

The Role of Peer Support in Diabetes Care and Self-Management

*Carol A. Brownson*¹ and *Michele Heisler*²

1 Division of Health Behavior Research, Washington University School of Medicine in St. Louis, St. Louis, Missouri, USA

2 Veterans Affairs Center for Clinical Practice Management Research, VA Ann Arbor Healthcare System, Ann Arbor, Michigan, USA

3 Department of Internal Medicine, University of Michigan Medical School, Ann Arbor, Michigan, USA

4 Michigan Diabetes Research and Training Center, Ann Arbor, Michigan, USA

Supplementary Material

This supplementary material contains the information referred to in the full version of this article, which can be found at <http://thepatient.adisonline.com>

Reference	Population	Setting	Elements of Support Provided by Peers	Peer Role(s)	Method/ Mode	Other Team Members/ Roles	Outcomes That Improved
Balcazar, 2005(52)	Latino families, mean age ranged 30-51 years across sites; 91% female	Community Based Organizations (CBOs) in seven US communities	CC, ES, FS, CR	“Promotores de salud” recruited participants, led heart health education classes with optional diabetes module (provided to about half the families), followed up with home visits or telephone contact, referred participants to health care providers for appropriate screenings provided transportation as needed	Educational classes in homes, community centers, churches, schools; telephone and home follow up	Research and program team members developed the train-the-trainer <i>promotores</i> program; local CBOs provided project oversight	Improved post-intervention heart-healthy behaviors, community referrals and screenings; information sharing beyond families; and participant satisfaction with the program
Brown, 2002(66)	Mexican Americans with type 2 diabetes diagnosed after age 35, and a family member; mean age 54.7 ± 8.2 years; 60% female	Community settings in a rural area along the US-Mexico border	CC, ES, FS	“Community workers” with type 2 diabetes managed preparations for group sessions, assisted the nurses and dietitians in groups and provided important links with the local Mexican American community	Group education classes in community settings	Nurses, dietitians and community workers provided instructional classes, support groups and food preparation demonstrations	Improved A1c, fasting blood glucose and diabetes knowledge at 6 and 12 months
Corkery, 1997(61)	Inner-city Latino adults with type 2 diabetes; mean age 52.8 ± 11.7 years; 74% female	Nurse-managed diabetes management clinic at an urban tertiary care teaching hospital	CC, IA, ES, FS	Bicultural “community health worker” (CHW) acted as a liaison between patients, their families and health care providers, attended clinic sessions, interpreted, reinforced self-care instructions, and reminded patients of upcoming appointments	Clinic visit; mode of other contact not specified	Certified diabetes educators (CDEs) led one-on-one diabetes education sessions with participants	Higher rates of diabetes patients who had the CHW intervention completed the diabetes education program compared to patients without the CHW intervention

Fedder, 2003(60)	African-American Medicaid patients with diabetes mellitus with/without hypertension; mean age 57.4 ±12 years; 78% female	Inner-city clinics in a northeastern US city	CC, IA, ES, FS, CR	CHW's linked patients with appropriate primary care and specialty practitioners by assisting them in making and keeping appointments; monitored patients' self-care behaviors; measured blood glucose and blood pressure, conducted foot inspections; assisted in establishing and/or sustaining Medicaid eligibility if appropriate; and provided social support to patients, their caregivers and families	Alternate weekly home visits and phone contacts	Research team coordinated the study, organized training for CHW's and supported them throughout the project	Reductions in total emergency room (ER) visits, ER and total hospital admissions and Medicaid reimbursements; improved quality of life one year post intervention compared with one year prior
Gary, 2003(67)	Urban African American adults with diabetes; mean age 59 ± 9 years; 77% female	Primary care sites in two inner city, predominantly African American neighborhoods	CC, IA, ES, FS	A volunteer CHW facilitated preventive care by helping schedule appointments, monitor behavior, reinforce adherence to treatment recommendations, mobilize social support and provide physician feedback	Three yearly face-to-face home or phone visits and additional contacts as needed	In combined arm, a nurse case manager and CHW met every two weeks to coordinate interventions and promote synergy among three nurse visits and three CHW visits with participants each year.	At two-year follow up, arm randomized to CHW and CHW and nurse case manager arms had improved glycemic control. Combined arm also had improved triglycerides and diastolic blood pressure (BP) compared to usual care.
Gilmer, 2005; Philis-Tsimikas, 2004(72, 74)	Mostly Latino adults with type 2 diabetes receiving care at community health clinics; mean age 51 years; about 70%	Urban community and health clinic sites	GS, ES	Trained peer educators/CHW's led an 8-week group self-management training program	Group classes	A team of a nurse/certified diabetes educator, bilingual/ bicultural medical assistant and bilingual/	After one year, both analyses showed participants had significant reductions in A1c, diastolic BP, total and LDL

