Integrated Health Care System Application in Patients With Hypertension and Diabetes: A Systematic Review and Meta-analysis

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Abstract

Background Integrated health care provide patients with comprehensive and continuous care, but it still no consequence whether it could improve the illness condition of patients who suffer from chronic disease, such as hypertension and diabetes. The objective of this study is to evaluate the effect of the integrated health care system in patients with hypertension and diabetes.

Methods Randomised controlled trials testing the effect of integrated health care system in patients with hypertension and diabetes were be included. We search in GIN, NICE, Cochrane, JBI, CINAHL, EMBASE, PUBMED, Web of Science, SINOMED, CNKI (Chinese database), WANFANG (Chinese database) and VIP (Chinese database) databases from the building date of database to 31/Oct/2020. The articles must meet the following inclusion criteria: research objects are patients who have been clearly diagnosed with hypertension and diabetes, all of the articles should use Integrated Health Care as intervention, the study type of article is randomized clinical trials, the articles should be published in Chinese or English. Risk of bias were assessed regarding randomisation, allocation sequence concealment, blinding, incomplete outcome data, selective outcome reporting, and other biases.

Results . 16 randomized controlled trials (seven hypertension, nine diabetes) involving 5,231 patients (2,593 with diabetes and 2,638 with hypertension) with intervention duration ranging from 6 to 24 months. Meta-analysis showed that integrated health care significantly improved systolic and diastolic blood pressure in patients with hypertension, it also significantly declined the level of glycosylated hemoglobin in diabetes. After using the integrated health care for 12 months, glycosylated hemoglobin was significantly decreased which compared to the 6-month intervention in patients with diabetes.

Discussion In this study, we undertook a meta-analysis of the published work that systematically evaluated the effects of integrated health care. Integrated Health Care could be beneficial to reduce glycosylated hemoglobin, and control blood pressure in patients with diabetes and hypertension. The diabetes management based on integrated health care is a long-term care process, and it would be effective over time.

Introduction

Chronic diseases have an increasing influence on people's quality of life due to their long course and high incidence(1). It has one or more of the following characteristics: permanent organ injury, leave residual disability, it caused by nonreversible pathological alteration, require special training of the patient for rehabilitation, or may be expected to require a long period of supervision, observation, or care. Especially, ninety percent elder people have at least one chronic condition and most of them have two or more(2-5).

However, a long term illness will cause many physical and psychological problems for patients: reduced quality of life, emotional stress, increase in hospital days, more associated disease, heavier economic burden and higher mortality(1).

All the time, the health workers of tertiary hospital have high quality professional skills to take care of patients. However, the overloaded work of tertiary hospitals makes it impossible for them to provide comprehensive care directly for patients who discharged. With the development of medical model and the continuous improvement of national health literacy. The linkage between hospitals and communities has become a new direction of chronic disease management(6, 7). Medical Treatment Partnership System, also known as regional medical treatment partnership system. Referring to the community that integrates medical resources in a specific region, integrates medical institutions of different types and levels, and realizes the sharing of medical resources and the sharing of responsibilities and benefits within the region(8). The World Health Organization defines integrated health care as a new medical care model which integrates health promotion, disease prevention, diagnosis, treatment, disease-management, rehabilitation and palliative care services. Coordinating across the different levels and sites on care within and beyond the health sector to provide patients with comprehensive and continuous care(9, 10). It combines physicians, hospitals, and other medical services with a health plan to provide the complete spectrum of medical care for its customers. In a fully integrated system, the three key elements - physicians, hospital, and health plan membership - are in balance in terms of matching medical resources with the needs of customer and patients. Nowadays, integration can happen across the level of care (such as primary, secondary, or tertiary), and there are mainly three ways to carry out the integrated health care: hospital,

community and home care. Three kinds of model were designed: individual model, group-and disease-specific models, the population-based model. individual model has some intervention methods, such as case-management, individual care plans, patient-center medical home, personal health budgets; group-and disease-specific models included some kind of methods, such as chronic care model, models for elderly and frail, disease-specific; Kaiser Permanente, Veterans Health Administration, care in Basque country(11)as the population-based model to manage the chronic diseases(12). Varieties of strategies were used such as regular follow up by the care team; encourage patients to participate in effective programs; define roles and distribute tasks among team members; emphasize the patients central role in managing their health; share evidence based guidelines and information with patients; integrate specialist expertise and primary care; provide timely reminders for providers and patients; facilitate individual patient care planning; group visits and so on(13). (Figure 1)

Hypertension is currently defined as when systolic pressure is consistently greater than 140 mm Hg or when diastolic pressure is consistently 90 mmHg or more. The 2017 Global Burden of Disease (GBD) indicated that hypertension was an important public-health challenge worldwide and affect 1.56 billion individuals by 2025 with an increased global prevalence of 60%(14, 15). Diabetes is defined as a heterogeneous group of disorders characterized by hyperglycemia and glucose intolerance. It was responsible for 1.6 millions of all non-communicable chronic disease deaths respectively in 2016(16) . Both of them are belong to the major chronic diseases(17).

