Diabetes Management: Interventions Engaging Community Health Workers

Summary Evidence Table – Economic Review

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Cost	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Author (Year): Bellary et al. (2009) **Design:** Randomized Controlled Trial **Economic Method:** Cost per QALY **Funding Source:** Multiple drug manufacturers. **Monetary Conversions:** Assumed index year 2007 in U.K. pounds.	**Location:** Birmingham, Coventry, U.K. **Setting:** Inner-city general practices in Coventry and Birmingham **Eligibility:** Adult South Asians with diabetes **Sample Size:** Intervention 868 (9 practices) Control 618 (12 practices) Mean Age 57, Female 48% Heart disease 17-19% Mean A1c 8.2% **Time Horizon:** Study from March 04 to April 07. Intervention length is 12 months. Outcomes assessed at 24	Extension of the United Kingdom Asian Diabetes Study (UKADS) Common treatment algorithm for BP, cholesterol, and diabetes **Interventions:** Additional practice nurse (NP) plus CHW (link worker) plus diabetes nurse. Bi-monthly follow-up in clinic with NP. NP trained by diabetes nurse, worked with primary care provider for protocol and prescribing; targeted blood pressure, lipid and glycemic control; educated patients. CHW contacted patients before/after visits with NP; reinforced education in native language;	Change in mean of outcomes At 24 months after start only diastolic blood pressure reduction was significant and meaningful. Systolic BP Interv 139.4 to 134.3 Control 141.1 to 136.4 Diff 0.5 lower (1.4 lower, adjusted) Diastolic BP Interv 82.9 to 78.4 Control 83.8 to 81.0 Diff 1.6 lower (2.3 lower, adjusted) A1c Diff 0.18 lower (0.08 lower, adjusted) BMI	Cost per patient over 2 years was 434 Components: Program 406 increase Salaries 74% Incentive pay to practice 16.5% Travel 5.8% Clinical equipment 3.6% Prescriptions 28 increase	**Healthcare Cost:** Change in health care cost not considered. Only prescriptions included in intervention cost at 14 per patient per year increase. **Productivity:** No productivity improvements considered	At 24 months: Incremental cost per patient 434 Incremental QALY per patient 0.015 Cost per QALY gained 28,933 Authors conclude not cost-effective based on 30K benchmark unless there is greater QALY improvement **Limitations:** Limited coverage of healthcare costs Not possible to isolate effect of the CHW

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	months after start.	encouraged lifestyle changes and adherence to visits and treatment. 5 CHWs, 3 in Birmingham and 2 in Coventry. 2 diabetes nurses. 2 specialist nurses. **Supervisor and Activities:** Not reported **Team-based Care:** Yes **Other Team Members:** Diabetes nurse, NP, PCP **Comparison:** Usual Care	Diff 0.38 higher (0.40 higher, adjusted) 10 year Chronic heart disease risk Diff 0.06 higher (0.08 lower, adjusted) No difference in medication, creatinine, total cholesterol. QALY based on EuroQoL-5 QoL declined for both groups Diff 0.015 increase			
Author (Year): Brown et al. (2002) Brown et al. (1999) **Design:** RCT **Economic Method:** Cost of intervention **Funding Source:** NIDDK, NIH, State of Texas. No grant details.	**Location:** Starr County, TX **Setting:** Multiple **c**ommunity sites **Population** Poorest county in Texas. Those diagnosed with type 2 diabetes after age 35, with 2 fasting blood	The Starr County Border Health Initiative **Intervention:** Culturally competent diabetes self-management education. 52 contact hours over 12 months **Components:**	Change in mean of outcomes A1c (-0.76) BMI (-0.32) not meaningful Fasting Blood Glucose (-21.45 mg/dl) Diabetes knowledge: Improved Systolic BP NR	Cost per patient per year $384 **Component Included in Cost:** Food and food preparations Nurse, dietitian, CHWs attending sessions 1-12 CHW plus a nurse or dietitian attended sessions 13-26 Education materials	**Healthcare cost per patient per year:** NR **Productivity:** NR **Other Economic Costs Averted:** NR	No summary estimates included

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Monetary Conversions: Index year assumed 1998 in U.S. dollars.	glucose=>140 mg dl or treated with insulin or treated for hypoglycemia =>1 year. Also included support person from friends or family. **Sample Size:** 252 patients Control 126 Intervention 126 **Characteristics:** Mean Age 53-55 Female 60-68% Race/Ethnicity Mexican American 100% Very low SES On diabetes medication 92-94% **Time Horizon:** Intervention was in place during 1994-1998, with wait-listed controls. Intervention length was 12 months.	Delivered by Mexican-American nurses, dietitians, and CHWs. 3 months weekly 2-hour instruction on nutrition, self-monitoring of blood glucose, exercise, and other self-care 6 months of biweekly plus 3 months of monthly 2-hour support group sessions to promote behavior changes through problem-solving and food preparation demonstrations. Transportation provided to sessions. Food preparation demonstrations and food items served. Grocery shopping trips with dietitian. **CHW Activities:** 8 trained CHWs with diabetes. Arranged locations, got supplies and materials, contacted participants weekly, arranged transportation,	Diastolic BP NR Cholesterol NR QALY NR DALY NR **Measure Type:** DiD	**Components not Included:** Patient medical supplies Community site rental fees Transportation CHW training CHW supervision **Data Source:** Tracked in study and session attendance.		

