RDs overseeing the training program did.This process provided additional insight into the determination of a sequence of assignment of CHWs to participant groups and was an integral part of the formal certification process for each CHW.

Ongoing Evaluation of Group Facilitation

During the initial weeks of each intervention group, RDs attended selected group sessions to review the facilitation process of the CHW.This was a continuation of the training process, wherein the RD would evaluate the use of open-ended questions, observe the weigh-in procedure and completion of progress sheets, and assess the CHW's ability to lead group discussions. The RDs were also careful to remind the CHWs to relax into the silence that can occur when using open-ended questions and to discuss strategies to encourage all group members to participate in the sessions. Since many groups had a mix of vocal members and those who rarely spoke, CHWs were advised to count to ten or to take three deep breaths after phrasing a question to the group.The CHWs became adroit at eliciting thoughts from the quieter group members, adding to the experiential group process.

Occasionally, CHWs who did not prepare adequately for the group were asked to interpret their facilitation of the session.A private debriefing session was initiated immediately after the group meeting that included the CHW, RD, and any other members of the study team who may have been present.Detailed feedback was provided focusing on strengths and weaknesses observed during that particular session. Importance was placed on focusing on the current HELP PD session and not returning to previously discussed topics or irrelevant subjects. The CHW was thanked for their time and efforts and offered assistance if needed. Protocol-dictated observation occurred in weeks 1-4, followed by RD attendance at sessions 5 and 13 to answer participant questions on nutrition and weight-loss and engage in troubleshooting.Additional sessions (beginning with session 5 and continuing through 8) could be attended by the RD or other members of the study team if it was determined that the individual CHW was not applying group leadership or content principles appropriately.Additionally, the RDs had weekly contact via phone and /or email with the CHWs during the intensive phase to address specific questions and review participant progress.

Monthly CHW Continuing Education

Additional training for the CHWs was provided in the form of monthly in-services as a part of regularly-scheduled CHW meetings.Topics covered during these in-services included:overcoming barriers to healthy eating, overcoming barriers to exercise, advanced facilitation skill sets, managing group discussions, providing validation and summary of ideas presented, review of record keeping, eliciting critical information during the weigh-in time, and an update on statistics regarding pre-diabetes.

Due to the number of participant groups needed for the study, some CHWs were able to facilitate more than one ongoing group.Those CHWs chosen to lead additional groups developed considerable skill regarding the development of group dynamics, the need for ground rules, and methods to encourage discussion. These CHWs were also able to enhance their ability during phone contacts to promote improved attendance among those participants who were missing sessions.The RDs provided feedback for participants needing more options for food, exercise, or stress management to meet their weight loss goals.Specific algorithms were developed by the study investigators to deal with sub-optimal participant compliance in the areas of self-monitoring, attendance, nutrition, and physical activity.These algorithms were designed to increase participant adherence to intervention goals and were used by the CHW to identify participants with sub-optimal adherence to study goals. By discussing non-compliant participants with the RD, the CHW was able to assist these individuals by phone, email or as part of the group meeting.If this initial response was not successful, the RD would then work with the participant individually or bring the matter to the larger study team as appropriate.Additionally, specific funds were set aside to provide an intervention participant "toolbox" option to assist in removing barriers to meet study goals. These funds could be used to provide items such as meal replacements, sports gear, transportation assistance, or other similar items.

Intervention Monitoring

The HELP PD lifestyle intervention was closely monitored and evaluated during all phases, from CHW training through intervention delivery.During the training, CHWs were asked to rate aspects of the training process and provide feedback.Likewise, the RDs evaluated changes in the CHWs knowledge, familiarity, and comfort with the curriculum. The intervention team, including investigators, research staff, and the RDs, met weekly during the intensive phase of the study and bimonthly during the maintenance phase.During these meetings several key process measures were used to assess the implementation of the CHW-led lifestyle intervention: attendance and weight-loss reported at group meetings, completion of self-monitoring logs, and achievement of nutrition and physical activity goals. Specific algorithms for each of these areas were developed as noted above. The intervention team reviewed real-time data collected each week, discussed issues identified by the CHWs and RDs, and provided recommendations to improve adherence.This information was then fed back to the CHWs by the RDs.RDs also regularly attended group sessions to assess the delivery of the intervention by the CHWs and ensure fidelity to the study protocol. Finally, at the conclusion of the study, par-

ticipants were asked to rate their satisfaction with the lifestyle intervention, their own participation in it, and suggestions for future improvement.

Of the ten CHWs that completed the initial training, eight completed the 24-month intervention.While all of the CHWs endeavored to fulfill their obligations to the participants and study team, some CHWs were less able to do so because of unforeseen circumstances.Feedback was provided to these CHWs; suggestions for change were made; and the RDs attended their sessions regularly.After many attempts to promote adherence to the study guidelines with these CHWs, the RDs recommended to the intervention committee that two CHWs discontinue as facilitators. This decision was made due to lack of time or changes in their personal lives, which made it difficult for them to fulfill their roles and meet study expectations.Two CHWs were able to provide coverage and continuity during these changes, keeping the groups intact while contributing experience and expertise during this transition period. Since standards had been developed for the CHW team at the outset of the study, the viability and integrity of the entire group was maintained by making these difficult decisions.