A growing number of randomized clinical trials about long term care for patients with hypertension and diabetes based on integrated health care have been published(18). Some studies have found positive effects of integrated health care on the management of diabetes and hypertension, while others have found negative results. In addition, some studies have only shown positive results in the short term due to the duration of the trial, and the result is still doubtful whether the efficacy can be maintained in a long term care.

New contribution

In this study, effects of integrated health care application in patients with hypertension and diabetes were studied. We undertook a meta-analysis of the published work that systematically evaluated the effects of integrated health care. Our results indicated that integrated health care can effectively reduce the glycosylated hemoglobin level of diabetic patients, and it had a significant effect on the reduction of blood pressure in patients with hypertension compare to the patients who received usual care. Thus, hypertension and diabetes management based on integrated health care should be used as a management method for the patients with hypertension and diabetes. We also found that the integrated health care in diabetes management is a long-term process, the longer the intervention time, the more significant the effect would be. Furthermore, we summarized kinds of strategies with high frequency in the intervention.

Methods

Study eligibility

The selected literature must meet the following inclusion criteria: 1) Research objects are patient who has been clearly diagnosed with hypertension and diabetes. 2) All the article should use the type of Integrated Health Care as Intervention methods. 4) The study type of article is randomized clinical trials. 5) Articles published in Chinese or English.

Articles would be excluded if any of the following conditions are met: (1) duplicated publications; (2) the full text of the article could not to be find.

Data sources

Searching GIN, NICE, Cochrane, JBI, CINAHL, EMBASE, PUBMED, Web of Science, SINOMED, CNKI (Chinese database), WANANG (Chinese database) and VIP (Chinese database). The searches were confined to articles published from the building date of database to 31/Oct/2020.

English searching term used in the foreign databases. Corresponding Chinese searching term was used during the literature search in Chinese databases. The example for searching in PubMed were as Table1.

Study selection

We Searched articles in both Chinese and foreign databases based on the searching terms. Remove duplicate literatures electronically between databases, and delete the literatures after reading the title and abstract. Then we read the full text to exclude articles that meet following criteria: duplicate publication, research object does not match, intervention does not match, non-randomized controlled trial, random method error, outcome indicators do not match, no data required for research provided. The remaining articles were included in quantitative analysis.

Data abstraction

Two researchers independently screened and retrieved the article based on the inclusion and exclusion criteria, it supervised by the third researcher who did not participate in the literature search. Firstly, they selected the one that satisfied the inclusion criteria by reading the titles of the retrieved articles. Secondly, they further read the abstract and full text based on the first step. The article will be select if it met the inclusion criteria: 1) Research objects are patient who have been clearly diagnosed with hypertension or diabetes. 2) All the article should use the type of Integrated Health Care as Intervention methods. 4) The study type of article is randomized clinical trials. 5) Articles published in Chinese or English. Finally, the remaining articles will be summarized and formed into a characteristic table according to the authors, journal, date, country, study type, study objects, experiment and control sample size, disease, intervention methods, outcome index, experiment duration and main conclusion.

Risk of bias assessment

The quality of each RCT was evaluated by the risk-of-bias assessment tool for RCT recommended by the Cochrane Handbook for Systematic Reviews of Interventions 5.0.2(19).

Meta-analysis was performed with RevMan5.3 software. Clinical heterogeneity was evaluated based on the inclusion and exclusion criteria in each study. The heterogeneity of the study design was assessed according to the content and completeness of the outcome indicators, duration of intervention, and randomization methods.

Data synthesis

Meta-analysis was performed on the organized and summarized outcome measurements from at least three to five articles. Since all of outcome (eg. blood pressure, glycosylated hemoglobin, body mass index) were continuous data, they were analyzed by the weighted mean difference. The 95% confidence interval (CI) was also calculated. A fixed-effect model was applied if the heterogeneity from multiple studies was small (consistency test had a $p > 0.05$ with $I2 \leq 50\%$). Otherwise, a random-effects model was adopted if there was high heterogeneity ($p < 0.05$, $I2 \geq 50\%$).

For the reason of the research topics, selection bias may exist in the articles that we included. At the same time, the positive results shown in most studies may have risk of selective reporting of outcomes, and it may tended to publication bias.

Results

Study selection and characteristics

After searching and repeated screening, sixteen articles(15, 20-34) were finally included. The detailed selection process has been shown in Figure 2. The baseline characteristics of the studies are listed separately in Table 2.

Methodological quality

Sixteen articles were included in the risk-of-bias assessment (Figure 3). Fifteen of the articles(15, 20-26, 28-34) used the random group design, one article(27) didn't elaborate on the random methods it used. Thirteen of them(15, 20-26, 28, 30-32, 34) have used effective methods to reduce the risk of allocation concealment, such as the use of opaque envelopes, undisclosed random number tables and so on. Eight articles(15, 21, 23, 24, 29-31, 34) have high risk in performance bias due to the particularity of intervention, and eight articles(15, 21-23, 27, 29-31) presented a blinding of data analysis and collection. All of the articles descripted the lost data and objects that were lost to follow-up.