	female								bicultural dietitian provided stepped-care pharmacologic management and counseling	cholesterol. Gilmer also reported reduced systolic blood pressure and reduced hospital expenditures compared to a cohort of historical controls
Griffin, 1999 (71)	Native American adults with type 2 diabetes	Community sites in the southwest US	IA, GS, ES		Bilingual "community mentors" led five culturally tailored diabetes lifestyle education sessions, with one site offering one-on-one sessions and the other two offering group sessions	Group and one-on-one sessions	Program team members designed the educational sessions addressing exercise, diet and support in making lifestyle changes and trained the community mentors	Participants had high levels of satisfaction with both one-on-one and group sessions; retention rates were high in both types of sessions		
Heath, 1987, 1991(80, 95)	Zuni Indian adults with type 2 diabetes; mean age 42 ± 10 years; 80% female	Community sites	GS, ES		Zuni volunteers trained in exercise and group leadership led one-hour aerobic exercise sessions offered five days/week	Group exercise sessions	Health educator provided initial training of lay volunteers	At two year follow-up, participants compared with nonparticipants experienced weight loss, decreased fasting blood glucose values and decreased use of anti-hyperglycemic medications		
Hopper, 1984(35)	Older, low-income, African American patients being treated for diabetes; 89% female	Urban hospital diabetes clinic	GS, ES, FS		"Home health aides" took health and physical histories, monitored weight and blood pressure, provided education and coaching on diet and meds	One-on-one home visits	Training by staff from the hospital's Medicine, Dietary and Physical Therapy Departments and the Nurse Practitioner (NP) Program;	Improvements in glycemic control, attendance at eye and diabetes clinic visits and reduction in number emergency room visits after 18-month intervention		

Humphry, 1997(69)	Patients (mostly Hawaiian/ Pacific Islanders) with diabetes who had poor metabolic control and had repeatedly missed appointments or pregnant women and children with diabetes who might require insulin	Community clinic in Hawaii	CC, ES, FS	CHWs provided case management; they coordinated health services for the patient, provided nutrition and diabetes education, interacted with patients and their physicians to adjust medications	Home and community-based visits	supervision by NP program Physician, nutritionist, CDE, health educator provided services in the clinic and served as a resource to the community health care workers and patients.	Improvements in blood glucose, weight, and hypertension control; frequency of contact between patients and members of the health care team; and patient satisfaction with services after 3 ½ year intervention period
Ingram, 2005(58)	Mexican American patients with diabetes identified through the health center databases at 2 locations; 50-70% over age 50; 66-70% female	Two border communities in a rural area along the US-Mexico border	CC, ES, FS, CR	“Promotores de salud” provided outreach, assisted participants in incorporating self-management behaviors into their lifestyles and offered ongoing support and follow-up; assisted patients in accessing health insurance, medications and other social services; in one site they eventually led the five 2-hour weekly diabetes education classes	Community group settings; one-on-one follow up via telephone	CDE developed curriculum and provided supervision to the <i>promotoras</i> in one site; program involved academic and community partners	Improvements in self-management behaviors (diet, foot care and glucose monitoring), A1c, random blood glucose and blood pressure levels after three-year intervention period
Ingram, 2007 (64)	Mexican American patients with diabetes who were members of a farmworker community; mean age 60 years; 77%	Border community in a rural area along the US-Mexico border	CC, IA, GS, ES, FS, CR	“Promotoras” implemented a community-based intervention that included support groups, home/hospital visits, telephone support, and	Community group setting, individual phone calls, home visits	Clinic providers provided usual care and basic education, collaborated on referrals to and from <i>promotoras</i>	Improvements in A1c, HDL and systolic blood pressure; self-reported increase in support from family and friends and increased comfort

	female				advocacy to people with diabetes. Support groups included information, social support and assistance with goal setting. Advocacy included referrals and assistance with appointments, help with paperwork and communication with providers, finding community resources				speaking with family, friends and physicians about diabetes; 12-month study period
Joseph, 2001(82)	Caucasian, middle income patients with diabetes who were just beginning to consider behavior change	Not specified	FS	FS	“Peer coaches” with diabetes provided non-judgmental encouragement, raised consciousness about need for change and focused on positive behaviors. Coaches matched to peers by age, gender and physical appearance	Initial face-to-face; weekly phone calls for 8 weeks	Training by diabetes nurse educator and social worker	Self-reported progress in diet, physical activity and blood glucose monitoring; satisfaction with peer coaching after 8-week intervention period	
Keyserling, 2000, 2002(81, 96)	African American women over 40 years of age with type 2 diabetes; mean age 58.5 years	Primary care centers, an HMO and the general medicine clinic in an academic center in the southeast US	GS, FS	GS, FS	“Community diabetes advisors” provided social support and feedback, reinforced diet and physical activity goals, assisted with group sessions as part of a clinic plus community condition in a program targeted at behavior change	Monthly telephone contact and three group sessions	Clinic-based health counselor and research assistant (both registered dietitians) provide training and support	Improvements in physical activity; decreased percentage of calories from saturated fats and, dietary cholesterol; decreased total caloric intake; improved scores on diabetes knowledge, mental and social well-being scales after one-year intervention period	

