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Cost-effectiveness of Community Health Workers in controlling diabetes epidemic on the U.S.–Mexico border



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ABSTRACT

Objectives: This study attempted to evaluate clinical outcomes and long-term cost-effectiveness of an intervention involving Community Health Workers (CHW's, a.k.a. *promotoras de salud* in Spanish) in assisting Mexican-American diabetes type-2 patients with controlling their condition. The intervention has been carried out in Hidalgo County, TX which is situated on the U.S.–Mexico border.

Study design: The design of the study is experimental. The sample ($n = 30$) was recruited from Mexican–American diabetes patients aged 30 or above. The intervention group received monthly visits from CHW's, while the control group did not.

Methods: Incremental lifetime health outcomes and related expenditures were calculated using the CDC Diabetes Cost-Effectiveness Model (DCEM) which is a probabilistic computer simulation model of disease progression and cost-effectiveness for type 2 diabetes patients. The DCEM allows projection of lifetime healthcare costs and Quality-Adjusted Life-Years (QALYs).

Results: The intervention group showed a significant improvement in glycemic control and cholesterol management after two years of intervention. The intervention is expected to reduce long-term complications, resulting in an increase in residual life-years and quality-adjusted life-years. The incremental cost-effectiveness ratio has been estimated to be \$13,810, which is below the level of comparable studies.

Conclusions: Intervention has a substantial impact on the medical costs of type 2 diabetes treatment. The estimates presented in this model may be used to analyse the cost-effectiveness of interventions involving CHW's for type 2 diabetes.

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Introduction

Diabetes type 2, which is by far the most common type of diabetes, takes ‘a staggering toll on individuals, families, and communities in the United States’.¹ Diabetes type 2 affects every tenth adult American and about 2 million people aged 20 years or older are newly diagnosed every year.² While this disease is found in all communities, there are significant disparities between ethnic groups. For example, compared to non-Hispanic white adults, the risk of diagnosed diabetes is 66% higher among Hispanics. Among Hispanic adults, Mexican–Americans have the highest rates of diabetes as well as the highest rates of complications such as neuropathy and retinopathy than non-Hispanic white adults.² Additionally, Mexican Americans living in rural and unincorporated areas experience a further disproportionate burden of diabetes and associated comorbidities when compared to non-Hispanic whites, or to Mexican Americans residing in other regions of the United States.³

Research in ethnic health disparities has long pointed out that type 2 diabetes is a social disease and, therefore, the disparity between Mexican–Americans and non-Hispanic whites in the incidence of type 2 diabetes has to do more with social inequities between these two groups rather than genetic factors.³ Of course, the two groups differ significantly in terms of their social standing and earning/buying power. Consequently, it has been noted that ethnic disparities in health status are in fact social class disparities.⁴ As a way of addressing these disparities, clinical interventions aimed at stemming the rising tide of diabetes in Mexican–American communities are encouraged to utilize social and cultural capital embedded in these communities.⁵

In this respect, Community Health Workers (CHW's) represent an emergent resource which builds on social and cultural capital of Mexican–American communities. A number of interventions using CHW's in community settings and targeting Mexican–American patients have been shown to improve clinical, behavioural and quality of life indicators, although most evidence comes from shorter-term evaluations and/or lacks control groups.^{6–10} While being recognized internationally as a means of addressing health disparities, CHW's (a.k.a. *promotoras de salud*, in Spanish) have been working with Mexican–American communities in the U.S. since the late 1960s.¹¹ As members of the communities in which they reside, CHW's share the language, customs and life experiences of the community members they serve. As recognized leaders among their peers, CHW's are uniquely positioned to represent their communities and advocate on behalf of them.

CHW's should be considered as an immediate response to, at least, two problems that historically hindered diabetes control among Mexican–Americans: (1) inadequate access to health care in the border region; and (2) delivering culturally competent quality care suited for the needs of Mexican–American population. Concerning the problem of healthcare access, it should be noted that the U.S.–Mexico border region lags in economic development and is, arguably, the poorest region of the country.^{12,13} Given the local economy's reliance on small businesses and low-wage jobs, the one of the most important systems of the healthcare sector – its finance system which pays for prevention and medical care –

lacks a stable base of private insurance to complement public and charity programs.¹³ Almost half of border residents lack medical insurance.¹³ Health insurance coverage matters as it helps to facilitate access to care, and is a primary factor in explaining ethnic disparities and whether an individual has a regular course of care.¹⁴

CHW's can deliver quality care which is not only affordable and accessible, but also culturally competent. This is important because some researchers have noted difficulty in achieving adequate glucose control among Mexican–Americans, even after controlling for the factors related to health literacy, leading to the stereotyping of them as non-compliant.^{15–17} Indeed, among Mexican–Americans, implementing lifestyle modifications to follow current diabetes self-management recommendations is often challenging. This is, in part, due to the lack of culturally-competent diabetes education programs that incorporate appropriate language, beliefs, values, costumes, and food preferences of this ethnic group. Within this context, culturally sensitive CHW-lead self-management interventions have been proposed as a means of supplementing formal medical care by encouraging Mexican–American diabetes patients to assume responsibility in the management of their own disease. Recent studies have shown that culturally specific diabetes management programs can be effective at improving clinical outcomes, such as reductions in H1c levels, among ethnic groups disproportionately affected by diabetes.^{9,18–20} CHW interventions also proved to be effective in improving behavioural outcomes, such as health literacy, self-efficacy and self-management.^{20,21} Moreover, culturally sensitive diabetes interventions aimed at improving self-management skills were found to be effective in improving glycemic control among Hispanics.^{9,16,21}

Little attention has been paid, however, to economic evaluation of CHW interventions. The question is not trivial because economic evaluation helps to determine whether or not it is worthwhile for society to allocate financial, human or other resources to a particular intervention. In a resource constrained health system of the U.S.–Mexico border region, any decision regarding the adoption of a diabetes intervention program will depend upon its expected cost-effectiveness; that is, on whether it generates improvements in patients' health at an acceptable cost. Even less attention has been paid to the cost-effectiveness of providing culturally competent diabetes care for Mexican–American populations who are often uninsured or underinsured. Only a handful of studies attempted to estimate the effectiveness of CHW interventions in Mexican–American diabetes patients. Below we quickly summarize the research design and findings of these studies.

In a community-based intervention aimed at controlling diabetes among low-income Hispanic adults in San Diego County, CA, Gilmer et al. estimated short- and long-term cost-effectiveness of diabetes case management.²² The clinical component was lead by a team headed by a registered nurse. CHW's were delegated supporting roles as bilingual/bicultural medical assistants. Gilmer et al. compared four intervention groups (the authors refer to them as ‘cohorts’) – the uninsured, those covered by County Medical Services (CMS), those who had Medi-Cal coverage (California's Medicaid Program), and those who have commercial insurance. The intervention program did not have a proper control group but a ‘cohort’ of historical controls was imputed. A model developed by Center

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