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Effectiveness of group medical visits for improving diabetes care: a systematic review and meta-analysis

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Abstract

Background: Group medical visits, whereby health care professionals meet with groups of patients who have the same disease, have been introduced in primary care as a way to meet the increasing demand for health care delivery to patients with chronic diseases. We performed a systematic review and meta-analysis of the evidence on the effectiveness of such visits for patients with diabetes.

Methods: We conducted a systematic review of all relevant studies published from 1947 to February 2012 identified in a search of electronic databases and grey literature. We included randomized controlled trials (RCTs) and observational studies published in English that included patients aged 16–80 years with type 1 or 2 diabetes and that had group medical visits as the intervention. These studies were assessed for methodologic quality. We included data only from the RCTs in the meta-analysis.

Results: Of the 94 studies identified, we selected 26 that met our inclusion criteria, 13 of which were RCTs. Group medical visits had a positive effect on clinical and patient-reported outcomes, with significant reductions in glycated hemoglobin (HbA_{1c} reduction –0.46%, 95% confidence interval –0.80% to –0.31%). We were unable to assess the effect of group medical visits on processes of care because of an insufficient number of RCTs that reported on this outcome.

Interpretation: Group medical visits for patients with diabetes were found to be effective in terms of reducing HbA_{1c}. The results of our meta-analysis suggest that wider implementation of group medical visits for patients with diabetes will have a positive effect on patient outcomes.

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Increasing evidence shows that strengthening the foundation of primary health care will lead to improved health and provide better management for people with one or more chronic conditions.[1] In Canada, increased attention on the primary health care system is particularly important given the growing number of people living with one or more chronic conditions.[2] The move to renew and redesign primary care has led to a number of innovations, including group medical visits.[3]

Group medical visits are a format for health care delivery whereby medical appointments are offered to a group of patients with the same disease instead of the traditional one-to-one patient–provider format.[4] During the group visit, patients receive a health evaluation and educational information about their condition and about the prevention of complications and disease progression, and they may have prescriptions, referrals and laboratory tests ordered. The visit is usually facilitated by a physician or a nurse practitioner and may involve other interdisciplinary team members such as a registered nurse, nutritionist and pharmacist.[5]

Group medical visits offer an ideal format for patients with chronic diseases because they allow health care practitioners to provide care to 12–15 patients in one appointment and enable patients to interact with people who share their condition. In Canada, group medical visits are increasingly being used to provide primary health care to patients with diabetes.[3] Type 1 and type 2 diabetes affect about 6.8% of the Canadian population.[6] Social support from peers with diabetes has been shown to improve some clinical outcomes.[7,8]

Although health care providers have reported this care model to be an effective way to deliver care,[9–12] data are limited and differ on the impact of group medical visits on patient outcomes. We conducted a systematic review and meta-analysis to measure the effect of group medical visits on biophysical, process-of-care and patient-reported outcomes among patients with type 1 and 2 diabetes.

Methods

We used the PICO (population, intervention, comparison and outcome) approach to develop the research question for our systematic review — population: patients with type 1 or 2 diabetes; intervention: group medical visits; comparison: usual care; outcomes: biophysical, patient-reported and processe-of-care outcomes.

Literature search

We conducted a comprehensive search of the following electronic databases from inception through February 2012: MEDLINE (PubMed), CINAHL, Biosis, ProQuest Dissertations and Theses, Embase, Web of Science, Psych Info and the Cochrane Database of Systematic Reviews. We also searched various sources of grey literature. Bibliographies of selected articles were manually searched for additional studies. Details of our search strategies are available in Appendix 1 (available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.130053/-/DC1). A librarian was consulted to review the search strategy.

Study selection

A 3-step process was used to determine the eligibility of studies for our review. First, the title of relevant articles were independently screened by each of us. Second, if titles were deemed relevant, abstracts were independently reviewed by 2 of us (L.H. and either S.T.W. or M.D.). Finally, if abstracts were deemed relevant, full-text articles were independently reviewed by 2 of us (as described above). Decisions regarding inclusion and exclusion of studies were made by consensus between the 2 reviewers; disagreements were resolved by the third reviewer as required.