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		assist with food preparations. Assist nurses and dietitians. Note CHW support role was requested by patients instead of their planned more prominent role. **Supervisor and Activities:** Not reported **Other Components:** No **Team-based Care:** No **Other Team Members:** Nurses and dietitians **Comparison:** Usual Care				
Author (Year): Brown et al. (2005) **Design:** RCT **Economic Method:** Cost of intervention **Funding Source:**	**Location:** Starr County, TX **Setting:** Multiple **c**ommunity sites. **Population:** Poorest county in Texas	Compressed version of the original Starr County Border Health Initiative **Intervention:** Culturally competent diabetes self-management	Change in mean of outcomes A1c Compressed (-0.7) Extended (-1.0) BMI NR	Cost per patient per year Compressed $131 Extended $384 **Component Included in Cost:** Food and food preparations	**Healthcare cost per patient per year:** NR **Productivity:** NR **Other Economic Costs Averted:**	**No summary estimates included**

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NIDDK Grant DK-48160. **Monetary Conversions:** Index year assumed 2002 in U.S. dollars.	Those diagnosed with type 2 diabetes after age 35, with 2 Fasting blood glucose=>140 mg dl or treated with insulin or for hypoglycemia =>1 year. Also included support person from friends or family. **Sample Size:** 216 patients Compressed 114 Extended 102 **Characteristics:** Mean Age 50 Female 60% Mexican American 100% Very low SES On diabetes medication ~90% **Time Horizon:** Intervention date not provided. Intervention length was 12 months.	education. 22 contact hours over 12 months, compared to original 52 hours. Also reduced group sessions from original 14 to 3. Hypothesize no significant difference between compressed and extended. **Components:** Delivered by Mexican-American nurses, dietitians, and CHWs. Extended – 12 weekly 2-hour sessions followed by 14 weekly 2-hour support group sessions. Compressed – 8 weekly 2-hour sessions followed by 3 weekly 2-hour group sessions First set sessions on nutrition, self-monitoring of blood glucose, exercise, and other self-care Second set of sessions on behavior changes through problem-	Fasting Blood Glucose Compressed (-12.4 mg/dl) Extended (-16.7 mg/dl) Diabetes knowledge: About same increase for 2 groups Found greater effect (dose response) on all outcomes with greater attendance. SBP NR DBP NR Cholesterol NR QALY NR DALY NR **Measure Type:** DiD **Period:** 12 months	Extended: Nurse, dietitian, CHWs attending sessions 1-12 CHW plus a nurse or dietitian attended sessions 13-26 Compressed: CHW plus nurse or dietitian at each session Education materials **Components not Included:** Patient medical supplies Community site rental fees Transportation CHW training CHW supervision **Data Source:** Tracked in study and session attendance.	NR	

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		solving and food preparation demonstrations. Transportation provided to sessions. Food preparation demonstrations and food items served. Grocery shopping trips with dietitian. **CHW Activities:** Not reported in this paper. May be similar to description in Brown et al 1999, 2002. Unclear whether CHW played more than support role in the present intervention. **Supervisor and Activities:** Not reported **Other Components:** No **Team-based Care:** No **Other Team Members:**				

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		Nurses and dietitians **Comparison:** Extended intervention				
Author (Year): Brown et al. (2012) **Design:** Model based on Pre to Post Study **Economic Method:** Cost per QALY gained. **Funding Source:** Texas Diabetes Council 2011-035171-001 and MD000170 P20 funded by the National Institute on Minority Health and Health Disparities. **Monetary Conversions:** Index year 2010 in U.S. dollars.	**Location:** Laredo, TX. **Setting:** Homes and primary care. **Population:** Hispanics age =>18 with type 2 diabetes. Poor baseline glycemic control for analysis inclusion. Most from Mercy Clinic, Laredo. Also required =>30 years age, baseline and endpoint A1c plus program participation for inclusion in analysis, and =>1 home visit. **Sample Size:** 30 patients from trial in analysis. Modeled for 6,551	Webb County-part of the University of Texas Community Outreach (UTCO) program. **Intervention:** Analysis of an existing and ongoing intervention. CHW-led counseling and education for self-management of diabetes delivered in homes and primary care. **Components:** Delivered by 5 State-certified CHWs and 1 Nurse Educator. Classroom health education – by CHW and Nurse Nutrition classes – CHW and Nurse teach diabetes self-management Exercise classes – CHW and Nurse	Proportion with controlled A1c (<=7%) increased from 0 to 60%. Baseline mean A1c 10.03. Mean reduction A1c 2.7. **Measure Type:** Pre-post from trial. Lifetime outcomes modeled using Archimedes based on reduction in A1c. Reduction in mean risk: MI 2.6%; Foot ulcers 5.6%; Foot amputation 3.5%. QALY increase by 394.92 or	Cost per patient within sample (n=30) for 18 months $1175.63 Scaled cost per patient per year adjusted for real-world count of participants During intervention $559 Post intervention $140.63 **Component Included in Cost:** Staff salaries, CHW wages, CHW training, supplies, volunteer time, fringe benefits, home visits plus scheduling time, travel cost, cost of classes/sessions based on time, materials, and venue. Participant time valued at average wage rate for area. **Components not Included:** CHW supervision and training not mentioned **Data Source:**	**Healthcare cost per patient per year:** included in cost per QALY estimate but not reported separately as part of the Archimedes model for diabetes. **Productivity:** NR **Other Economic Costs Averted:** NR	Modeled based on Archimedes-Diabetes model. **Cost-effectiveness:** (3% discount) Entire Population $33,319 over 20 years $130,272 for 5 years $56,009 for 10 years Sensitivity Post intervention cost at 25% $21,977 over 20 years Post intervention cost at 75% $45,696 over 20 years **Comments:** Unclear whether criteria for inclusion in analysis poses selection bias. Average baseline A1c was 9% for this Hispanic population implying gains are probably underestimated. Cannot determine contribution of CHWs