Meta-analysis

There are 9 articles(20, 23-26, 29, 32-34) used glycated hemoglobin as outcome in the patients with diabetes. Glycosylated hemoglobin (HbA1c) is formed by a progressive, non-enzymatic reaction between glucose and hemoglobin within the erythrocytes(35). It is used as a clinic index to reflect the average blood glucose levels of the past 1-2 months(36), HbA1c is the primary outcome in these five articles. In addition, meta-analysis of glycated hemoglobin at 6 months(25, 26, 34) and 12 months(20, 24, 25, 32-34) were performed according to the different intervention duration.

Another 7 articles(15, 21, 22, 27, 28, 30, 31) are focused on hypertension, and the integrated health care as the main intervention to be used. All of them have the same index: blood pressure (systolic and diastolic blood pressure) and six(15, 21, 22, 27, 28, 31) have body mass index. Body mass index (BMI) is a classical index to assess the risk associate with hypertension(37). Blood pressure has been a major risk factor for heart disease in population(38), systolic and diastolic blood pressure as the primary outcome was measured in these articles.

Meta-analysis of integrated health care interventions on the patients with hypertension

Seven articles(15, 21, 22, 27, 28, 30, 31) reported patients' blood pressure after the integrated health care management intervention. Their results all showed a reduction in blood pressure from baseline in the intervention group. A random-effects model was used into the analysis of systolic blood pressure since there was high statistical heterogeneity (I^2=94%). It is reported that there is a statistical difference in systolic blood pressure between intervention group and control group (MD=-5.87; 95% Cl=-10.34, -1.40; P=0.01) (Figure 4).

A random-effects model was used into the analysis of diastolic blood pressure since there was high statistical heterogeneity (I^2=100%). The difference of diastolic blood pressure between the intervention group and the control group was also significant (MD=-13.53; 95% Cl=-22.58, -4.48; P=0.0003) (Figure 5).

Six articles(15, 21, 22, 27, 28, 31) reported patients' Body Mass Index after integrated health care-based management intervention. A random-effects model was used into the analysis of Body Mass Index since there was high statistical heterogeneity (I^2=55%). The results showed there is no significant difference between the intervention group and the control group (MD=-0.14; 95% Cl=-0.78, 1.19; P=0.49) (Figure 6).

Intervention after 12months were also compared (Figure 7; Figure 8; Figure 9):

Meta-analysis of integrated health care interventions on the patients with diabetes

Nine articles(20, 23-26, 29, 32-34) reported patients' glycated hemoglobin. A random-effects model was used into the analysis of glycated hemoglobin since there was high statistical heterogeneity (I^2=88%). The results didn't show the statistical deviation between intervention group and control group (MD=-0.30; 95% Cl=-1.03,0.43; P=0.00002) (Figure 10).

Intervention after 6 and 12months were also compared (Figure 11; Figure 12):

Discussion

Overall findings

We performed a meta-analysis of 16 randomized controlled trials involving 5,231 patients (2,593 with diabetes and 2,638 with hypertension) with intervention duration ranging from 6 to 24 months. According to the above results, we found that the chronic disease management model based on integrated medical care had a good overall control effect on the blood pressure of patients with hypertension and the HbA1c index of patients with diabetes, with statistical significance. However, we also found that there was no significant difference in BMI among hypertensive patients. In addition, we extracted the data of HbA1c after 6 months and 12 months' intervention (due to the limit intervention duration in hypertension, further intervention market analysis). It was found that there was no statistical significance in HbA1c after 6 months, but the outcome after 12 months of intervention was statistically significant.

Implications for Practice

Integrated health care has been carried out in many countries, and most of them achieved good results in the patients who need to control the primary outcome (39-41). Integrated health care provided more complete and comprehensive disease management for patients with hypertension and diabetes. In our reviews, we found several intervention methods with high frequency: evidence-based guidelines and information(42); timely reminder(43); regular follow up(44); individual care planning(45); patients participate in effective programs(42). Through evidence-based guidelines and information, patients could timely report their health problems to medical staff and get response such as the symptoms of retinopathy and diabetic foot. Regular follow up can effectively reduce the medical burden and patient's anxiety, and it helps medical staff to keep a long-term follow-up for the discharged patients. Individual care planning can encourage patients to participate the activities of the program. For example, giving the patient with different levels of exercise and dietary guidance according to the severity of hypertension.

The results of meta-analysis indicated that after using the integrated health care intervention method for 12 months, the patient's glycosylated hemoglobin was significantly improved compared to the 6-month intervention. This consequence is similar as the conclusion of the author(25) who found that the difference between intervention group and control group was statistically significant after 6 months rather than 3 months. Researcher(34) took a hospital-community integrated chronic disease management intervention on 100 patients with type 2 diabetes for 3,6 and 12 months. They found that glycosylated hemoglobin began to decrease when the intervention had been performed for 12 months. The results showed that diabetes management was more like a long-term process, the longer the intervention time, the more significant the effect would be. Thus, it could be believed that the diabetes management based on integrated health care is a long-term care process, and it would be effective over time.