We included randomized controlled trials (RCTs) and observational studies published in English or translated into English that included patients aged 16–80 years with type 1 or 2 diabetes and had group medical visits as the intervention. We excluded studies in which the intervention was for educational purposes or did not include a health care provider who could diagnose, prescribe, make referrals and order laboratory tests.

Multiple articles from the same study or group of patients were classified as "kinned" articles. We grouped kinned articles together and counted them as one study.

Data extraction

We collected data on study characteristics, participant demographics, and clinical and patient-reported outcomes. Where possible, sample size and post-intervention means and standard deviations (SDs) were extracted for both the intervention and usual-care groups. We extracted data from the observational studies to inform the discussion. Data were initially extracted by one of us (L.H.) and checked by the others (S.T.W., M.D.) to ensure accuracy.

Assessment of bias

We assessed RCTs for risk of bias using the Cochrane Risk of Bias Tool.[13] One of us (L.H.) completed the full quality assessment. Congruency of the assessment was ensured by having a second reviewer (S.T.W.) independently assess quality of 5% of the included studies. A sensitivity analysis was performed in which we excluded studies that had 2 or more items with a high risk of bias. Because some articles included patients with either type 1 or type 2 diabetes, we conducted an additional sensitivity analysis for glycated hemoglobin (HbA_{1c}) in which we excluded studies that included only patients with type 1 diabetes as well as studies in which the type of diabetes was unclear. Overall effect size, significance and funnel plots were examined for HbA_{1c}.

Data synthesis

We included only RCTs in the meta-analysis. We analyzed the data from RCTs using Review Manager software (RevMan, version 5.1, Nordic Cochrane Centre). For each RCT, the effect size was calculated to determine the mean differences between the intervention and control groups at the longest reported time after the intervention.

Mean differences were first pooled into a fixed-effects model. A χ^2 test for heterogeneity was performed; when significant heterogeneity was found ($I^2 > 25\%$), the analysis was recalculated with a random-effects model. The mean differences were weighted and pooled following Hedges' method for calculating standardized mean differences.[14]

When measures of dispersion were not reported for outcome data, we used baseline SDs or calculated SDs from reported p values. When no baseline SD or p values were reported, we estimated SDs from the baseline range data. When examining these estimated SDs, we found that they were conservative estimates of the value; a sensitivity analysis in which we removed studies with uncertain SDs yielded improved HbA_{1c} outcomes with a decrease in effect size.

We performed a meta-regression analysis to determine (a) if the length of time patients spent attending group medical visits was related to effect size and (b) if the number of group visits a patient attended in a year was related to effect size. To examine the number of group visits attended per year, we created an "intensity"

value by dividing the number of appointments by the number of years of the intervention. For the meta-regression analysis, we used Stata software, version 12.1 (StataCorp LP).

Results

We identified 92 potentially eligible articles. The most common reasons for exclusion were that the intervention did not involve a health care provider who could prescribe, diagnose, assess and refer patients; the article was a narrative or commentary based on other research studies; the study did not include a group medical visit as the intervention; and the article was not in English. A total of 26 studies met our inclusion criteria (Figure 1).[5,15–45]

Study characteristics

The characteristics of the 13 RCTs included in the meta-analysis are summarized in Table 1[15–33] (for characteristics of all 26 studies, see Appendix 2, available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.130053/-/DC1). The number of studies published after 2002 increased substantially (4 studies before 2002, 12 between 2002 and 2007, and 16 between 2008 and 2012). One document was a doctoral dissertation, completed in 2011.[43] Most of the studies (n = 20) were conducted in the United States,[5,15–23,25–28,33,34,36–43] with the remainder conducted in Europe (Austria n = 1,[44] France n = 1,[35] Italy n = 3[29–32,45] Norway n = 1[24]). Samples ranged in size from 37 to 707 participants. Three studies included fewer than 50 patients, and 6 had more than 200; the remainder had between 50 and 100 patients (n = 7 studies) or between 100 and 200 patients (n = 10).