Liebman, 2007, 2008(63, 70)	Low-income Latino (mostly Puerto Rican) patients with type 2 diabetes	Urban federally qualified health center in the northeast US	CC, GS, ES, FS, CR	Bilingual/bicultural CHWs provided outreach to get people back into care, conducted home visits, accompanied patients to their medical visits, provided telephone and in-person counseling and support, and ensured that patients continued their regular medical care. In addition, "volunteer community mentors" served as role models during the breakfast and snack clubs and education classes	Home visits, phone follow up, group activities in the clinic	Primary care team provided services to patients; diabetes educator and nutritionist provided training and support to CHWs; supervision provided by nurse	Improvements in A1c associated with participation in program activities and improvements in getting regular care; 3 ½ year intervention period
Lorig, 1999(53)	Adults 40 years or older with heart disease, lung disease, stroke or arthritis	Community-based sites	GS, ES	Pairs of trained, volunteer lay leaders led seven weekly 2 1/2 hour sessions of a patient chronic disease self-management course	Group education classes	Initial training and oversight by research team	Improvements at 6 months in weekly minutes of exercise, frequency of cognitive symptom management, communication with physicians, self-reported health, health distress, fatigue, disability and social/role activities; fewer hospitalizations and days in hospital
Lorig, 2003(54)	Spanish-speaking adults with chronic conditions--heart disease, lung disease, or type 2	Community sites	GS, ES	Trained pairs of peers led a six-week group self-management training program	Group education classes	Research team provided initial training and oversight; lay leaders trained	At four months compared with a control group, participants had improved health

	diabetes; mean age 57 ± 13.9 years; 79% female						status, health behavior and self-efficacy, as well as fewer emergency room visits. At one year, the improvements were maintained and remained significantly different from baseline.	other lay leaders	
Lorig, 2005(55)	Latinos with chronic illness (more than half had diabetes); mean age 61.3 (Spanish speaking group) and 62.1 years (English speaking group); 83% and 88% female respectively	Churches, neighborhoods and clinics in southwest US and Mexico	ES	Pairs of trained peer leaders facilitated weekly self management classes for 6 weeks for 2 different groups, one Spanish speaking and one English speaking	Group education classes	University researchers designed the study; El Paso Diabetes Association offered the program	At four months and one year, both groups had improved health behaviors such as physical activity, health status and self-efficacy; improved physician utilization in the Spanish speaking group		
Lorig, 2006(56)	Adults with chronic conditions (more than 60% had diabetes)	Internet-based	IA, GS, ES, FS	Pairs of trained peer moderators led each workshop with content delivery scripted on the web. Moderators reminded participants to log on, modeled action planning and problem solving, offered encouragement, posted to the bulletin and monitored participants' daily posts.	Password-protected, interactive web-based instruction; web-based bulletin board discussion groups and a book with all the program content and references	Program developers developed the program content and provided training and oversight to peer moderators	At one year, the intervention group had improved health status and improved self-efficacy compared to usual care control patients.		
Lujan, 2007(75)	Mexican Americans with type 2 diabetes; mean age 58 years;	Catholic faith-based clinic in a major city on the	GS, ES, FS	"Promotoras" delivered 8 weekly 2-hour, participative group classes	Group education; telephone and	CDE and <i>promotoras</i> developed classes;	Improvements in A1c levels and diabetes knowledge; 6-month		

	80% female	Texas-Mexico border		and conducted telephone follow up with participants biweekly; after the classes ended, they mailed inspirational faith-based health behavior change postcards biweekly for 16 weeks to participants	mail follow-up	principal investigator monitored delivery of classes	intervention
McDermott, 2003(57)	Indigenous Australians; mean age 52.4 to 53.3 years over study period	Remote communities in northeast Australia	CC	Local “indigenous health workers” managed registries, recall and reminder systems and care plans	One-on-one care	Research team and diabetes experts determined need for system changes, oversaw the project and provided training to local workers.	Increases in the proportion of people with controlled hypertension and blood glucose; improvements in self monitoring and taking insulin; decreased diabetes-related hospitalizations; 3-year study period
Moore, 2002(62)	Clinic patients	Hospital based diabetes education program in a small southeast US town	FS	“Community outreach volunteers” with diabetes assembled class materials, served as hosts for classes, answered phones, verified class attendance, downloaded data from meters, made reminder calls for class, maintained mailing lists, mailed newsletters and follow up surveys, made reminder phone calls	Group education classes; logistical support on the office	Registered nurse (CDE) led the program	Reductions in A1c levels overall, greater for the volunteers than participants; improved processes of care (blood glucose monitoring, annual eye, foot and lipids); time saving for staff; 2 ½ year study period
Plescia, 2006(84)	African Americans with diabetes living in disadvantaged	Communities in southeastern US	ES, FS, CR	“Lay health advisors” (LHAs) conducted door-to-door visits and	Home visits, group activities in	Coalition of grassroots community activists and	Not reported for participants; Improved health

