Community Preventive Services Task Force

Diabetes Prevention: Interventions Engaging Community Health Workers

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Finding and Rationale Statement
Ratified August 2016

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Task Force Finding and Rationale Statement

Intervention Definition

Community health workers (including promotores de salud, community health representatives, community health advisors, and others) are frontline public health workers who serve as a bridge between underserved communities and healthcare systems. They are from, or have an unusually close understanding of, the community served. Community health workers often receive on-the-job training, and work without professional titles. Organizations may hire paid community health workers or recruit volunteers to act in this role.

Community health workers may address a broad range of health issues. Interventions that engage community health workers to focus on diabetes prevention aim to reduce one or more risk factors for type 2 diabetes among members of the community, primarily through improvements in diet, physical activity, and weight management. Interventions are delivered to community groups or individuals at increased risk for type 2 diabetes. Programs may include education about diabetes prevention and lifestyle modification, or informal counseling, coaching, and extended support for community members with a higher risk for diabetes. Community health workers deliver program content through one-on-one interactions, group sessions, or a combination of the two. Intervention activities take place in homes or community-based settings. Community health workers may work alone or as part of an intervention team comprising counselors, clinicians, or other health professionals.

Task Force Finding (August 2016)

The Community Preventive Services Task Force recommends interventions engaging community health workers for diabetes prevention based on sufficient evidence of effectiveness in improving glycemic control and weight-related outcomes among people at increased risk for type 2 diabetes. Some evidence suggests interventions adapted from the U.S. Diabetes Prevention Program (Diabetes Prevention Program Research Group 2002, NIDDK 2016) reduce rates of progression to type 2 diabetes, though more research is needed. Interventions engaging community health workers for diabetes prevention, which are typically implemented in underserved communities, can improve health, reduce health disparities, and enhance health equity.

The economic evidence indicates that interventions engaging community health workers for diabetes prevention are cost-effective.

Rationale

Basis of Finding

The Task Force recommendation is based on evidence from a systematic review of 22 studies (search period through May 2015). Studies evaluated the effectiveness of interventions in which community health workers worked with community groups or individual members who had one or more risk factors for type 2 diabetes. Included studies evaluated interventions that engaged community health workers (CHWs) as health education providers (22 studies); outreach, enrollment, and information agents (6 studies); members of care delivery teams (4 studies); and patient navigators (3 studies) (HRSA 2007).

Findings demonstrated interventions engaging CHWs resulted in improved glycemic control (HbA1c, fasting blood glucose [FBG]) and weight-related outcomes, and reduced rates of progression to type 2 diabetes (Table 1). However, evidence on reduced progression to type 2 diabetes came from only 3 studies with small sample sizes, leading the Task Force to downgrade the strength of the supporting review to sufficient evidence on effectiveness.

Table 1. Outcomes Related to Glycemic Control and Weight

Outcome Measure	Results[A] by Study Design
Change in mean weight	**Greatest suitability of study design**[B] (7 studies): Median decrease of 3.7 lbs (IQI: -4.8 to -1.9) **Least suitable study design**[C] (7 studies): Median decrease of 2.8 lbs (IQI: -3.6 to -1.5) **Combined study design** (14 studies): Median decrease of 3.0 lbs (IQI: -5.2 to -1.8)
Change in mean BMI	**Greatest suitability of study design** (6 studies): Median decrease of 0.6 kg/m2 (IQI: -1.0 to -0.4) **Least suitable study design** (7 studies): Median decrease of 0.5 kg/m2 (IQI: -0.6 to -0.5) **Combined study design** (13 studies): Median decrease of 0.5 kg/m2 (IQI: -0.7 to -0.5)
Change in mean waist circumference	**Greatest suitability of study design** (4 studies): Median decrease of 1.1 inches (Range:-1.5 to -0.7) **Least suitable study design** (6 studies): Median decrease of 1.4 inches (IQI:-2.5 to -0.9) **Combined** (10 studies): Median decrease of 1.4 inches (IQI:-1.6 to -0.9)
Progression to type 2 diabetes	**Greatest suitability of study design** (3 studies) Two studies showed decreases of 5.1 percentage points (p-value=0.10) and 2.2 percentage points (p-value not reported) One study showed an increase of 0.03 person years (p-value not reported)