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	participants in program **Characteristics (n=30):** Mean Age 48-52 Male 87% Mexican American 100% Baseline A1c 9.5 to 10.5% **Time Horizon:** Oct 2009 to Jan 2010. Data from follow up through January 15, 2011. Intervention length was 18 months.	provide venues and social support Counseling sessions – 1-1 by CHW for self-management and diabetes education, also facilitate group sessions Home visits - CHWs reinforce themes from classes, develop cues to action, and discuss classes to attend, help remove barriers. **Supervisor and Activities:** NR **Other Components:** No **Team-based Care:** No **Team Members:** CHW, Nurse Educator and Project Director Volunteers included dietitian, Zumba instructor, and university students. **Comparison:** None	0.06 per capita (n=6551) SBP NR DBP NR Cholesterol NR	Tracked in study and session attendance.		to effects and cost-effectiveness

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Author (Year): Culica et al. (2007) **Design:** Before after **Economic Method:** Cost of intervention **Funding Source:** None. **Monetary Conversions:** Index year assumed 2005 in U.S. dollars.	**Location:** Dallas, TX **Setting:** Health Center, Central Dallas Ministries Community Health Services (CDM-CHS) clinic. **Population** Clinic patients Age => 18 with diabetes type 1 or 2, stable blood pressure, and referred by physician. **Sample Size:** Initial 162 Drop-outs 35 With 12-month A1c 55 **Characteristics:** Years since diagnosis 6.5 years Mean Age 48 Female 64% Mexican American 78% African American 15% Caucasian 6% Asian 1% Very low SES	Community Diabetes Education (CoDE) **Intervention:** Patients referred to CoDE by CDM-CHS physicians. Must be clinic patients. The clinic follows Texas Department of Health algorithms for diabetes treatment, and has physician services, pharmacy, home testing supplies, and labs for nominal fee. **CoDE Components and Activities:** Single bilingual CHWs directly supervised by CDM-CHS physicians. All treatment after physician approval. Provide patients education on self-managed care and case management. Certified by State and with high school equivalency. Trained by registered dietitians and certified diabetes educators	Mean of outcomes 12 month A1c 8.22 to 7.14 (n=55 with records) 8.14 to 7.0 (n=36 who attended all visits) 12 month BMI 31.73 to 30.38 (n=55 with records) 31.22 to 31.12 (n=36 who attended all visits) 12 month Blood Pressure Mean Systolic BP/Diastolic BP <130/80 and did not change Diabetes knowledge: NR Cholesterol NR QALY NR DALY NR **Measure Type:** Before after	Cost per patient per year $461 **Component Included in Cost:** 1 CHW Educator salary $82 Patient medical supplies $260 Study supplies $119 Note per patient contact time is 7 hours maximum over 12 months **Components not Included:** Community site rental fees CHW training CHW supervision Development of patient materials Monthly meetings among CoDE director, all staff, and CHWs to review processes. **Data Source:** Tracked in study and session attendance.	**Healthcare cost per patient per year:** NR **Productivity** NR **Other Economic Costs Averted** NR	**No summary estimates included** **Comments:** Single CHW teamed with clinic physician able to reduce A1c.

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	Time Horizon: Recruitment July 2003 to March 2005. Intervention length was 24 months.	at no cost (12 hors class and 5 hours 1-1). Volunteer endocrinologist trained CHW on diabetes, meal planning, dietary assessment (10 hours 1-1). CHW passed written exam. Monthly case conferences and weekly chart reviews with physician. CoDE protocol developed by CHW and endocrinologist. 7 clinic visits total, with first 3 at 60 minutes, and quarterly at 30-60 minutes. Indefinite quarterly follow-ups after 12 months. CHW recorded vitals, measurements, medication compliance, foot exam, meal plans, goals, diabetes education and skills, lifestyle changes, primary goal selection.				

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		Supervisor and Activities: Clinic physician **Team-based Care:** Yes **Other Team Members:** Clinic physician **Comparison:** No comparison				
Author (Year): Esperat et al. (2012) **Design:** Pre post **Economic Method:** Intervention cost. **Funding Source:** HHS HRSA Grant #H4MHP 11079. **Monetary Conversions:** Index year assumed 2010 in U.S. dollars.	**Location:** Lubbock, TX **Setting:** CHWs home visits and care in Community Health Center. **Population** Patients from Community Health Center with diabetes, high blood pressure, asthma, obesity, depression referred by family nurse practitioners to intervention. **Sample Size:** Intervention 152	**Intervention:** Transformacion Para Salud (TPS) Family nurse practitioners (FNP) teamed with CHWs for chronic care self-management. CHW met monthly with FNP to discuss specific patients and challenges. Senior FNP supervised CHWs. CHWs met weekly with project Coordinator to discuss patient's non-health and immediate needs (food, shelter). CHWs taught and assisted patients	Change in mean of outcomes 6 month change A1c reduced 0.7 pct pt BP reduced significantly but no details provided Total cholesterol, LDL, and HDL were slightly and insignificantly decreased, but no details. Improvements in self-efficacy, diet plans, and fruits, exercise, blood sugar testing, and	Annual cost for intervention per patient for all chronic diseases $6361 Included in cost: No details provided. Data Source: Not reported.	**Healthcare Cost:** NR **Productivity:** NR **Other Economic Costs Averted:** NR	**No summary measure estimated**