	communities identified as experiencing health disparities			coordinated educational opportunities and workshops in the communities that included walking groups, diabetes support groups and health house parties where they made presentations on diabetes	the community	representatives from local agencies guided the planning, implementation and evaluation of the project. A registered dietitian, registered nurse, smoking cessation health educator and fitness specialist provided training and technical expertise in their respective disciplines and helped LHAs develop specific programs and campaigns	behaviors (e.g., physical activity and diet), health beliefs and feeling of empowerment among LHAs; 2-year study period
Quinn, 2001(76)	Church-going African American women who were overweight	Urban African American churches	GS, ES	Trained lay health educators (LHEs) led 14 weekly structured, small-group sessions	Group sessions	Research team provided initial training and ongoing monitoring, support and oversight to LHEs	Participants lost on average 8.3 pounds after 14 weeks of intervention
Sixta, 2008(77)	Mexican American adults with type 2 diabetes; mean age 56.3 years; 71% female	Community clinic in US-Mexico border community	GS, ES	Pairs of clinic-employed community health workers (" <i>promotoras</i> ") provided a 10-week diabetes self-management course (10 weekly 1.5-hour sessions)	Group education classes	Health care providers oversaw course design, quality control and outcomes and provided <i>promotora</i> education and training; RN	Participants in group receiving a <i>promotora</i> -led culturally tailored diabetes self-management course had significantly better diabetes knowledge scores

Struthers, 2003(78)	Adult American Indians with or at risk of diabetes who were part of two Northern Plains tribes	Two Reservations in US	ES	“Peer facilitators” recruited participants, coordinated and conducted 12-week curricula-based Talking Circles	Group education classes	University researcher and project coordinator hired and trained peer facilitators	Not reported for participants; study evaluated experience of peer facilitators	than a wait-list usual-care control group; 6-month intervention period
Teufel-Shone, 2005(79)	Hispanic patients with diabetes who had previously participated in Border Health ¡SI! education classes and their families and supporters	Two US- Mexico border communities in southeast US	GS, ES, FS	“Promotoras” delivered a family-based diabetes prevention program that emphasizes family support, communication and health behaviors in a 12-week program with 10 points of contact	Home visits, multi-family group sessions in the community	Community and university partners and <i>promotoras</i> developed the program. Two community agencies supervised the <i>promotoras</i> who conducted the intervention	Improvements in knowledge of eight diabetes risk factors, family efficacy to change food and physical activity behaviors after 12-week intervention	
Thompson, 2007(59)	Diabetic Mexican American patients with A1c level >8.0, comorbid depression, or inadequate social support: mean age 57 years; 66% female	Urban community health center on the west coast of the US	CC, IA, GS, ES, FS	CHWs assessed patients’ readiness to change behavior; provided support and counseling by phone at least weekly for the first 6 months and monthly thereafter; led support groups, a walking club, and diabetes classes; conducted outreach; assisted with a psycho-educational group for patients who also had depression; and met with patient care team in quarterly team conference	Telephone contact, group activities, community outreach	Primary care providers, health educator and dietitian (CDE) provided usual care/services; dietitian and health educator provided training and support for CHWs	Improvements in A1c (greater among women and those who had more frequent contact with the <i>promotoras</i>); non-significant improvements in low density lipoprotein cholesterol and blood pressure; one-year study period	