Outcome Measure	Results[A] by Study Design
Change in mean HbA1c	**Greatest suitability of study design** (3 studies): Median decrease of 0.07% (range: -0.18 to 0) **Least suitable study design** (3 studies): Median decrease of 0.10% (range: -0.23 to 0.09) **Combined study design** (6 studies): Median decrease of 0.09% (IQI: -0.19 to 0.02)
Change in mean fasting blood glucose	**Greatest suitability of study design** (5 studies): Median decrease of 1.0 mg/dL (IQI: -15.7 to 2.3) **Least suitable study design** (2 studies): Decrease of 6.8 mg/dL ($p<0.001$) and 2.4 mg/dL (not significant) **Combined study design** (7 studies): Median decrease of 2.4 mg/dL (IQI: -6.8 to 1.0)

[A]Results shown in table were those reported at the end of each intervention

[B]Includes the following study designs: group RCT, before-and-after with comparison group

[C]Includes the following study design: before-and-after without comparison group

IQI = Interquartile Interval

Eight studies evaluated intervention effectiveness on risk factors for cardiovascular disease (CVD), including changes in cholesterol and blood pressure outcomes. Overall, studies showed mixed results (Table 2). This body of evidence included studies with a short duration (<6 months), limited sample size (median=80 clients), and predominately female participants (80%). Of note, if lipids and blood pressure measures are not elevated, participants might benefit from lifestyle modifications. However, if lipids and blood pressure measures are elevated, studies do not attempt to control or investigate these measures, as medical treatment was not part the intervention.

Table 2. CVD Risk Factors

Outcome Measure	Results[A] by Study Design
Change in mean total cholesterol	**Greatest suitability of study design**[B] (2 studies): Increase of 25.2 mg/dL (p<0.01)) and a decrease of 3.9 mg/dL (not significant) **Least suitable study design**[C] (4 studies): Median decrease of 7.8 mg/dL (range: -9.7 to -1.1) **Combined study design** (6 studies): Median decrease of 5.7 mg/dL (IQI: -9.1 to 2.3)
Change in mean LDL	**Greatest suitability of study design** (1 study): Decrease of 5.0 mg/dL (not significant) **Least suitable study design** (4 studies): Median decrease of 5.3 mg/dL (range: -9.2 to 2.8) **Combined study design** (6 studies): Median decrease of 5.0 mg/dL (IQI: -8.3 to -0.2)
Change in mean HDL	**Least suitable study design** (4 studies): Median increase of 0.3 mg/dL (range: -0.9 to 2.3)
Change in mean triglycerides	**Least suitable study design** (2 studies): Decrease of 13.8 mg/dL (p=0.005) and an increase of 3.8 mg/dL (p=0.03)
Change in mean SBP	**Greatest suitability of study design** (3 studies): Median increase of 2.5 mmHg (range: -1.7 to 6.0) **Least suitable study design** (5 studies): Median decrease of 3.8 mmHg (IQI: -12.7 to -1.0) **Combined study design** (8 studies): Median decrease of 2.6 mmHg (IQI: -5.5 to 2.3)

Outcome Measure	Results[A] by Study Design
Change in mean DBP	**Greatest suitability of study design** (3 studies): Median increase of 1.0 mmHg (range: -3.2 to 2.0) **Least suitable study design** (5 studies): Median decrease of 2.8 mmHg (IQI: -8.1 to -1.7) **Combined** (8 studies): Median decrease of 2.4 mmHg (IQI: -5.5 to 0.4)

[A]Results shown in table were those reported at the end of each intervention

[B]Includes the following study designs: group RCT, before-and-after with comparison group

[C]Includes the following study design: before-and-after without comparison group

IQI = Interquartile Interval

Evidence measuring health behavior outcomes (20 studies) was largely self-reported. Increases in physical activity and improvements in nutrition were seen across the included studies (Table 3).