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	Characteristics: Not reported **Time Horizon:** No dates provided. 6 months change reported.	with access to community health and social resources. Each CHW handled 50 patients. Home visits: weekly in first month, bi-weekly in 2nd month, followed by monthly. Augmented with phone calls. Visits used to assess skills and knowledge, impart knowledge about chronic disease and self-care, facilitate access to social and other support services, establish goals, and measure progress. Patients weaned off program when determined to be ready. Support group formed from former program participants. **Supervisor and Activities:** Nurse Practitioner **Team-based Care:**	vegetable intake. No details. **Measure Type:** Pre post			

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		Yes **Other Team Members:** Project coordinator, physicians, dietitians **Comparison:** None				
Author (Year): Gilmer et al. (2007) Linked to Gilmer et al. (2005) **Design:** Model based on ongoing program **Economic Method:** Modeled Cost-effectiveness (Cost per QALY) **Funding Source:** Novo Nordisk Inc. **Monetary Conversions:** Index year 2003 in U.S. dollars.	**Location:** Original program in San Diego, CA. **Setting:** Original program in multiple health centers. **Population** Four cohorts of patients from Project Dulce chosen based on insurance status. **Sample Size:** Uninsured 760 County Medical Services (CMS) 1,345 Medi-Cal 1,213 Commercial 575 **Characteristics:** Years since diagnosis 5.9 to 8.2	Project DULCE modeled. **Intervention:** Clinical Team led by registered nurse/diabetes educator (RN), bicultural/bilingual medical assistant (MA), and bilingual/bicultural registered dietitian (RD). RN trained by endocrinologist in stepped pharmacological treatment of diabetes to meet ADA standards. Average 5 visits with RN and 50% consult with RD. Telephone-based reminders and patient queries. Promotora (CHW)-led 8-week self-	CORE-Diabetes Model based on 15 Markov submodels for diabetes complications. Randomness in events but no uncertainty in parameter values taken from literature. Intervention effect at 12-months drawn from Project DULCE. Mean change (mean baseline level) due to DULCE A1c Uninsured -1.3 (9.4) CMS -0.8 (8.6) Medi-Cal -0.5 (8.2)	Cost per patient (Year 1) $662 Cost per patient (Year 2 Onwards) $235 **Component Included in Cost:** Visits to RN, RD Group sessions with CHW Overhead Database registry Coordination of care Scheduling Manage Referrals CHW training **Components not Included:** CHW supervision Development of patient materials **Data Source:** Tracked in Project DULCE and attendance records.	**Healthcare cost per patient per year:** Change in mean hospitalization and emergency room visits -$707 Change in mean pharmaceuticals $1582 Also includes outpatient in the modeling using CORE-Diabetes. **Productivity:** NR **Other Economic Costs Averted:** NR	Modeled based on CORE-Diabetes model. 40 years physiological effects and healthcare cost maintained over modeled years and partial program cost from year 2 onwards. Discount at 3%. Net Cost per patient per year (for all 4 cohorts): Year 1 $1537 Year 2+: $1110 **40 Year Cost/QALY gained:** Uninsured $8991/0.9=$10141 CMS $10921/0.4=$24584 Medi-Cal $11792/0.3=$44941 Commercial $12368/0.2=$69587

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	Mean Age 47 to 55 years Female 68 to 49% Latino 16% to 81% African American 3% to 10% Caucasian 13% to 61% **Time Horizon:** 40 year lifetime model. Original program assessment done at 12 month followup.	management training. About 50% attend average of 4 classes. CHWs have diabetes themselves, selected from community and undergo 4-month training. Collaborative classes cover diabetes and complications, role of diet, exercise, and self-monitoring. **Supervisor and Activities:** NR **Team-based Care:** Yes **Other Team Members:** Clinic physician **Comparison:** Usual care	Commercial -0.4 (7.8) Systolic BP Uninsured -3.1 (123.8) CMS -2.8 (128.9) Medi-Cal -1.9 (126.7) Commercial -0.0 (122.6) Total Cholesterol Uninsured -21.5 (208.7) CMS -12.9 (205.2) Medi-Cal -12.6 (202.1) Commercial -4.1 (195.5) BMI No change **Measure Type:** DiD for intervention effect			**Acceptability based on $50K Benchmark** Uninsured 100% CMS 92% Medi-Cal 57% Commercial 31% **Cost per QALY Gained (Sensitivity) 20-Year** Uninsured $5367 CMS $26839 Medi-Cal $51104 Commercial $97568 **A1c effect reduced 50%** Uninsured $21157 CMS $44502 Medi-Cal $77805 Commercial $135613 **Comments:** This is a team-based care intervention with the CHW group sessions as an added component. Unclear whether CHW is part of the team.
Author (Year): Gilmer et al. (2005) Linked to Gilmer et al. (2007)	**Location:** San Diego, CA **Setting:** Original program in multiple health	Project DULCE **Intervention:** Clinical Team led by registered nurse/diabetes	Intervention effect at 12-months drawn from Project DULCE.	Cost per patient per year $507 Visits with Nurse $325 Visits with dietitian $46	**Change in healthcare cost per patient per year:** Total $842	**Intervention cost plus Healthcare Cost per patient per year:** $507+$842=$1349 (Paper report $1346 after adjustment)