Implications for Policy

Integrated care is a way to strengthen health systems in all countries, whether in low -, middle - or high-income countries(46). The improvement of the health system can improve patient outcomes, reduce the cost of medical care and increase patient satisfaction(47). Therefore, governments should take responsibility for improvement of the system.

Through our research, we believe that these suggestions may also help to the further improvement in the formulation of relevant policies :(1) the policy should take full account of the characteristics of chronic diseases and build a management mode of medical confederacy suitable for long-term operation. Based on our results alone, 12 months of intervention is better than 6 months of intervention in the management of patients with diabetes. (2) Adherence to the patient-centered management mode and integration of multiple projects seem to be more effective in improving the outcome of patients. (3) With the development of science and technology, the traditional medical system should be integrated with the Internet to maximize the interests of both society and patients

Strengths and Potential Limitations.

Author(48) figured out a greater effect of glycosylated hemoglobin in their meta-analysis on the sustained effectiveness of multicomponent integrated care in type 2 diabetes. Furthermore, several works(20, 25, 48) found that there was a significantly decrease in Serum LDL-cholesterol after intervention.

The results of meta-analysis revealed that integrated health care had a significant effect on the reduction of blood pressure in patients with hypertension. Author(49) found that the health education based on integrated care combined with hospitals, communities and families could significantly improve the blood pressure of patients. In their research on community hypertension management led by senior nurses of tertiary hospital, the author(50) found that the application of integrated health care can improve the blood pressure and self-management ability in patients with hypertension. Author(51) pointed out the hypertension management which used integrated health care as intervention could effectively improve the blood pressure.

The results of meta-analysis revealed that the difference of body mass index between intervention and control group were not statistical. We suppose this would be relative with inadequate diet, exercise and medication guidance. Researcher(15), in their meta-analysis, pointed out that giving patients with suggestion for decreasing caloric intake and increasing physical exercise helped to lose weight. At the same time, there is a close relationship between obesity and hypertension but it is not absolute. And

it may be the possible reason to explain the nondifference in body mass index between groups. Therefore, author(31) figured out that the improvement in body mass index might be associate with treatment adherence. Weight loss has been proposed as an effective, non-pharmacologic means for the primary prevention of hypertension(52). In future, researchers may be able to effectively reduce body mass index by improving diet, exercise, and medication guidance, extending intervention time, and improving treatment adherence.

Due to the varieties of strategies in integrated health care, there were a high heterogeneity in the meta-analysis. It was difficult to present blinding in intervention, so there is a certain risk of bias. This study focuses on the analysis of the objective index including HbA1c, BP and BMI instead of the patients'feeling. As the patient centered medical environment continue to be improved, patient's subjective feeling and disease control effect are both important.

Conclusion

Integrated health care can facilitate the connection among medical treatment, prevention and healthcare. It can be promoted the development of health services from 'disease-center treatment' to 'patient health-center care' and gradually realize the goal of providing people with comprehensive health care services. Integrated health care promoted the resource sharing. Tertiary hospitals share experience in disease diagnosis, treatment and rehabilitation with community hospitals. Medical staff in community hospitals received training and assessment by the health workers from tertiary hospitals, this model could release the burden of outpatient visits in tertiary hospitals and enhance the professional skills in medical staffs of community hospital and caregivers. Our study has verified the effectiveness of the integrated health care model in hypertension and diabetes, it provided the evidence for the model to manage the chronic disease.

Declarations

Ethics approval and consent to participate:

Not applicable

Consent for publication

Not applicable

Availability of data and materials

All data generated or analysed during this study are included in this published article

Competing interests:

The authors declare that they have no competing interests

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Authors' contributions:

Yan.Z and Yue.M wrote the main manuscript text.

Chongbo.Z and Jiahong.L prepared figures and tables.

Hong.J, Yanpei.C and Yafang.X analysis data.

All authors reviewed the manuscript.

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Tables

Table 1 Searching in PubMed

	Searches	Results[a]	Type
#1	Search: (((((((((Integrated Health Care Systems[Title])) OR (Home Care Services[Title])) OR (Hospital-Based Home Care Services[Title])) OR (Home Health Nursing[Title])) OR (Home Nursing[Title])) OR (Comprehensive Health Care[Title])) OR (Patient Care Planning[Title])) OR (Primary Health Care[Title])) OR (Progressive Patient Care[Title])	10057	ADVANCED
#2	Search: (((Chronic Diseases[Title]) OR (Hypertension[Title])) OR (Coronary Disease[Title])) OR (Diabetes Mellitus[Title])	239505	ADVANCED
#3	#1 AND #2	192	ADVANCED
a: Deadline to 31 October 2020.			