Table 3. Health Behavior Change Outcomes

Outcome Measure	Results[A] by Study Design
Physical activity outcomes	**Greatest suitability of study design**[B] (8 studies) One study reported statistically significant improvements, four studies reported non-significant improvements, and three studies study showed no improvement **Least suitable study design**[C] (11 studies) Four studies reported statistically significant improvements, four studies reported non-significant improvements, and three studies showed no improvement

Outcome Measure	Results[A] by Study Design
Nutrition outcomes	**Greatest suitability of study design** (7 studies) Two studies reported statistically significant improvements, two studies reported non-significant improvements, and three studies showed no improvement **Least suitable study design** (8 studies) Two studies reported statistically significant improvements, four studies reported non-significant improvements, and two studies showed no improvement

[A]Results shown in table were those reported at the end of each intervention

[B]Includes the following study designs: group RCT, before-and-after with comparison group

[C]Includes the following study design: before-and-after without comparison group

One study included in the review evaluated access to service (i.e., insurance coverage) and reported an increase in the number of insured participants after CHW engagement.

Applicability and Generalizability Issues

Included studies were from the U.S. (21 studies) and New Zealand (1 study). Studies were conducted in urban (7 studies) and rural (2 studies) areas. CHWs delivered services in communities (16 studies), community and home settings (4 studies), homes (1 study), and a worksite (1 study). Fifteen studies reported the number of CHWs engaged and participants served. The median number of CHWs per study was 6; the median number of clients served was 101, including one study that served more than 500 clients.

In the included studies, CHWs served adults aged 18-64 (19 studies), and youth aged 17 years or younger (2 studies); no studies included older adults aged 65 and older. Across all studies, more than 70% of participants were female, and 3 studies reported 100% female only study populations, although overall results were similar in men and women. Included studies did not provide enough information to draw conclusions about results by clients' sexual orientation, disability status, or insurance status.

Ten included studies limited their population to clients at risk for diabetes, whereas 12 studies allowed clients with diabetes to participate. However, the proportion of clients with diabetes in these 12 studies was low (median: 22.8%; IQI: 13.0 to 27.1) Positive effects were similar for studies that included clients at risk for diabetes and studies that included clients with diabetes.

Eighteen studies evaluated programs that enrolled clients from underserved groups as defined by race/ethnicity, education, or annual income. Studies were limited to clients who were Hispanic (9 studies), African-American (3 studies), or Asian (3 studies), or had study populations that were at least 75% Native Hawaiian or Pacific Islander (2 studies) or Native American (1 study). Five studies were conducted in church-based settings and culturally tailored to target smaller groups in underserved areas. In seven studies, most participants had less than a high school education; four studies

were evaluated in majority low-income populations. Based on this evidence, CHW interventions targeted to underserved groups are likely effective in addressing health disparities.

Data Quality Issues

Study designs consisted primarily of before-and-after designs without comparison groups (12 studies), followed by group randomized controlled trials (7 studies) and before-and-after with comparison (3 studies). Common limitations affecting this body of evidence were loss to follow-up, insufficient reporting of sampling methods and intervention description, and self-selection bias.

Other Benefits and Harms

One study included in the review found that CHW engagement helped to increase the number of program participants who obtained health insurance. Although not examined in the included studies, CHWs are ideally positioned in communities to provide or assist members of the community in completing diabetes risk assessments and assist those at high risk for type 2 diabetes to obtain clinical follow-up and enrollment in appropriate community-based programs.

Experts noted that participants who increase their level of physical activity will be at increased risk for associated injuries. These risks can be minimized, however, with graduated increases in physical activity and by engaging in lower impact activities such as walking. No other potential harms to patients, communities, or CHWs were identified.

Economic Evidence

Economic evidence indicates that interventions engaging community health workers for diabetes prevention are cost-effective.

The economic review included seven studies from a search of the literature through July 2016. Studies were based in the United States (6 studies) and the United Kingdom (1 study). All 7 studies were implemented in community settings and most patients came from minority or low-income populations. One study reported educational and exercise interventions that were followed by CHW-facilitated support. The remaining 6 studies used interventions engaging CHWs alone. For studies that did not report cost per quality adjusted life year (QALY) saved, reductions in A1c were translated to QALY saved using published methods (Valentine et al. 2006) to generate cost-effectiveness estimates. All costs and benefits were adjusted to 2015 U.S. dollars.