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Design: Pre post with historical control **Economic Method:** Intervention cost and healthcare cost. **Funding Source:** Multiple county, state, and federal grants. No details. **Monetary Conversions:** Index year 2002 in U.S. dollars.	centers covered under County Medical Services (CMS). **Population:** CMS diabetes patients referred to DULCE program by physician with 1-year enrollment and baseline and 1-year post A1c record. **Sample Size:** 188 **Characteristics:** Mean Age 51 to 52 years. Female 58 to 70% Latino 30% to 37% African American 4% to 7% Caucasian 22% to 27% Asian 17 to 19% A1c 8.5 to 8.7% Systolic Blood Pressure 130 to 132 mmHg **Time Horizon:** Recruit those enrolled 1 year between July	educator (RN), bicultural/bilingual medical assistant (MA), and bilingual/bicultural registered dietitian (RD). RN trained by endocrinologist in stepped pharmacological treatment of diabetes to meet ADA standards. Average 5 visits with RN and 50% consult with RD. Telephone-based reminders and patient queries. Promotora (CHW)-led 8-week self-management training. About 50% attend average of 4 classes. CHWs have diabetes themselves, selected from community and undergo 4-month training. Collaborative classes cover diabetes and complications, role of diet, exercise, and self-monitoring.	Mean change in outcomes due to DULCE A1c (-0.8) pct pt Systolic BP (-5.4) mm Hg Diastolic BP (-8.0) mm Hg LDL Cholesterol (-15.6) mg/dL BMI NR QALY NR DALY NR **Measure Type:** DiD for intervention effect	Group sessions with CHW $41 Staff overheads, databases, CHW training $95 **Component Included in Cost:** Visits to nurse, dietitian Group sessions with CHW Overhead Database registry Staff overheads CHW training **Components not Included:** CHW supervision Development of patient materials **Data Source:** Tracked in Project DULCE and attendance records.	Hospital + emergency room visits -$688 Outpatient -$9 Pharmacy $1539 **Productivity:** NR **Other Economic Costs Averted:** NR	**Cost-Effectiveness:** NR **Comment:** Short followup to assess morbidity effects.

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	2000 and Dec 2002. Intervention length was 12 months.	**Supervisor and Activities:** NR **Team-based Care:** CHW not in the team **Other Team Members:** Clinic physician **Comparison:** Historic control with usual care				
Author (Year): Greenhalgh et al. (2011) **Design:** Pilot RCT **Economic Method:** Intervention cost. **Funding Source:** NHS SDO Programme (SDO111) and NHS R&D. No details. **Monetary Conversions:** Index year 2009 in U.K. pounds.	**Location:** London, U.K. **Setting:** Newham Diabetes Center. **Population:** Persons with diabetes treated at community clinic and from minority ethnic groups. **Sample Size:** Intervention 79 Control 78 **Characteristics:** Mean Age 58 Female 70%	**Intervention:** The evaluated intervention is an add-on to the team-based diabetes care provided at the local diabetes center. Story-sharing diabetes groups led by members of same ethnic community with diabetes. Offered in multiple South Asian and African and English language-based groups	<u>Mean change in outcomes</u> <u>Primary</u> UKPDS coronary risk score from baseline 21.9, At 6 month increase 0.5 At 12 month increase 0.17 <u>Secondary</u> Attendance Interv 79% attended =>1 session and 49% attended half sessions Control 35% 1 session and 0% attended > 1.	Cost per patient 345 pounds (3 months) Training CHW 12 CHWs 12 half days 7200 pounds Course trainer 12 half days preparation and 12 half days delivery 3600 pounds Venue hire and refreshments 12 half days 1200 pounds Resource pack 300 pounds Accreditation and quality control 300 pounds Cost per Story-sharing Group CHW 12 half day preparation and 12 half	**Healthcare cost per patient per year:** NR **Productivity:** NR **Other Economic Costs Averted:** NR	**No summary economic outcomes reported.** **Comment:** No physiological outcomes were significantly different. Only significant improvement was patient confidence in self-care. Short term intervention and follow-up. No goal setting or planning. Key self-care domains may not have been covered. No family members encouraged to attend.

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	South Asian 83% African Caribbean 7% Somali 10% Mean A1c 8.2%; Systolic blood pressure 134 mmHg; BMI 30 Treatment Diet Only 7% Deprived suburban area. **Time Horizon:** Recruitment Nov 06 to Jan 08. Intervention length is 3 months. Follow-up at 6 and 12 months after end.	12-week training for lay facilitator, CHWs. Spontaneous story-telling about condition. Led by trained member of group. Medical professionals may respond to stories but not in format of presentation. Each session begins with 10-15 minute social time, buzz groups of 2-3 to discuss stories, and plenary session where groups asked to share stories. Transportation offered by need. Total of 72 group sessions were held. **Supervisor and Activities:** NR **Team-based Care:** No **Other Team Members:** Medical professionals but	A1c From baseline 8.2, increase 0.22 at 6 months and decrease 0.12 at 12 months. Systolic BP From baseline 133, increase 6.02 at 6 months and decrease 2.58 at 12 months. Well-being, From baseline 13, increase 0.63 at 6 months and increase 1.09 at 12 months. Total cholesterol/HDL From baseline 3.9, increase 0.04 at 6 months and increase 0.10 at 12 months. BMI NR QALY NR DALY NR Significant improvement in patient	day delivery 1200 pounds Sessions attendance by professionals 6 1 hour attendance 360 pounds Total cost per group for 12-week session 2520 pounds **Component Included in Cost:** CHW time and attendance Overhead Professional inputs CHW training Venue and overheads Materials and supplies **Components not Included:** CHW supervision **Data Source:** Tracked in Project.		