Of the total 4652 patients, 3112 received group care or attended group medical visits as an intervention. The mean age of participants in the studies that reported this information was 59.3 years, and 56% of participants attending group medical visits were men.

Study quality

A summary of the risk-of-bias assessment of the 13 RCTs can be found in Table 2. The amount of bias varied across the trials. Only one had a low risk of bias in most areas.[22] The other RCTs either did not report enough information for bias to be assessed or had 2 or more areas assessed as a high source of bias.

Clinical outcomes

Eleven of the RCTs reported HbA_{1c} data at baseline. The baseline values did not differ significantly between the studies (weighted mean difference –0.09, 95% confidence interval [CI] –0.29 to 0.11). Only 10 studies reported HbA_{1c} data that could be included in our meta-analysis. Pooled analysis of HbA_{1c} values after the intervention period showed significantly lower values among the patients attending group medical visits (weighted mean difference –0.46, 95% CI –0.80 to –0.13) (Table 3, Figure 2).

In the meta-regression analysis, we found that duration of treatment directly affected patients' HbA_{1c} values. Patients who attended group medical visits for longer periods had better HbA_{1c} outcomes. For every year increase in the duration of treatment, there was a decrease in effect size of 0.25, which indicated a drop in HbA_{1c} of one quarter of 1%. When we examined whether the frequency of group visits had an effect on HbA_{1c} outcomes, it did not explain the difference in the effect size, which indicated that the duration of treatment had a greater effect on HbA_{1c} outcomes than the number of appoint-

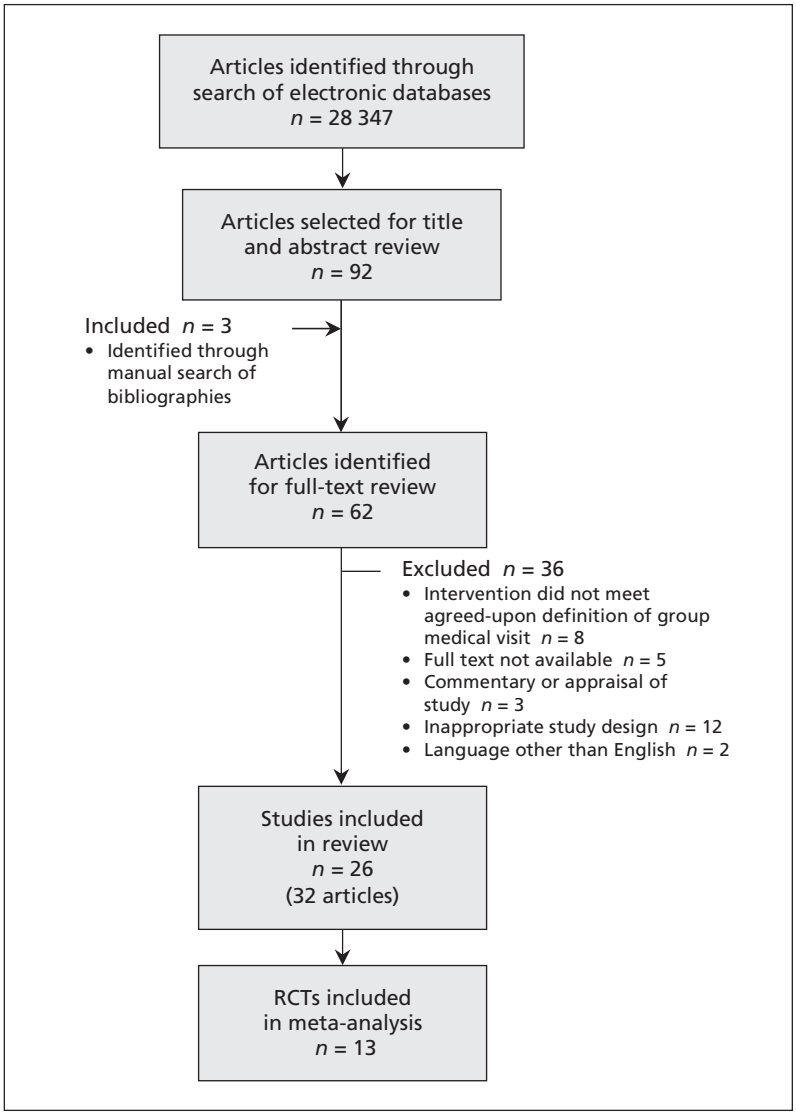

Figure 1: Selection of studies. RCT = randomized controlled trial.