Table 2 Characteristics of included randomized controlled trial studies (n=16)

Authors, years	Participants	Intervention	Intervention providers	Outcome measures	Duration	Conclusion
Mattei da Silva, Â et al 2020, Brazil	94 patients with hypertension Experiment-group: 1)Age:49.4±6.4 2)Size:47 Control-group: 1)Age:49.2±8.4 2)Size:47	**Case management** Evidence-based guidelines and information; Timely reminder; Regular follow up; Individual care planning	Nurses	•SBP/DBP •BMI	12months	The intervention group's blood pressure and body mass index decreased significantly compared to the usual care group
Mika J et al 2002, Finland	587 patients with hypertension Experiment-group: 1)Age:54.4±10.1 2)Size:304 Control-group: 1)Age:54.2±9.9 2)Size:283	**Disease-specific:** Evidence-based guidelines and information; Regular follow up; Patients participate in effective programs	Physician and a nutritionist; Local public health nurses	•SBP/DBP •BMI	12months	Significant reductions after 1 year both in SBP and in DBP were in favor of the intervention group.
Ronald E et al 2017, America	138 patients with diabetes Experiment-group: 1)Age:53(Interquartile Range:47-61) 2)Size:71 Control-group: 1)Age:54(Interquartile Range:46-60) 2)Size:67	**Case management** Evidence-based guidelines and information; Timely reminder; Regular follow up; Individual care planning; Patients participate in effective programs	a board-certified family medicine physician and an endocrinologist; Local public health nurses	•HbA1c	12months	A significant decrease in HbA1c in intervention group.
Brian Hurwitz et al 1993, British	181 patients with diabetes Experiment-group: 1)Age:62.0±11.2 2)Size:89 Control-group: 1)Age:63.1±8.6	**Patient-centred medical home:** Evidence-based guidelines and information;	General practitioners; Clinic doctors	•HbA1c	6months	Decrease in HbA1c in intervention group.

	2)Size:92	Regular follow up; Timely reminder				
Gao Junling et al 2015, China	1204 patients with hypertension Experiment-group: 1)Age:66.0 ± 9.3 2)Size:600 Control-group: 1)Age:67.1 ± 10.3 2)Size:604	**Patient-centred medical home:** Evidence-based guidelines and information; Regular follow up; Individual care planning; Patients participate in effective programs	General practitioners	•SBP\DBP •BMI	12months	The average DBP decrease in the GV groups was more than that in the control groups significantly.
Rabia H et al 2010, Turkey	80 patients with hypertension Experiment-group: 1)Age:56.92±8.04 2)Size:40 Control-group: 1)Age:55.62±8.46 2)Size:40	**Patient-center medical home:** Evidence-based guidelines and information; Timely reminder; Regular follow up; Individual care planning; Patients participate in effective programs	Nurses	•SBP\DBP •BMI	12months	A significant decrease in BP in intervention group.
LI Yudong et al 2003, China	415 patients with diabetes Experiment-group: 1)Age:66.77±7.29 2)Size:215 Control-group: 1)Age:67.95±7.61 2)Size:200	**Disease-specific:** Evidence-based guidelines and information; Regular follow up; Timely reminder; Patients participate in effective programs; Group visit	staff in general hospital; staff in community hospital	•HbA1c	12months	A significant decrease in BP and HbA1c in intervention group.

HUANG Hualei et al 2019, China	222 patients with diabetes Experiment-group: 1)Age:68.3±5.1 2)Size:110 Control-group: 1)Age:68.2±5.4 2)Size:112	**Disease-specific:** Evidence-based guidelines and information; Regular follow up; Individual care planning; Patients participate in effective programs	specialist physician; general practitioner	•HbA1c	6months 12months	A significant decrease in BP in intervention group after 3、6、12 months. A significant decrease in HbA1c in intervention group after 6 months.
HAN Yun et al 2019, China	100 patients with diabetes Experiment-group:50 Control-group:50 Age:25~75	**Disease-specific:** Evidence-based guidelines and information; Regular follow up; Individual care planning	staff in general hospital; staff in community hospital	•HbA1c	6months 12months	A significant decrease in HbA1c in intervention group after 12 months.
Tiffany L. Gary et al 2009, America	488 patients with diabetes Experiment-group: 1)Age: 59 ± 11 2)Size:235 Control-group: 1)Age: 56 ± 11 2)Size:253	**Case management:** Evidence-based guidelines and information; Timely reminder; Regular follow up; Individual care planning; Patients participate in effective programs	Nurses; Community health worker	•HbA1c	24months	Those who had more visits with a CHW and NCM had a statistically significant decline in HbA1c level compared with the minimal group.
RUSSELL E.GLASGOW et al 2005, America	733 patients with diabetes Experiment-group: 1)Age: 62±1.4 2)Size:379 Control-group: 1)Age: 64±1.3 2)Size:354	**Disease-specific:** Evidence-based guidelines and information; Timely reminder; Regular follow up;	Primary care physician; care manager	•HbA1c	12months	Both conditions improved on measures of HbA1c, but there was not a significant difference between conditions.