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		peripheral involvement **Comparison:** Structured diabetes self-management education led by nurse with interpreter support	confidence in self-care **Measure Type:** DiD for intervention effect			
Author (Year): Kane et al. (2016) **Design:** Pre to Post **Economic Method:** Program cost and incomplete healthcare cost **Funding Source:** Merck Company Foundation. **Monetary Conversions:** Assumed 2012 as index year in U.S. dollars.	**Location:** Dallas, TX **Setting:** 5 clinics within Baylor Scott White Health (BSWH) serving North and Central Texas. **Eligibility:** Age => 18 years with diabetes and uninsured or underinsured. Referred by BSWH physicians from 5 clinics and from emergency room and inpatient cases of uncontrolled diabetes. Targeted Hispanics. **Sample Size:** Intervention 1,235 enrolled. Analysis done for	Diabetes Equity Project (DEP) **Interventions:** This is a translation to clinic practice of a pilot CHW intervention originally implemented in a hospital setting. CHWs embedded within diabetes care teams, working directly with physicians, nurse practitioners, nurses, and medical assistants. CHWs with high school diploma and Spanish fluency. Supervised by nurse manager. CHWs underwent Texas CHW certification, diabetes-specific training, patient	Change in mean of outcomes At 12 months after start. A1c reduced 0.9 from 8.3% Systolic BP reduced 3.8 from 129 Diastolic BP reduced 2.0 from 79.3 Insignificant reduction in BMI Significant improvement also in diabetes knowledge and perceived competence in self-management Increase in EQ-5D (quality of life) from 0.8 to 0.85 but insignificant	Cost per patient over 12 months $403 **Components:** No details provided	Healthcare cost per patient per year reduced $137 Components: Inpatient and ER based on Schmidt 2015 **Productivity:** NR	**No summary estimates provided.** **Limitations:** No details about components of program cost. Incomplete cost of healthcare. No control group. Analysis based only on those with => 2 visits with CHW.

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	885 who completed => 2 visits with CHW. Age 40 to 59 years Female 61% Hispanic 71% Black 15% **Time Horizon:** Enrollment from Sep 09 to June 13. Intervention length 12 months.	counseling, and motivational interviewing. 7 one-on-one 30-60 minute sessions between CHW and patient over 12 months. Obtain health history, clinical measurements, provide education about diabetes, self-management, medication, adherence, and lifestyle changes. Set goals and help with barriers. Worked closely with PCP for patient care. **Team-based Care:** Yes **Comparison:** None	Measure: Pre to Post			
Author (Year): Prezio et al. (2014) Linked to Clulica et al. (2007) **Design:** Modeled based on RCT	**Location:** Dallas, TX **Setting:** Urban diabetes center. **Population:** Patients with diabetes served by clinic.	**Intervention:** The Community Diabetes Education (CoDE) program. CHW trained by volunteer registered dietitian, endocrinologist,	Change in mean of outcomes: At 12 months A1c reduced by 0.7% from baseline 8.9% in RCT.	First year cost per patient $435 Second year and thereafter annual cost per patient $316 **Component Included in Cost:** Components of first year cost per patient	**Healthcare cost per patient:** 20-year healthcare cost predicted by Archimedes Model. Study does not report separately. Included in the net cost per QALY gained that is reported.	Modeled based on Archimedes-Diabetes model. **Cost per QALY Gained:** All Ages 5-Year $100,195 10-Year $38,726 20-Year $355

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Economic Method: Intervention cost and Cost per QALY gained. **Funding Source:** No external funding. **Monetary Conversions:** Index year 2012 in U.S. dollars.	**Sample Size:** Intervention 90 Control 90 Model simulated 10,000 in each arm **Characteristics:** Mostly uninsured and Mexican origin in RCT. In Model Mean Age 47 Female 64% Mean A1c 9.5; systolic blood pressure 126 mmHg; BMI 33.6; Smokers 11%. **Time Horizon:** 12 month RCT completed in 2006. Modeled to 20 years.	and diabetes educator. See Culica (2007) for intervention details. **Supervisor and Activities:** Clinic physician **Team-based Care:** Yes **Other Team Members:** Clinic physician **Comparison:** Usual care	Long term outcomes predicted by Archimedes model with intervention effect and baseline patient characteristics from RCT. Outcomes include retinopathy, diabetes complications, foot ulcer, amputation, end stage renal disease,, chronic heart disease, cardiovascular event, and myocardial infarction. 20-year discounted QALY gained Was 561 per 10,000 **Measure Type:** DiD for intervention effect and modeled effects.	7 CoDE sessions with CHW ($17.55 per hr) 1 hour physician supervision of CHW, chart review, medical decisions in excess of usual care ($66.31 per hr) Patient time ($15.65 per hr) Patient diabetes supplies $51.07 **Components not Included:** Venue and overhead CHW training cost Transportation **Data Source:** Tracked in Project.	**Productivity:** NR **Other Economic Costs Averted:** NR	20-Year Horizon Age 20-34 $12,870 Age 35-54 $6010 Age 55-75 Cost Saving Cost per QALY gained lowest for ages 55-75 and highest for ages 20-34. 20-year cost of program at 3% discount rate was $4958