Table 1 (part 1 of 3): Characteristics of 13 randomized controlled trials included in the meta-analysis

Study	Study duration	Duration and frequency of group medical visits	No. of patients	Study population	% male	Outcomes measured	HbA_{1c} outcome	BP outcome
Clancy et al., 2003[15–17]	6 mo	2-h sessions; monthly over 6 mo	Intervention: 59 Control: 61	Age > 18 yr; type 2 diabetes with HbA_{1c} > 8.5% at most recent evaluation	21.7	Trust in physician (scale), ADA process-of-care indicators, patient care assessment tool, HbA_{1c}, lipid profiles	At 6 mo: 9.513% in intervention and 9.714% in control; difference not significant	Not measured
Clancy et al., 2007[18,19] and 2008[20]	12 mo	2-h sessions; monthly over 12 mo	Intervention: 96 Control: 90	Age > 18 yr; poorly controlled type 2 diabetes (HbA_{1c} > 8%)	28	Emergency department visits, inpatient stays, primary and specialty outpatient visits, total charges, HBA_{1c} testing, lipid profiles, adherence to ADA guidelines, cancer screens	Not measured; instead study looked at no. of patients who received HbA_{1c} testing	Not measured
Cohen et al., 2011[21]	6 mo	2-h sessions over 6 mo; weekly for 4 wk, then monthly for 5 mo	Intervention: 50 Control: 49	Veterans with type 2 diabetes; HbA_{1c} > 7.0%, LDL cholesterol > 100 mg/dL (or > 70 mg/dL if coronary artery disease present); BP > 130/80 mm Hg	Intervention: 100 Control: 96	HbA_{1c}, LDL cholesterol, BP, goal attainment of these values, diabetes self-care behaviour, prescribing (medications) between groups, no. of visits with primary care provider	Target goals reached by 40.5% in intervention v. 20.4% in control (p = 0.03); patients in intervention group had higher odds of attaining HbA_{1c} goals	Target systolic BP (< 130 mm Hg) reached by 50% in intervention and 32.7% in control (p = 0.015); patients in intervention group had higher odds of attaining systolic BP goals
Edelman et al., 2010[22]	12.8 mo	90–120 min per session; every 2 mo over 12 mo; total 7 sessions	Intervention: 133 Control: 106	Veterans with poorly controlled diabetes (HbA_{1c} ≥ 7.5%) and hypertension (systolic BP > 140 mm Hg, diastolic BP > 90 mm Hg); type of diabetes not specified	Intervention: 95.5 Control: 96.2	Systolic and diastolic BP, HbA_{1c}, self-reported medication adherence	Mean decrease 0.8% in intervention and 0.5% in control; difference not significant (p = 0.159)	Mean decrease in systolic BP was 13.7 mm Hg in intervention v. 6.4 mm Hg in control (p = 0.011)
Naik et al., 2011[23]	12 mo	60-min sessions; 4 sessions; every 3 wk over 3 mo	Intervention: 45 Control: 42	Veterans aged 50–90 yr with a primary care provider; type 2 diabetes; mean HbA_{1c} 7.5% 6 mo before study	Unknown	HbA_{1c}, diabetes self-efficacy scale, diabetes specific knowledge and understanding scale	At 1 yr: 8.05% ± 1.40% in intervention v. 8.64% ± 1.39% in control (p = 0.05)	Not measured
Rygg et al., 2012[24]	12 mo	5-h sessions; every 2 wk over 6 wk, or every 3 wk over 9 wk, depending on site	Intervention: 73 Control: 73	Age > 18 yr; type 2 diabetes; consultation with general practitioner in past 3 yr	"Approximately 50%"	HbA_{1c}, patient activation, diabetes knowledge, BP, weight, BMI, total and HDL cholesterol, triglycerides, creatinine, oral glucose-lowering medication, visits with health care personnel in past 3 mo, satisfaction with diabetes treatment, problem areas in diabetes, EQ-VAS, SF-36 (physical and mental health domains), self-management (diet, foot care and blood glucose)	At 12 mo: no significant difference (p = 0.432), except in subgroup analysis of patients with highest HbA_{1c} (> 7.7%) at baseline (8.2% ± 1.4% in intervention group v. 8.8% ± 1.4% in control group; p = 0.012)	Systolic BP intervention: 140.6 (17.1), control: 143.7 (20.8). diastolic BP intervention: 82.6 (10.3), control 83.3 (10.3)