Discussion

Implications for Future, Similar Interventions

The use of experiential learning, training in dyads, and peer mentoring are common methods for training and development in many areas of healthcare delivery [15,16]. We found that through actively engaging our CHWs in the training process and allowing them to work together, they were more invested in the success of the intervention and were able to develop more confidence in their own abilities.Additionally, they were able to develop a peer-support system that helped them to deal with participant compliance and adherence issues through shared experience. Groups developing similar interventions in the future should consider including elements of experiential learning and peer mentoring to enhance the training experience.

By providing ongoing training and evaluation throughout the intervention period, we were able to continue to hone the facilitation and intervention skills of our CHWs.Additionally, ongoing participant and group monitoring allowed the members of our intervention team to assess progress towards study goals and protocol adherence.Future interventions should consider including continuing education and ongoing evaluation to ensure continued fidelity to the program and to address any issues as they arise.

Conclusions

Although we have not yet examined the relationship between training and evaluation of individual CHWs and the relative success of their intervention groups, future analyses will include an examination of within-group and between-group differences in weight loss and glucose reduction. Results of the intervention at one and two-years seem to indicate that a CHW-led intervention, implemented by RDs in a community setting, is an effective way to implement a translation of the Diabetes Prevention Program.

Acknowledgements

The authors wish to acknowledge the contributions of the HELP PD research staff and community-health workers, along with the Diabetes Care Center and Clinical Research Unit of Wake Forest Baptist Health, for their project-related efforts. This project is supported by Award # R18DK069901 from the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute of Diabetes and Digestive and Kidney Diseases or the National Institutes of Health.

References

1. Centers for Disease Control and Prevention. National diabetes fact sheet: national estimates and general information on diabetes and prediabetes in the United States. 2011.

2. Knowler, W. C , Barrett-Connor, E,Fowler et al. et al. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. N Engl J Med. 2002, 346: 393-403.

3. Tuomilehto J,Lindstrom J,Eriksson J G ,Valle TT, Hamalainen H et al. prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. N Engl J Med. 2001, 344: 1343-1350.

4.Eddy DM ,Schlessinger L,Kahn R. Clinical outcomes and cost-effectiveness of strategies for managing people at high risk for diabetes. Ann Intern Med. 2005, 143(4): 251-264.

5. Quinn MT, McNabb W L. Training lay health educators to conduct a church-based weight-loss program for African American women. Diabetes Educ. 2001, 27(2): 231-238.

6. Brownstein JN,Chowdhury FM, Norris SL, Horsle T, Jack L et al.Effectiveness of community health workers in the care of people with hypertension.Am J Prev Med. 2007,32(5):435-447.

7.Norris S L, Chowdhury FM, Van Le K, Horsley T, Brownstein et al. Effectiveness of community health workers in the care of persons with diabetes. Diabet Med. 2006, 23(5): 544-556.

8. Navarro A M,SennK L,McNicholasL J,KaplanR M , Roppe B et al.Por La Vida model intervention enhances use of cancer

screening tests among Latinas. Am J Prev Med. 1998, 15(1): 32-41.

9. Katula JA,VitolinsMZ , RosenbergerEL,Blackwell C,EspelandMA et al.Healthy Living Partnerships to Prevent Diabetes (HELP PD): design and methods. Contemp Clin Trials.2010, 31(1): 71-81.

10.BlackwellCS,FosterKA,IsomS,Katula JA,VitolinsM Z et al. Healthy Living Partnerships to Prevent Diabetes: recruitment and baseline characteristics. Contemp Clin Trials.2011, 32(1): 40-49.

11.The Diabetes Prevention Program (DPP): description of lifestyle intervention. Diabetes Care.2002,25(12): 2165-2171.

12.KatulaJA,VitolinsMZ,RosenbergerE L, BlackwellCS,Morgan TM et al. One-Year Results of a Community-Based Translation of the Diabetes Prevention Program: Healthy-Living Partnerships to Prevent Diabetes (HELP PD) Project. Diabetes Care. 2011, 34(7): 1451-1457.

13.KatulaJA,VitolinsMZ , Morgan TM,LawlorMS,BlackwellCS et al.The Healthy Living Partnerships to Prevent Diabetes study: 2-year outcomes of a randomized controlled trial. Am J Prev Med. 2013, 44(4): S324- S332.

14. Lawlor MS, Blackwell CS, Isom SP,Katula JA,VitolinsMZ et al. Cost of a group translation of the Diabetes Prevention Program: Healthy Living Partnerships to Prevent Diabetes. Am J Prev Med. 2013, 44(4): S381-S389.

15. CharlesworthG,Shepstone L, WilsonE , Thalanany M,MugfordM et al. Does befriending by trained lay workers improve psychological well-being and quality of life for carers of people with dementia, and at what cost? A randomised controlled trial. Health Technol Assess.2008, 12(4): iii, v-ix,1-78.

16. Quillian JP. Community health workers and primary health care in Honduras. J Am Acad Nurse Pract. 1993, 5(5): 219-225.