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Author (Year): Rothschild et al. (2014) **Design:** RCT **Economic Method:** Intervention cost. **Funding Source:** NIDDK (grant R01-DK061289). **Monetary Conversions:** Index year assumed to be 2007 in U.S. dollars.	**Location:** Chicago, IL **Setting:** CHWs did home visits. **Population:** Mexican Americans in Chicago metro with type 2 diabetes =>18 years and taking oral hypoglycemic agent. Must have insurance or be enrolled in free public clinic. Community outreach for recruitment. **Sample Size:** Intervention 73 Control 71 **Characteristics:** Married 65% Some college 11% Female 67% Mean age 54 Mean A1c 8.5% **Time Horizon:** Recruited Jan 06 to Sept 08. Study period 4.5 years. Length of	**Intervention:** Mexican American Trial of Community Health Workers (MATCH). CHWs delivered home-based behavioral self-management training during home visits. Frequency is 36 over 2 years per patient. Including goal setting, problem solving, journaling, obtaining family support, and stress management. 3 CHWs selected from 10 Mexican American CHWs from local not for profit with no diabetes who underwent 100 hours training on diabetes, self-management support, and home visiting. 3 selected for MATCH. **Supervisor and Activities:** Not reported	Change in mean of outcomes Intervention effects at 1 year A1c reduced by 0.55 pct pt BP Control showed no difference Weight reduced 4.82 pounds No difference in medication adherence or glucose self-monitoring. Modest increase in physical activity No dose response in number of CHW visits **Measure Type:** DiD	Cost for intervention per patient per year $1020 **Components included in cost:** CHW wages and benefits **Components not included in cost:** Supervision Training Office space and equipment Travel Over 4.5 years, 3 CHWs performed 1647 home visits lasting average of 99 minutes. Median visits 7 per week per CHW. **Data Source:** Not reported.	**Healthcare cost per patient:** Noted there was no difference in emergency room visits or hospitalizations. No cost was provided. **Productivity:** NR **Other Economic Costs Averted:** NR	**No summary economic measures reported** **Comment:** No change in medication adherence but reduction in A1c points to other mechanisms such as more care visits, weight loss, or diet.

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Cost	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	intervention 24 months.	**Team-based Care:** No **Other Team Members:** None **Comparison:** Usual care plus newsletter DiabetesAction, 36 issues covering self-management				
Author (Year): Ryabov et al. (2014) **Design:** Modeled based on RCT **Economic Method:** Intervention cost and intervention cost per QALY gained. **Funding Source:** Partial grant from NIH. No details. **Monetary Conversions:** Index year 2008 in U.S. dollars.	**Location:** Hidalgo County, TX **Setting:** Patients drawn from Community Health Center. **Population:** Patient age => 30 with type 2 diabetes from Community Health Center (CHC). **Sample Size:** Intervention 15 Control 15 **Characteristics:** Predominantly Mexican	**Intervention:** Monthly visits by CHWs, trained and certified diabetes educators. Average experience 7.3 years. Diabetes education based on National Diabetes Education program guidelines. Content included diabetes pathophysiology, causes including hereditary factors, self-management, healthy diet and recipes, goal setting and self-management plan. Also took height, weight, BP at each visit.	Outcomes modeled included nephropathy, retinopathy, chronic heart disease, and stroke. Change in mean of outcomes A1c reduced by 0.6 pct pt Triglycerides reduced by 12.4 mg/dL HDL increased by 7.5 mg/dL Systolic BP increased by 4.7 mmHg	2-year cost of intervention Total $15,362 Cost per patient per year $1024/2. **Components included in cost:** Home visits $44 per visit CHW and administrative assistant wages Materials and equipment **Components not included:** CHW training CHW supervision Incremental cost of program for intervention group through lifetime $9667 or $644 per patient. We assume the cost of implementation	**Healthcare cost per patient:** NR **Productivity:** NR **Other Economic Costs Averted:** NR	Modeled effects and QALY based on the CDC Diabetes Cost-effectiveness Model (DCEM). Incremental program cost for intervention group $9667 Incremental QALY gained 0.07 Cost per QALY gained $13,810 **Comment:** Did not account for cost of healthcare as affected by intervention outcomes. Cost per QALY could be

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	American, poor, underinsured Mean Age 55 Female 80% Married 77% Income 47% less than 10K; 40% less than 20K. Education median 8.5 years. Mean A1c 7.6% **Time Horizon:** Modeled from diagnosis to death or 95 years age. Intervention length is 2 years. Likely started in 2008. RCT follow-up July 31, 2010.	Visit length 40-60 minutes. Health care provided by CHC for both intervention and control patients. Quarterly serological tests. **Supervisor and Activities:** None **Team-based Care:** No **Other Team Members:** None **Comparison:** Usual care	Diastolic BP increased 0.6 mmHg BMI decreased 1.1 (0.51) Lifetime discounted QALY gained was 0.7 for intervention versus control, that is 0.047 per patient. **Measure Type:** DiD for intervention effect and modeled effects.	has been included through amortization. **Data Source:** Tracked in Project and in invoices from clinic.		overestimated. Unclear whether cost of implementation is included. Just in case, reviewers added implementation cost and determined cost per QALY gained at $35,756.
Author (Year): Segal et al. (2016) **Design:** Randomized Controlled Trial **Economic Method:** Intervention cost per unit change in physiological outcomes.	**Location:** North Queensland, Australia **Setting:** Community. **Eligibility** Indigenous Australians in 12 remote rural locations with poorly controlled diabetes.	Getting Better at Chronic Care (GBAC) **Interventions:** Indigenous health workers who are certified in indigenous primary care. Also trained in diabetes management. Received intensive	Change in mean of outcomes At 18 months after start. A1c reduced 4.7 mmol/mol Percent of those with very high A1c reduced Hospitalizations comparing 20	Total cost $1,006,027 CHW Salaries (3 full-time and 3 part-time) $522421 Trial manager and clinic support team $483606 Cost per patient per year $6707 **Components included in cost:** CHW salary	Change in healthcare cost per patient over 18 months: Insignificant reductions in cost for intervention group for all categories Only significant reduction was for diabetes as primary diagnosis, with savings of $646 per	**No summary measures** **Comments:** Authors note the high cost of intervention even for poorly controlled diabetes, and compare to the estimates cost per patient per year in indigenous primary care of $2700, which includes physician,