Two Feathers, 2005(65)	Inner-city African American and Latino adults with diabetes; mean age 58.5 ± 14.5 years; 79% female	Community-based sites and clinics in a northeast US city	CC, GS, ES, FS	“Family Health Advocates” led five culturally tailored, diabetes self-management group training sessions, (2 hours each, 4 weeks apart), provided individual support and help setting and meeting behavioral goals, and helped participants navigate the health system	Group sessions, individual meetings and telephone contact	Health care professionals provided initial training, consultation and quality oversight.	Significant improvements in A1c level compared to a cohort of historical controls and improvements in post-intervention dietary knowledge, behaviors and physical activity knowledge
Vetter , 2004 (68)	Inner city African American adults with type 2 diabetes; mean age 59 years; 77% female	University clinic in a northeast US city	CC, IA, FS, CR	CHWs assisted with scheduling appointments, monitored participant and family behavior, reinforced adherence to treatment recommendations, mobilized social support, provided physician feedback, and provided instrumental support	Three 45-60 minute home visits by CHW during a two-year period	Clinic visit was followed by either newsletters, nurse case manager (NCM) follow up, CHW home visits or both NCM and CHW	Reductions in A1c, lipids, diastolic blood pressure; improvements in physical activity and dietary risk scores. CHW group experienced greatest improvement in diet and physical activity at the end of the two-year intervention period
Wilson, 1987(83)	Older adults with type 2 diabetes who were not taking insulin and who had been advised by their physicians to lose weight; mean age 68.2 ± 7.2 years; 80% female	Senior citizen centers and nutrition sites located in four largely rural counties of US Pacific Northwest	FS	“Peers support facilitators” met with education class participants for one hour after their education session to foster peer interaction and self-help	Group sessions	Ten 60-minute education classes were conducted by a registered dietitian. Eight sessions were held weekly. The ninth and tenth sessions were held during weeks 12 & 16.	Groups with peer support experienced substantially greater weight loss and an initial reduction in glycosylated hemoglobin than those who got education only; 16-week intervention

References

1. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. *Diabetes Care* 2004;27(5):1047-53.
2. King H, Aubert R, Herman W. Global Burden of Diabetes, 1995–2025: Prevalence, numerical estimates, and projections. *Diabetes Care* 1998;21(9):1414-31.
3. Narayan K, Gregg E, Fagot-Campagna A, Engelgau M, Vinicor F. Diabetes--a common, growing, serious, costly, and potentially preventable public health problem. *Diabetes Research and Clinical Practice* 2000;50(Suppl 2):S77-84.
4. CDC. National Diabetes Fact Sheet: Department of Health and Human Services; 2005.
5. Roglic G, Unwin N. Global Mortality Attributable to Diabetes: Time for a Realistic Estimate. *Diabetes Voice* 2005;50(1):33-4.
6. CDC. Sensitivity of Death Certificate Data for Monitoring Diabetes Mortality -- Diabetic Eye Disease Follow-Up Study, 1985 - 1990 In: *Morbidity and Mortality Weekly Report: Department of Health and Human Services* 1991. p. 739-741.
7. Beller G. New technology and the cost of health care. *Journal of Nuclear Cardiology* 2005;12(5):515-7.
8. American Diabetes Association. Economic Costs of Diabetes in the U.S. in 2007. *Diabetes Care* 2008;31(3):1-20.
9. *Diabetes Atlas*: International Diabetes Federation; 2008.
10. Logminienė Ž, Norkus AV, L. Direct and indirect diabetes costs in the world. *Medicina* 2004;40(1):16-26.
11. Mangione C, Gerzoff R, Williamson D, Steers W, Kerr E, Brown A, et al. The association between quality of care and the intensity of diabetes disease management programs. *Annals of Internal Medicine* 2006;145(2):107-16.
12. Norris S, Nichols P, Caspersen C, Glasgow R, Engelgau M, Jack L, et al. The effectiveness of disease and case management for people with diabetes. A systematic review. *American Journal of Preventive Medicine* 2002;22(4 Suppl):15-38.
13. Wagner E, Glasgow R, Davis C, Bonomi A, Provost L, McCulloch D, et al. Quality improvement in chronic illness care: a collaborative approach. *The Joint Commission Journal on Quality Improvement* 2001;27(2):63-80.
14. Glasgow R, Funnell M, Bonomi A, Davis C, Beckham V, Wagner E. Self-management aspects of the improving chronic illness care breakthrough series: implementation with diabetes and heart failure teams. *Annals of Behavioral Medicine* 2002;24(2):80-7.
15. Smedley B, Stith A, Nelson A. *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care* Washington, D.C.: Institute of Medicine; 2002.
16. Bodenheimer T, Lorig K, Holman H, Grumbach K. Patient self-management of chronic disease in primary care. *Journal of the American Medical Association* 2002;288(19):2469-75.
17. Fisher E, Brownson C, O'Toole M, Shetty G, Anwuri V, Glasgow R. Ecological approaches to self-management: the case of diabetes. *American Journal of Public Health* 2005;95(9):1523-35.
18. Adams K, Corrigan M. *Priority Areas for National Action: Transforming Health Care Quality*. Washington, D.C.: Institute of Medicine; 2003.
19. Sabate E. *Adherence to long-term therapies: evidence for action*. Geneva: World Health Organization; 2003.
20. Saaddine J, Cadwell B, Gregg E, Engelgau M, Vinicor F, Imperatore G, et al. Improvements in diabetes processes of care and intermediate outcomes: United States, 1988-2002. *Annals of Internal Medicine* 2006;144(7):465-74.
21. American Diabetes Association. Standards of medical care in diabetes--2008. *Diabetes Care* 2008;31(Suppl 1):S12-54.
22. IDF Clinical Guidelines Task Force. *Global guideline for type 2 diabetes*. Brussels: International Diabetes Federation; 2005.
23. Segal K. Type 2 diabetes and disease management: exploring the connections. *Disease Management* 2004(Suppl 1):S11-22.