Intervention Cost

Seven studies reported on cost of intervention, with a median cost per person per year of $600 (IQI: $369 to $731). The major drivers of cost were the cost of CHW time, supervision and training of CHWs, and the cost of any additional staff or additional interventions. The cost most often missing from studies was the cost of training and supervising CHWs. Based on the drivers of cost, two studies provided complete estimates for the cost of intervention.

Healthcare Cost

The change in patients' healthcare cost due to intervention was reported in 2 studies, with one reporting a reduction of $1,242 per person per year and another reporting no change. A third study modeled the impact on healthcare cost but did not report the estimate. The major drivers of healthcare cost were outpatient and inpatient care, medication, and emergency room visits, with two studies providing complete estimates for healthcare cost based on their inclusion of these drivers.

Total Cost

Total cost is measured as the sum of change in healthcare cost due to intervention and the cost of intervention. A negative value indicates averted healthcare cost exceeds the cost of intervention. Three studies reported total cost of $48, $600, and -$856 per person per year. The study that showed a negative total cost included the important intervention cost and healthcare cost drivers.

Cost-effectiveness

Two studies reported cost per QALY saved at $4,720 and $41,154. One study, for which translation of reduction in A1c to QALY saved was feasible, was not included in the evidence for cost-effectiveness because it did not account for change in healthcare cost.

The two studies that reported cost-effectiveness below the conservative benchmark of $50,000 likely overestimated net cost because they did not report averted emergency room visits and increased productivity of patients. Also, the study that reported $4,720 per QALY saved did not report the cost of CHW supervision and training. Replacing the intervention cost in this study with the highest from the included studies ($780 per person per year), however, would still result in a cost effectiveness estimate far less than $50,000. In conclusion, overall cost-effectiveness evidence indicates that interventions engaging community health workers for diabetes prevention are cost-effective.

Considerations for Implementation

The National Diabetes Prevention Program (National DPP) [www.cdc.gov/diabetes/prevention/index.html] is a partnership of public and private organizations working to increase access for people with higher diabetes risk to evidence-based, affordable, high-quality lifestyle change programs. Through the National DPP, partner organizations:

- Deliver CDC-recognized lifestyle change programs nationwide
- Ensure quality and adherence to proven standards
- Train community organizations that can run the lifestyle change program effectively
- Increase referrals to and participation in CDC-recognized lifestyle change programs
- Increase coverage by employers and public and private insurers

The growing National DPP infrastructure provides the most promising avenue for implementation of sustainable programs engaging CHWs for diabetes prevention, especially in diverse and underserved communities. Trained CHWs may be potentially important providers of CDC-recognized programs and could serve as lifestyle coaches for participants who are referred by healthcare providers, or self-referred based on National DPP web-based risk assessment tools.

Recent rulings by the Centers for Medicare and Medicaid Services (CMS) provide emerging opportunities for sustainable funding of CHW services. In 2013, the Centers for Medicare and Medicaid Services began allowing states to provide Medicaid reimbursement for preventive services recommended by the U.S. Preventive Services Task Force (USPSTF) when "recommended by a physician or other licensed practitioner" and delivered by a broad array of health professionals, including CHWs. States determine which services are covered, who provides them (including any required education, training, experience, credentialing, certification, or registration), and how providers are reimbursed.

In most studies identified in this review, CHWs functioned as the only provider of health education, informal counseling, and extended support for program participants. The broader literature suggests that CHWs are more typically engaged as a member of a team, providing a broader range of services for community members in both community and clinical

settings. For example, trained CHWs could function as screening and enrollment agents, helping clients complete a simple risk assessment for type 2 diabetes (ADA 2015, CDC 2016), and then connecting at-risk clients with appropriate clinical follow-up and community services.

Consideration should be given to the frequency and settings for interactions between CHWs and clients. Group sessions were the predominant delivery mechanism. Evaluated interventions were delivered during group sessions (7 studies), one-on-one, in-person interactions (4 studies), or a combination (8 studies; most often group sessions followed by one-on-one contact in person or by telephone). Overall, studies reported improvements in glycemic and health behavior outcomes, though there was not enough evidence to determine whether mode of delivery had an effect on individual outcomes. Many studies reported on interaction frequency between CHWs and clients (e.g., weekly, bimonthly), but there was not enough data to assess effects on outcomes.