		Individual care planning; Patients participate in effective programs				
GRETCHEN A.PIATT et al 2006, America	73 patients with diabetes Experiment-group: 1)Age:69.7±10.7 2)Size:27 Control-group: 1)Age: 68.6 ±8.6 2)Size:46	**Chronic Care Model:** Evidence-based guidelines and information; Timely reminder; Regular follow up; Individual care planning; Patients participate in effective programs	Physician; Nurses practitioners/physician assistantsBehaviorist	•HbA1c	12months	A marked decline in HbA1c was observed in the CCM group but not in the other groups.
Jing-Xia Kong et al 2018, China	258 patients with diabetes Experiment-group: 1)Age: 69.12 ± 10.54 2)Size:134 Control-group: 1)Age: 71.48 ± 8.79 2)Size:124	**Chronic Care Model:** Evidence-based guidelines and information; Timely reminder; Regular follow up; Individual care planning; Patients participate in effective programs	Physicians	•HbA1c	9months	The intervention group had a remarkable reduction in glycated hemoglobin.
G. Cicolini et al 2014 Italy	298 patients with hypertension Experiment-group: 1)Age: 59.8±15.0 2)Size:100 Control-group: 1)Age: 58.3±13.9 2)Size:98	**Disease-specific:** Evidence-based guidelines and information; Regular follow up; Patients participate in effective programs	Nurses	•SBP •DBP •BMI	6moths	The intervention group showed a statistically significant greater improvement in BMI and BP.
Erik J. A. J. Beune et al	139 patients with hypertension	**Disease-specific:**	Nurses	•SBP •DBP	6months	Contrary to SBP and BMI, effect

2014, Netherlands	Experiment-group: 1)Age: 53.3±10.2 2)Size:71 Control-group: 1)Age: 54.6±9.5 2)Size:68	Individual care planning; Regular follow up; Patients participate in effective programs		•BMI		of the intervention on between-group difference in DBP reduction is significant.
Alfonso Leiva et al 2014, Spain	208 patients with hypertension Experiment-group: 1)Age: 64.5±9.8 2)Size:103 Control-group: 1)Age: 66.7±11.7 2)Size:105	**Disease-specific:** Evidence-based guidelines and information; Timely reminder; Regular follow up; Family support; Patients participate in effective programs	Nurse	•SBP •DBP	12months	The systolic BP in the intervention group was 151.3 versus 153.7 in the control group (P=0.294). The diastolic BP did not differ between groups (83.4 versus 83.6).

*BP: Blood Pressure; SBP/DBP: Systolic Blood Pressure/Diastolic Blood Pressure; BMI: Body Mass Index; HbA1c: Glycated Hemoglobin; GLU: Fasting plasma glucose