24. CDC. Prevalence of Receiving Multiple Preventive-Care Services Among Adults with Diabetes --- United States, 2002--2004. In: *Morbidity and Mortality Weekly Report: Department of Health and Human Services*; 2005. p. 1130-3.
25. Strine T, Okoro C, Chapman D, Beckles G, Balluz L, Mokdad A. The impact of formal diabetes education on the preventive health practices and behaviors of persons with type 2 diabetes. *Preventive Medicine* 2005;41(1):79-84.
26. Funnell M, Brown T, Childs B, Haas L, Hosey G, Jensen B, et al. National standards for diabetes self-management education. *Diabetes Care* 2008;31(Suppl 1):S97-104.
27. Norris S, Engelgau M, Narayan K. Effectiveness of self-management training in type 2 diabetes: a systematic review of randomized controlled trials. *Diabetes Care* 2001;24(3):561-87.
28. Zweifler J. The missing link: improving quality with a chronic disease management intervention for the primary care office. *Annals of Family Medicine* 2007;5(5):453-6.
29. Dower C, Knox M, Lindler V, O'Neil E. Advancing community health worker practice and utilization: the focus on financing. In; 2006.
30. Ruddy G, Rhee K. Transdisciplinary Teams in Primary Care for the Underserved: A Literature Review. *Journal of Health Care for the Poor and Underserved* 2005;16(2):248-56.
31. Leninger M. *Culture Care Diversity and Universality: A Theory of Nursing*. New York: National League of Nursing; 1991.
32. Israel B. Social networks and social support: implications for natural helper and community level interventions. *Health Education Quarterly* 1985;12(1):65-80.
33. Satterfield D, Burd C, Valdez L, Hosey G, Eagle Shield J. The "in-between" people: participation of community health representatives in diabetes prevention and care in American Indian and Alaskan Native communities. *Health Promotion Practice* 2002;3(2):166-75.
34. University of Arizona, Annie E. Casey Foundation. *The National Community Health Advisor Study: Weaving the Future*. In: University of Arizona Press 1998.
35. Hopper S, Miller J, Birge C, Swift J. A randomized study of the impact of home health aides on diabetic control and utilization patterns. *American Journal of Public Health* 1984;74(6):600-2.
36. Dennis C. Peer support within a health care context: a concept analysis. *International Journal of Nursing Studies* 2003;40(3):321-32.
37. *Community Health Worker National Workforce Study: U.S. Department of Health and Human Services, Health Resources and Services Administration, Bureau of Health Professions*; 2007 March.
38. Nemcek M, Sabatier R. State of evaluation: community health workers. *Public Health Nursing* 2003;20(4):260-70.
39. Musick M, Herzog A, House J. Volunteering and mortality among older adults: findings from a national sample. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences* 1999;54(3):S173-80.
40. Schwartz C, Sendor M. Helping others helps oneself: response shift effects in peer support. *Social Science and Medicine* 1999;48(11):1563-75.
41. Brown S, Nesse R, Vinokur A, Smith D. Providing social support may be more beneficial than receiving it: results from a prospective study of mortality. *Psychological Science* 2003;14(4):320-7.
42. Ruggiero L, Spirito A, Bond A, Coustan D, McGarvey S. Impact of social support and stress on compliance in women with gestational diabetes. *Diabetes Care* 1990;13(4):441-3.
43. Tillotson L, Smith M. Locus of control, social support, and adherence to the diabetes regimen *The Diabetes Educator* 1996;22(2):133-9.
44. Gallant M. The influence of social support on chronic illness self-management: a review and directions for research. *Health Education and Behavior* 2003;30(2):170-95.
45. Swider S. Outcome effectiveness of community health workers: an integrative literature review. *Public Health Nursing* 2002;19(1):11-20.
46. Lewin S, Dick J, Pond P, Zwarenstein M, Aja G, van Wyk B, et al. Lay health workers in primary and community health care. *Cochrane Database of Systematic Reviews* 2005;25(1).
47. Lehmann U, Sanders D. *Community health workers: What do we know about them? The state of the evidence on programmes, activities, costs and impact on health outcomes of using community health workers*. Geneva: World Health Organization; 2007.
48. Heisler M. *Building Peer Support Programs to Manage Chronic Disease: Seven Models for Success*: California HealthCare Foundation; 2006.