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Cost	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Funding Source: National Health and Medical Research Council (NHMRC) Program Grant (631947) and Partnership Grant (570149). **Monetary Conversions:** Index year 2012 in Australian dollars.	**Sample Size:** Intervention 87 (6 communities) Control 106 (6 communities) Indigenous Australians 100% Mean Age 47.5, Female 61% Obese 52-65%, Smoke 36-39%; Alcohol use 37-41% A1c 95-99 mmol/mol **Time Horizon:** CHW intervention was 18 months. March 2012 to Sep 2013.	support from clinic team. Family-centered with community outreach. Primary care team of physician, nurse, and 18 months of intensive CHW support for patients. **Supervisor and Activities:** NR **Team-based Care:** Yes **Other Team Members:** Physician, Nurse **Comparison:** Usual Care team of physician, nurse, and less intensive CHW support.	months pre to 18 months post All inpatient categories increased for both groups with small favor for intervention. Only significant but small reduction was inpatient with diabetes as primary diagnosis. Markov model for disease progression based on baseline and post intervention markers. No transitions were significantly different. **QoL based on AQoL-4D** Both groups had minor reduction in QoL Measure: DiD	Clinic support staff **Components not included:** CHW training CHW supervision	patient per year in hospitalizations. **Productivity:** NR	nurse, managerial, and CHW support.

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Cost	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Author (Year): Tang et al. (2014) **Design:** RCT **Economic Method:** Incomplete cost of program. **Funding Source:** American Academy of Family Physicians Foundation (Grant P30DK092926). National Institute of Diabetes and Digestive and Kidney Diseases (Grant R18DK0785501A1). Centers for Disease Control and Prevention (Cooperative agreement no. U50/CCU417409). **Monetary Conversions:** Assumed 2012 as index year in U.S. dollars.	**Location:** Southwest Detroit, MI **Setting:** Community. Patients treated in community health center. **Eligibility:** Age => 21 years treated in community health center with diagnosed type 2 diabetes and self-identified as Latino. **Sample Size:** CHW Intervention 56 Peer Leader Intervention 60 Mean Age 49, Female 54-64% Latino 100%, Less than HS 71-84%; No diabetes medication 3.6 to 5.0% **Time Horizon:** Intervention occurred in 2012. Diabetes education 6	Extended patient support for the CHW-led Journey to Health (JTH) diabetes education intervention. 6-month JTH consisted of 11 2-hour group sessions in diabetes self-management, 2 1-hour home visits per month, 1 visit with patient and primary care provider **2 arms Interventions:** 12 month CHW (CHW Group) telephone outreach to sustain improvements following a 6 month diabetes self-management education intervention. Monthly phone calls and or emails covering goals, plans, problem solving, and identifying community resources.	Change in mean of outcomes A1c6-months CHW group -0.5 pct pt PL group -0.7 pct pt 12-months CHW group -0.4 pct pt PL group -0.6 pct pt 18-months CHW group -0.3 pct pt PL group -0.6 pct pt No difference between groups. LDL-C 6-months No change 12-months No change 18-months CHW group No change PL group -14 mg/dL No difference between groups. Systolic BP/Diastolic BP for PL Group were 6-months	Peer leaders received stipend of $1000 per year. Average salary of CHWs was $29129 Components: Only labor cost for PL and CHW time Participant incentives of $40 at baseline, 6, 12, and 18 months. Personal communication with authors: 2 CHWs in one arm and same CHWs supervising peer health workers in the other arm alternating on monthly basis. Reviewers computed cost per patient per year at $669. **Components included in cost:** CHW and peer leader wages. **Components not included:** CHW supervision CHW training	**Healthcare Cost** NR **Productivity:** NR **Other Economic Costs:** NR	**No summary economic outcomes** **Comments:** Both PL and CHW led support interventions were effective at 6 and 12 months and PL was more effective in sustaining improvements at 18 months. Note the 1-1 contact designed into the PL intervention is more intensive than phone/email contact in CHW intervention. **Limitations:** Not a comparison to usual care.

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	months followed by evaluated support intervention of 12 month length.	CHWs had average 6 years experience in leading diabetes education. Employees of clinic, HS or GED, 160 hours outreach training and 80 hours diabetes education training, residents of SW Detroit. 12 month outreach by peer leaders (PL) following 6 month diabetes self-management education intervention. Group sessions followed by phone contacts. Focus on goals, plans, problem solving, and identifying community resources. Follow-up with non-attenders. PLs were volunteers and received nominal stipend for transport and chid care. Had diabetes, lived in SW Detroit, bilingual, patient from JTH, Latino, =>21 years age,	-6.6/-3.9 mmHg 12-months -6.4/-4.1 mmHg 18-months -5.8/-3.4 mmHg No change in SBP/DBP for CHW group at any time point. Measure: Pre to Post			

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Cost	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
		underwent 46 hour training. Training focus on diabetes knowledge, active listening, empowerment and facilitation, and self-efficacy. **Comparison:** Usual diabetes care				

ADA, American diabetes association
UKPDS, United Kingdom Prospective Diabetes Study
NR, not reported
BP, blood pressure
DiD, difference in difference
CHW, community health worker
QALY, quality-adjusted life year
DALY, disability-adjusted life year