Figures

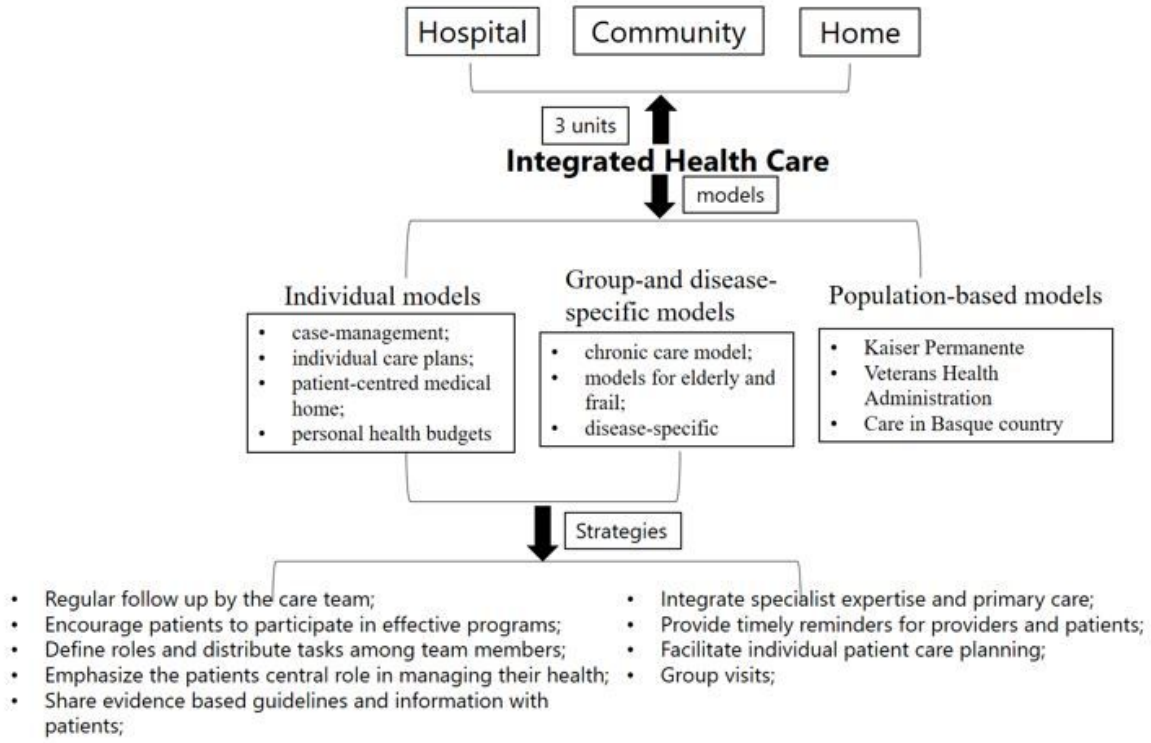


Figure 1

Strategies and ways in integrated health care

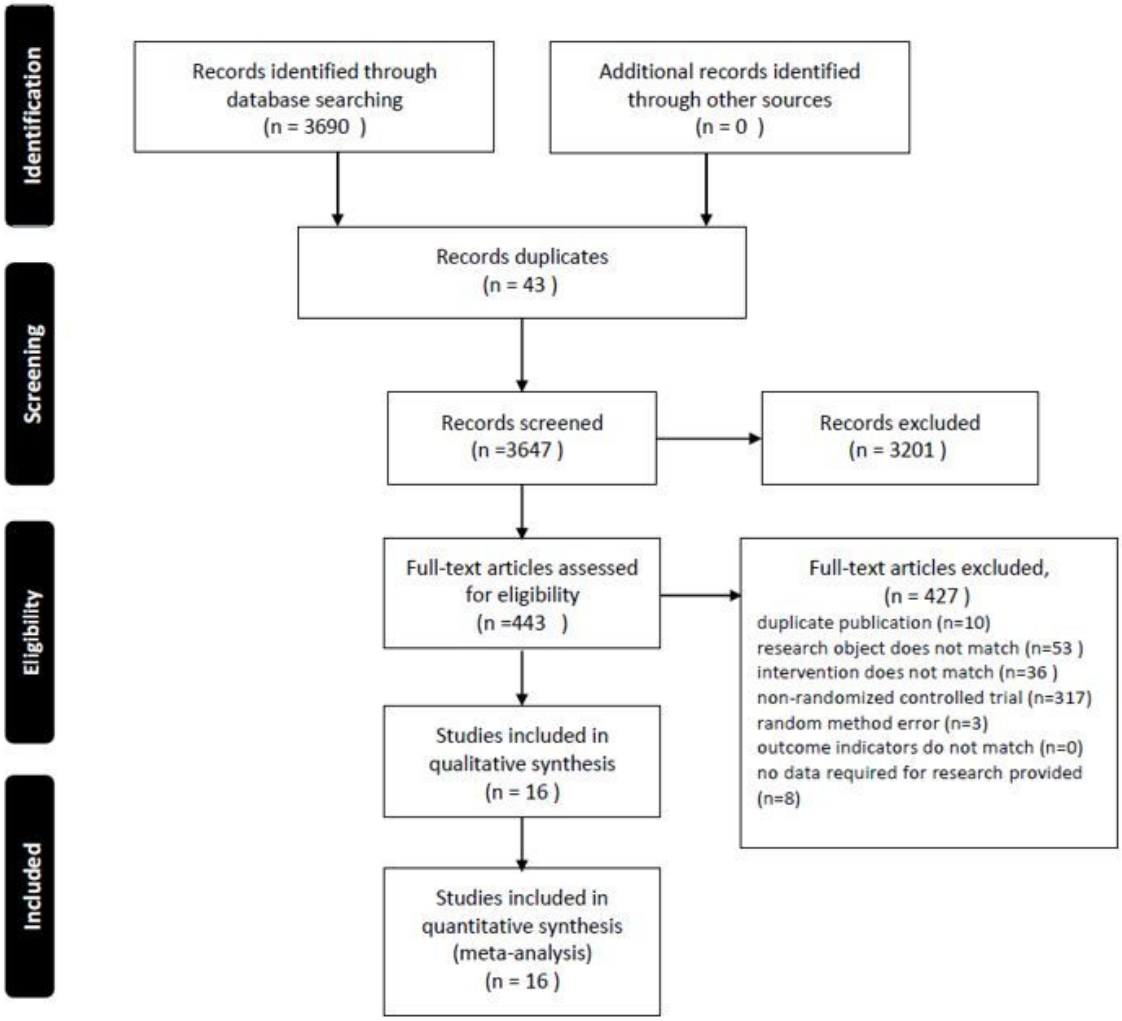
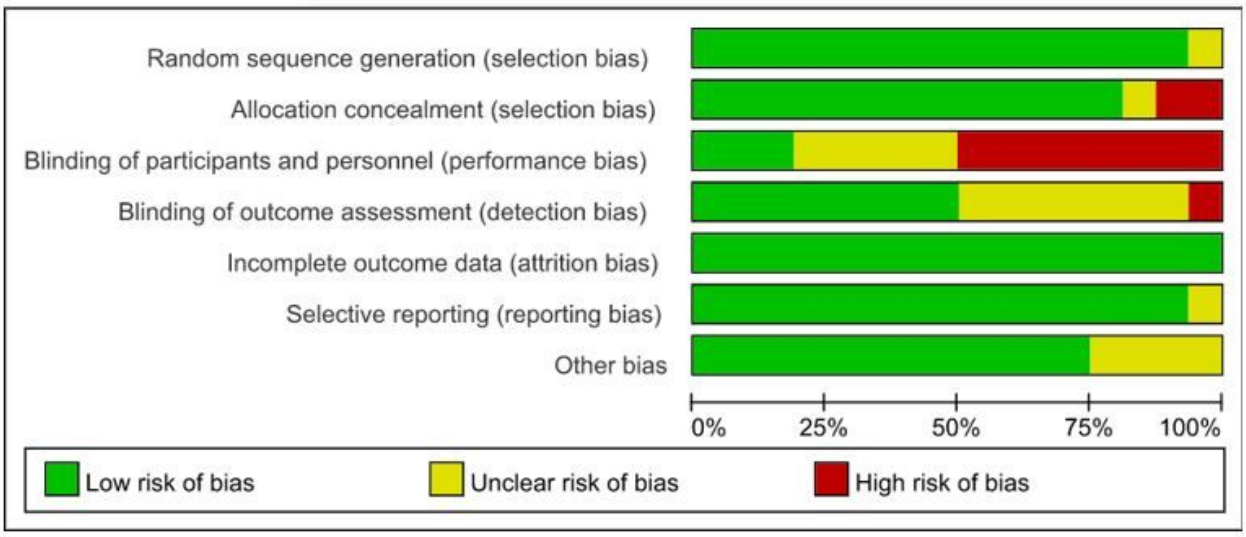