49. Ro M, Treadwell H, Northridge M. Community Health Workers and Community Voices: Promoting Good Health. In: *Community Voices*; 2003.
50. Prasad B, Muraleedharan V. Community health workers: a review of concepts, practice and policy concerns: HRH Global Resource Center; 2007.
51. Norris S, Chowdhury F, Van Le K, Horsley T, Brownstein J, Zhang X, et al. Effectiveness of community health workers in the care of persons with diabetes. *Diabetic Medicine* 2006;23(5):544-56.
52. Balcazar H, Alvarado M, Hollen M, Gonzalez-Cruz Y, Pedregon V. Evaluation of Salud Para Su Corazón (Health for Your Heart) — National Council of La Raza Promotora Outreach Program. *Preventing Chronic Disease* 2005;2(3):1-9.
53. Lorig K, Sobel D, Stewart AB, BL Jr., Bandura A, Ritter P, Gonzalez V, et al. Evidence suggesting that a chronic disease self-management program can improve health status while reducing hospitalization: a randomized trial. *Medical Care* 1999;37(1):5-14.
54. Lorig K, Ritter PG, VM. Hispanic chronic disease self-management: a randomized community-based outcome trial. *Nursing Research* 2003;52(6):361-9.
55. Lorig K, Ritter P, A J. Outcomes of border health Spanish/English chronic disease self-management programs. *The Diabetes Educator* 2005;31(3):401-9.
56. Lorig K, Ritter P, Laurent D, Plant K. Internet-based chronic disease self-management: a randomized trial. *Medical Care* 2006;44(11):964-71.
57. McDermott R, Tulip F, Schmidt B, Sinha A. Sustaining better diabetes care in remote indigenous Australian communities. *BMJ* 2003;327(7412):428-30.
58. Ingram M, Gallegos G, Elenes J. Diabetes is a community issue: the critical elements of a successful outreach and education model on the U.S.-Mexico border. *Preventing Chronic Disease* 2005;2(1):A15.
59. Thompson J, Horton C, Flores C. Advancing diabetes self-management in the Mexican American population: a community health worker model in a primary care setting. *The Diabetes Educator* 2007;33(Suppl 6):159S-165S.
60. Fedder D, Chang R, Curry S, Nichols G. The effectiveness of a community health worker outreach program on healthcare utilization of west Baltimore City Medicaid patients with diabetes, with or without hypertension. *Ethnicity and Disease* 2003;13(1):22-7.
61. Corkery E, Palmer C, Foley M, Schechter C, Frisher L, Roman S. Effect of a bicultural community health worker on completion of diabetes education in a Hispanic population. *Diabetes Care* 1997;20(3):254-7.
62. Moore K, Mengel M. Expanding the team: the use of volunteers in a diabetes education program. *The Diabetes Educator* 2002;28(4):554-8.
63. Liebman J, Heffernan D. Quality Improvement in Diabetes Care Using Community Health Workers. *Clinical Diabetes* 2008;26(2):75-6.
64. Ingram M, Torres E, Redondo F, Bradford G, Wang C, O'Toole ML. The impact of promotoras on social support and glycemic control among members of a farmworker community on the US-Mexico border. *The Diabetes Educator* 2007;33(Suppl 6):172s-8.
65. Two Feathers J, Kieffer E, Palmisano G, Anderson M, Sinco B, Janz N, et al. Racial and Ethnic Approaches to Community Health (REACH) Detroit partnership: improving diabetes-related outcomes among African American and Latino adults. *American Journal of Public Health* 2005;95(9):1552-60.
66. Brown S, Garcia A, Kouzekanani K, Hanis C. Culturally competent diabetes self-management education for Mexican Americans: the Starr County border health initiative. *Diabetes Care* 2002;25(2):259-68.
67. Gary T, Bone L, Hill M, Levine D, McGuire M, Saudek C, et al. Randomized controlled trial of the effects of nurse case manager and community health worker interventions on risk factors for diabetes-related complications in urban African Americans. *Preventive Medicine* 2003;37(1):23-32.
68. Vetter M, Bristow L, Ahrens J. A model for home care clinician and home health aide collaboration: diabetes care by nurse case managers and community health workers. *Home Healthcare Nurse* 2004;22(9):645-8.
69. Humphry J, Jameson L, Beckham S. Overcoming social and cultural barriers to care for patients with diabetes. *The Western Journal of Medicine* 1997;167(3):138-44.
70. Liebman J, Heffernan D, Sarvela P. Establishing diabetes self-management in a community health center serving low-income Latinos. *The Diabetes Educator* 2007;33(Suppl 6):132S-138S.