Continued

Table 1 (part 2 of 3): Characteristics of 13 randomized controlled trials included in the meta-analysis

Study	Study duration	Duration and frequency of group medical visits	No. of patients	Study population	% male	Outcomes measured	HbA_{1c} outcome	BP outcome
Sadur et al., 1999[25]	12 mo	2-h sessions; monthly over 6 mo	Intervention: 82 Control: 74	Age 16–75 yr; type 1 and 2 diabetes; HbA_{1c} > 8.5%, or no HbA_{1c} test performed in previous yr	Intervention: 58.8 Control: 55.7	HbA_{1c}, self-reported changes in self-care practices, self-efficacy, satisfaction, utilization of inpatient and outpatient health care	≥ 5 mo after randomization: 8.18% in intervention and 9.33% in control ($p < 0.0001$)	Not measured
Schillinger et al., 2009[26]	12 mo	90-min sessions; monthly over 9 mo	Intervention: 104 Control (usual care): 108 3rd arm (wkly automated telephone support with nurse follow-up): 112	Adult patients with type 2 diabetes; uninsured with high school education or less; ≥ 1 primary care visit in past yr; recent HbA_{1c} ≥ 8.0%	Intervention: 36.3 Control: 44.7	1-yr changes in structure (patient assessment of chronic Illness care), communication processes (interpersonal processes of care) and outcomes (behavioural, functional and metabolic)	No difference between groups (9.0% ± 2.0% in both groups; $p = 0.3$)	Systolic BP 138.9 ± 20.3 mm Hg in intervention and 141.5 ± 23.9 mm Hg in usual-care group ($p = 0.1$); diastolic BP 75.5 ± 11.3 mm Hg in intervention and 78.5 ± 18.5 mm Hg in usual-care group ($p = 0.08$)
Taveira et al., 2010[27]	4 mo	2-h sessions; weekly over 4 wk	Intervention: 58 Control: 51	Veterans aged ≥ 18 yr with type 2 diabetes; HbA_{1c} 7%–9% in previous 6 mo	Intervention: 91.4 Control: 100	HbA_{1c}, BP (systolic < 130 mm Hg, diastolic < 80 mm Hg), lipids, tobacco use	Target reached by 40.4% in intervention and 21.6% in control; absolute mean change –0.9 ± 1.6 in intervention and 0.0 ± –1.5 in control	Target systolic BP reached by 65.5% in intervention and 39.9% in control; absolute mean change –7.3 ± 20.3 mm Hg in intervention and –1.7 ± – 19.6 mm Hg in control. Target diastolic BP reached by 65.5% in intervention and 68.6% in control; absolute mean change –6.5 ± 10.0 mm Hg in intervention and 1.0 ± 10.8 mm Hg in control
Taveira et al., 2011[28]	6 mo	90-min sessions; weekly for 4 wk, then monthly for 5 mo	Intervention: 44 Control: 44	Veterans with depression and type 1 or 2 diabetes; HbA_{1c} > 6.5% in previous 6 mo	Intervention: 100 Control: 95.5	HbA_{1c} < 7% at 6 mo, adherence to ADA guidelines (systolic BP < 130 mm Hg, diastolic BP < 80 mm Hg), total, LDL and HDL cholesterol, tobacco cessation, change in 10-yr coronary event risk at 6 mo, depression symptoms	7.4% ± 1.2% in intervention v. 8.4% ± 2.0% in control group ($p < 0.05$)	Systolic BP 123.4 ± 12.3 mm Hg in intervention and 127.0 ± 17.3 mm Hg in control ($p < 0.05$ from baseline)