CHWs are typically matched to the populations they serve and the specific services they deliver. In the included studies, CHWs were frequently matched with populations by location, race or ethnicity, or language. CHWs usually provided clients with culturally appropriate information and education on diabetes prevention, lifestyle counseling to build individual capacity, and informal counseling and social support. They also conducted home visits to ensure clients got the services they needed. Most studies reported that CHWs received "some" training, usually focused on diabetes prevention education, but there was limited evidence on specific types, methods, and duration of training.

Evidence Gaps

Most of the included studies included fewer than 100 participants and were conducted in urban or suburban settings. More evidence is needed on effectiveness of large-scale programs (i.e., >500 participants), and programs conducted in rural settings. All studies in this review were funded by public grants; it would be useful to understand whether CHW interventions funded by other mechanisms are equally effective. Most included studies evaluated outcomes at <12 months. More evidence is needed on programs evaluated over a longer time period to evaluate sustained effects such as glycemic control and weight management.

More evidence is needed to understand effective methods for recruiting, training, and supervising along with evaluating the impact of CHWs' experience and educational attainment. Additionally, more information on frequency and duration of CHW–client interactions would be useful. Reporting on CHWs' role as a member of care delivery team was limited. More evidence on the role and impact of CHWs in a team-based care environment is needed. The population was majority female across the lifestyle modification interventions. More evidence on the recruitment and retention of males would be useful. CHWs usually delivered services in either community or home settings. Further evaluations of community-worksite-clinic-health center linkages and the distribution and implementation of diabetes prevention resources and their use in local communities including the underserved would be useful.

In this body of evidence, positive, significant changes were seen in weight loss, indicating an improvement in diet and physical activity behaviors. However, evidence was mixed for improvements in other risk factors for cardiovascular disease, specifically blood pressure and cholesterol. More comparative studies are needed.

Evaluations on models of care focused on providing culturally appropriate health education. There was not enough evidence to draw conclusions on interventions engaging CHWs as navigators, community organizers, outreach/enrollment/ information agent or member of a care delivery team. More evidence is needed to assess intervention effects in communities at risk for type 2 diabetes. Finally, more information is needed on reimbursement

arrangements including CMS implementation and funding of CHW services through clinical or community-based providers.

Studies that qualified for the economic review were incomplete in their reporting and inclusion of the important drivers of intervention cost and healthcare cost. In addition to reporting this type of information, future studies should assign a cost for the services of CHWs, whether such services are voluntary or otherwise.

References

ADA. *Are You at Risk for Type 2 Diabetes: Diabetes Risk Test*. American Diabetes Association. Alexandria (VA); 2015. Available at URL: http://www.diabetes.org/are-you-at-risk/diabetes-risk-test/

CDC. *National Diabetes Prevention Program (National DPP)*. Centers for Disease Control and Prevention, U.S. Department of Health and Human Services. Atlanta (GA); 2016. Available at URL: http://www.cdc.gov/diabetes/prevention/index.html.

CDC. *CDC Prediabetes Screening Test*. National Diabetes Prevention Program. Centers for Disease Control and Prevention, U.S. Department of Health and Human Services. Atlanta (GA); 2016. Available at URL: http://www.cdc.gov/diabetes/prevention/pdf/prediabetes-screening-test-tag508.pdf.

Diabetes Prevention Program Research Group. (2002). Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med* 2002(346), 393-403. Available at URL: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1370926/pdf/nihms-5217.pdf.

Health Resources Services Administration (HRSA), Bureau of Health Professions. *Community health worker national workforce study*. U.S. Department of Health and Human Services. Rockville (MD); 2007. Available at URL: http://bhpr.hrsa.gov/healthworkforce/reports/chwstudy2007.pdf.

NIDDK. *Diabetes Prevention Program (DPP)*. National Institute of Diabetes and Digestive and Kidney Diseases, National Institute of Health. Bethesda (MA); 2016. Available at URL: https://www.niddk.nih.gov/about-niddk/research-areas/diabetes/diabetes-prevention-program-dpp/Pages/default.aspx.

Valentine W, Palmer A, Nicklasson L, Cobden D, Roze S. Improving life expectancy and decreasing the incidence of complications associated with type 2 diabetes: a modelling study of HbA1c targets. *International Journal of Clinical Practice* 2006;60(9):1138-45.

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