71. Griffin J, Gilliland S, Perez G, Helitzer D, Carter J. Participant satisfaction with a culturally appropriate diabetes education program: the Native American Diabetes Project. *The Diabetes Educator* 1999;25(3):351-63.
72. Gilmer T, Philis-Tsimikas A, Walker C. Outcomes of Project Dulce: a culturally specific diabetes management program. *The Annals of Pharmacotherapy* 2005;39(5):817-22.
73. Philis-Tsimikas A, Walker C. Improved care for diabetes in underserved populations. *The Journal of Ambulatory Care Management* 2001;24(1):39-43.
74. Philis-Tsimikas A, Walker C, Rivard L, Talavera G, Reimann J, Salmon M, et al. Improvement in diabetes care of underinsured patients enrolled in Project Dulce: a community-based, culturally appropriate, nurse case management and peer education diabetes care model. *Diabetes Care* 2004;27(1):110-5.
75. Lujan J, Ostwald S, Ortiz M. Promotora diabetes intervention for Mexican Americans. *The Diabetes Educator* 2007;33(4):660-70.
76. Quinn M, McNabb W. Training lay health educators to conduct a church-based weight-loss program for African American women. *The Diabetes Educator* 2001;27(2):231-8.
77. Sixta C, Ostwald S. Texas-Mexico border intervention by promotores for patients with type 2 diabetes. *The Diabetes Educator* 2008;34(2):299-309.
78. Struthers R, Hodge F, De Cora L, Geishirt-Cantrell B. The experience of native peer facilitators in the campaign against type 2 diabetes. *The Journal of Rural Health* 2003;19(2):174-80.
79. Teufel-Shone N, Drummond R, Rawiel U. Developing and adapting a family-based diabetes program at the U.S.-Mexico border. *Preventing Chronic Disease* 2005;2(1):A20.
80. Heath G, Wilson R, Smith J, Leonard B. Community-based exercise and weight control: diabetes risk reduction and glycemic control in Zuni Indians. *American Journal of Clinical Nutrition* 1991;53(6 (Suppl)):1642S-1646S.
81. Keyserling T, Samuel-Hodge C, Ammerman A, Ainsworth B, Henríquez-Roldán C, Elasy T, et al. A randomized trial of an intervention to improve self-care behaviors of African-American women with type 2 diabetes: impact on physical activity. *Diabetes Care* 2002;25(9):1576-83.
82. Joseph D, Griffin M, Hall R, Sullivan E. Peer coaching: an intervention for individuals struggling with diabetes. *The Diabetes Educator* 2001;27(5):703-10.
83. Wilson W, Pratt C. The impact of diabetes education and peer support upon weight and glycemic control of elderly persons with noninsulin dependent diabetes mellitus (NIDDM). *American Journal of Public Health* 1987;77(5):634-5.
84. Plescia M, Groblewski M, Chavis L. A Lay Health Advisor Program to Promote Community Capacity and Change Among Change Agents. In: *Health Promotion Practice*; 2006.
85. May M, Kash B, Contreras R. Community Health Worker Certification and Training: A National Survey of Regionally and State-Based Programs: Southwest Rural Health Research Center; 2005.
86. Willaert A. Minnesota Community Health Worker Project In.
87. Duthie P, Philippi E, Schultz J. Collaboration for training: a partnership to improve quality, consistency and cost-effectiveness of essential training for community health workers. *American Journal of Health Education* 2005;36(2):113-6.
88. Maurana C, Rodney M. Strategies for developing a successful community health advocate program. Key elements of community health advocacy. *Family and Community Health* 2000;23(1):40-9.
89. Proulx D. Project Jumpstart: A community college and AHEC partnership initiative for community health worker education. *Texas Journal of Rural Health* 2000;18(3):6-16.
90. Hill-Briggs F, Batts-Turner M, Gary T, Brancati F, Hill M, Levine D, et al. Training Community Health Workers as Diabetes Educators for Urban African Americans: Value Added Using Participatory Methods. *Progress in Community Health Partnerships* 2006;1(2):185-94.
91. Bhattacharyya K, Winch P, LeBan K, Tien M. Community health worker incentives and disincentives: How they affect motivation, retention, and sustainability. Arlington: Basic Support for Institutionalizing Child Survival Project (BASICS II) for the United States Agency for International Development; 2001 October.
92. Whitley E, Everhart R, Wright R. Measuring return on investment of outreach by community health workers. *Journal of Health Care for the Poor and Underserved* 2006;17(1 Suppl):6-15.
93. Peyrot M, Rubin R. Access to diabetes self-management education. *The Diabetes Educator* 2008;34(1):90-7.

94. Davis K, O'Toole M, Brownson C, Llanos P, Fisher E. Teaching how, not what: the contributions of community health workers to diabetes self-management. *The Diabetes Educator* 2007;33(Suppl 6):208S-215S.
95. Heath G, Leonard B, Wilson R, Kendrick J, Powell K. Community-based exercise intervention: Zuni Diabetes Project. *Diabetes Care* 1987;10(5):579-83.
96. Keyserling T, Ammerman A, Samuel-Hodge C, Ingram A, Skelly A, Elasy T, et al. A diabetes management program for African American women with type 2 diabetes. *The Diabetes Educator* 2000;26(5):796-805.