Continued

Table 1 (part 3 of 3): Characteristics of 13 randomized controlled trials included in the meta-analysis

Study	Study duration	Duration and frequency of group medical visits	No. of patients	Study population	% male	Outcomes measured	HbA_{1c} outcome	BP outcome
Trento et al., 2002,[29] 2001[30] and 2004[31]	4 yr	Duration of session not stated; session every 3 mo	Intervention: 56 Control: 56 (42 in each group at yr 5)	Type 2 diabetes, treated with diet alone or diet and oral hypoglycemic agents; attended diabetes clinic	Intervention: 51.1 Control: 60.7	Weight, fasting blood glucose level, HbA_{1c}, serum creatine, total and HDL cholesterol, triglycerides, microalbumine: creatinine ratio, diabetes-related quality of life, knowledge of diabetes, health behaviours, BP, BMI	At 5 yr after randomization: 7.3% ± 1.0% in intervention and 9.0% ± 1.6% in control ($p < 0.001$)	Not measured
Trento et al., 2005[32]	3 yr	Duration of session unclear; every 2–3 mo; total 15 sessions over 36 mo	Intervention: 30 Control: 28	Age < 70 yr; type 1 diabetes with onset before 30 yr; insulin started within 1 yr of diagnosis; ≥ 1 yr previous attendance in clinic	Intervention: 61.3 Control: 58.1	Diabetes-related quality of life, knowledge of type 1 diabetes, health behaviours, HbA_{1c}, total and HDL cholesterol, microalbumine:creatinine ratio, complications (hypoglycemic episodes [retrospective]), economic analysis	At 3 yr: 7.88% ± 0.20% in intervention and 8.79% ± 1.38% in control (p = NS)	Not measured
Wagner et al., 2001[33]	2 yr	Half-day sessions; "periodic" (intervals of 3 mo and 6 mo)	Intervention: 278 Control: 429	Age > 30 yr; patients with diabetes (type not specified) using insulin or oral hypoglycemic therapy were "preferentially selected"	Intervention: 56 Control: 51.8	Subscales of SF-36 (general health, physical function, emotional role function, social function and pain), bed disability, restricted-activity days	At 24 mo: no difference between groups (7.9% in both groups; $p = 0.9$)	Not measured

Note: ADA = American Diabetes Association, BMI = body mass index, BP = blood pressure, EQ-VAS = EuroQol 5-d measure of health outcome, HDL = high-density lipoprotein, LDL = Low-density lipoprotein, NS = not significant, SF-36 = Medical Outcomes Study 36-item Short Form.

ments attended per year. We did not analyze other attributes of group visits using meta-regression techniques because the data were not consistently reported in the RCTs.

When we excluded studies with 2 or more methodologic features assessed as a high source of bias, the overall effect of group medical visits on HbA_{1c} improved (weighted mean difference −0.62, 95% CI −1.23 to −0.01). When we excluded studies with 3 or more features assessed as a high source of bias, the effect size did not change significantly (−0.47, 95% CI −0.94 to 0.00). When we excluded studies that had only patients with type 1 diabetes, the effect size increased (−0.58, 95% CI −1.12 to −0.04).

Five of the RCTs evaluated the effects of group medical visits on systolic blood pressure, and 4 assessed the effects on diastolic pressure. No statistically significant effect on either type of blood pressure was found in the meta-analysis (Table 3; see also Appendix 3, available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.130053/-/DC1).

Group medical visits had a slightly positive effect on patients' weight, but no effect on body mass index; the effect on weight was not statistically significant. A negative effect of group medical visits on total and high-density lipoprotein cholesterol levels was noted; however, the effects were minimal (Table 3, Appendix 3).

Other outcomes

Patients who attended group medical visits reported improvements in quality of life, as measured by the Diabetes Quality of Life Questionnaire[46] (weighted mean difference −29.30, 95% CI −60.64 to 2.05); however, the results were limited to 2 RCTs and were not statistically significant.

Data on process-of-care outcomes in the RCTs were insufficient to include them in the meta-analysis. In our synthesis of findings from all 26 studies, we noted reports on aspects of patients' engagement in their health care, including positive outcomes in the domain of self-care,[21,25] physical activity,[39] the setting and achievement of measurable goals,[21,34,39] patient knowledge,[24,31,32,41,44] self-efficacy[23,25] and self-management.[24,26,34,36,40,44]

Interpretation

Our meta-analysis showed that group medical visits for patients with diabetes led to significant reductions in HbA_{1c}. Small decreases have been shown to have substantial clinical impacts: a 1.0% reduction in HbA_{1c} may be associated with a 37% decrease in microvascular complications, up to a 14% reduction in the incidence of myocardial infarction and a 21% decrease in the risk of death from diabetes.[47]

Patients with diabetes are known to be at increased risk of cardiovascular disease and cardiovascular-related death.[48,49] Although not statistically significant, the reductions in systolic and diastolic blood pressure among patients attending group medical visits are of interest. Many lifestyle modifications such as weight reduction, dietary changes, physical activity and alcohol consumption have been found to reduce systolic blood pressure by 2–8 mm Hg.[50] A reduction of 2 mm Hg in diastolic blood pressure has been

Table 2: Risk-of-bias assessment of the randomized controlled trials

Study	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Clancy et al.[15–17]	High	Unclear	High	Unclear	Unclear	Unclear	Unclear
Clancy et al.[18–20]	Low	Low	Low	High	Unclear	Unclear	Unclear
Cohen et al.[21]	High	High	High	Unclear	Unclear	Unclear	Unclear
Edelman et al.[22]	Low	Low	Low	Low	Low	Low	Unclear
Naik et al.[23]	Low	Low	Unclear	High	Low	Unclear	Unclear
Rygg et al.,[24]	Low	Low	Low	Unclear	Low	Unclear	Unclear
Sadur et al.[25]	High	High	High	Unclear	Unclear	Unclear	Unclear
Schillinger et al.[26]	Low	High	High	Unclear	Low	Unclear	Unclear
Taveira et al.[27]	High	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear
Taveira et al.[28]	High	High	Unclear	High	Low	Unclear	Unclear
Trento et al.[29–31]	Low	Unclear	Low	Unclear	Low	Unclear	Unclear
Trento et al.[32]	High	High	High	Unclear	Unclear	Unclear	Unclear
Wagner et al.[33]	High	High	High	Unclear	Unclear	High	Unclear

associated with a 6% decrease in the risk of coronary heart disease and a 15% reduction in stroke and transient ischemic attacks.[51]

An additional factor to consider when caring for patients with diabetes is their quality of life. Although only 2 of the RCTs measured this outcome using the Diabetes Quality of Life Questionnaire, the aspects of patients' quality of life examined in many of the other studies were similar to the domains covered in the questionnaire.

Only 2 of the RCTs examined the risk of hypoglycemic events associated with group medical visits.[22,32] Studies have shown that intensive glucose-lowering therapy among patients with diabetes may increase the risk of morbidity and mortality owing to hypoglycemic events.[52,53]

Table 3: Pooled analysis of the effect of group medical visits on clinical outcomes reported in randomized controlled trials

Outcome	No. of trials	Weighted mean difference (95% CI)
HbA_{1c}	10	–0.46 (–0.80 to –0.13)
Systolic BP	5	–2.81 (–6.84 to 1.21)
Diastolic BP	4	–1.02 (–2.71 to 0.67)
Total cholesterol	3	0.04 (–0.21 to 0.30)
HDL cholesterol	3	0.01 (–0.07 to 0.10)
Triglycerides	3	–0.01 (–0.41 to 0.38)
Weight	3	–0.50 (–3.87 to 2.88)
BMI	4	0.05 (–0.90 to 1.00)

Note: BMI = body mass index, BP = blood pressure, CI = confidence interval, HDL = high-density lipoprotein.

Limitations

There were few long-term studies examining the effectiveness of group medical visits for diabetes care. Fifteen of the 26 studies were 12 months or less in duration, and 6 studies were up to 2 years in duration. The study with the longest duration followed patients for 5 years after the intervention. Therefore, the long-term or sustainable outcomes of group medical visits are unclear, and it is difficult to know if the outcomes were maintained for a substantial length of time after the intervention.

Another limitation was that we restricted our search to include only published studies. We realize that studies showing a lack of effect may not have been published. We also included only articles written in English or translated into English, thereby excluding 2 studies not published in English.

Many of the studies involved specific populations of patients, such as those with low incomes, those with different ethnic backgrounds and veterans. Although group medical visits may work for populations with specific characteristics, the mixed results indicate that further examination of the types of populations and types of delivery models is needed.

Conclusion

Group medical visits for patients with diabetes were found to be effective in terms of reducing HbA_{1c}. The results of our meta-analysis, combined with the other benefits reported by patients and providers, suggest that wider implementation of group medical visits for patients with diabetes will have a positive effect on patient outcomes.

Study	Group medical visit Mean ± SD	*N*	Usual care Mean ± SD	*N*	Mean difference (95% CI)
Clancy et al.[17]	9.51 ± 2.52	59	9.71 ± 2.52	61	–0.20 (–1.10 to 0.70)
Edelman et al.[22]	8.3 ± 1.3	133	8.6 ± 1.5	106	–0.30 (–0.66 to 0.06)
Naik et al.[23]	8.05 ± 1.4	45	8.64 ± 1.39	42	–0.59 (–1.18 to –0.00)
Rygg et al.[24]	7.2 ± 1.2	73	7.2 ± 1.4	73	0.00 (–0.42 to 0.42)
Sadur et al.[25]	8.5 ± 1.9	65	8.6 ± 2	61	–0.10 (–0.78 to 0.58)
Schillinger et al.[26]	9 ± 2	96	9 ± 2.2	103	0.00 (–0.58 to 0.58)
Taveira et al.[28]	7.4 ± 1.2	44	8.4 ± 2	44	–1.00 (–1.69 to –0.31)
Trento et al.[31]	7.3 ± 1	42	9 ± 1.6	42	–1.70 (–2.27 to –1.13)
Trento et al.[32]	7.88 ± 0.2	30	8.79 ± 1.38	28	–0.91 (–1.43 to –0.39)
Wagner et al.[33]	7.9 ± 0.94	278	7.9 ± 0.94	429	0.00 (–0.14 to 0.14)
Overall Heterogeneity: I^2 = 82%		865		989	–0.46 (–0.80 to –0.12)

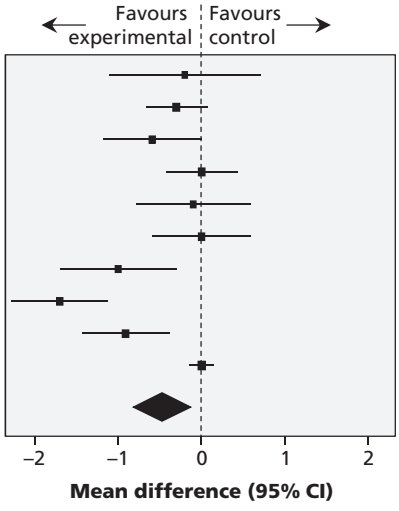

Figure 2: Pooled analysis of the effect of group medical visits versus usual care for patients with diabetes on glycated hemoglobin (HbA_{1c}) reported in randomized controlled trials. A weighted mean difference of less than zero indicates a positive effect of group medical visits. CI = confidence interval, SD = standard deviation.

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