Figure 2

Flow of studies throughout the review



* green = low risk of bias, red = high risk of bias, yellow = unclear risk of bias

Figure 3

Bias of included randomized-controlled trial studies

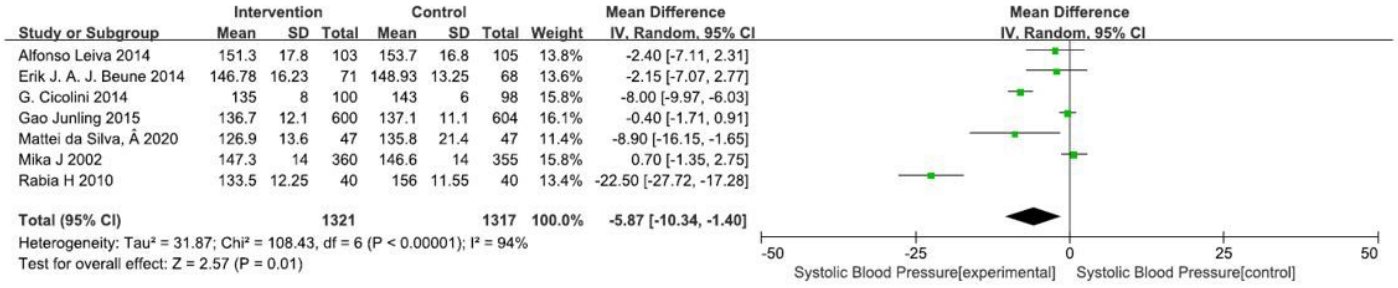


Figure 4

Effect sizes of comparable outcomes of systolic blood pressure after all months of intervention

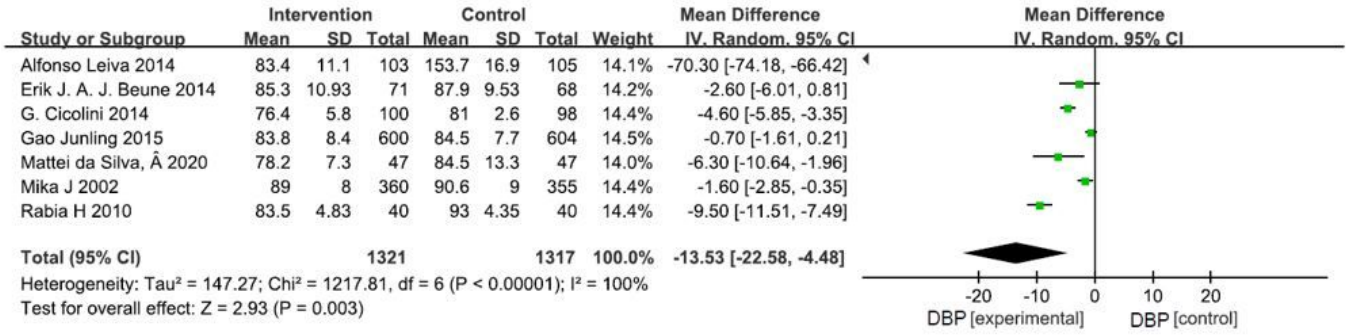


Figure 5

Effect sizes of comparable outcomes of diastolic blood pressure after all months of intervention

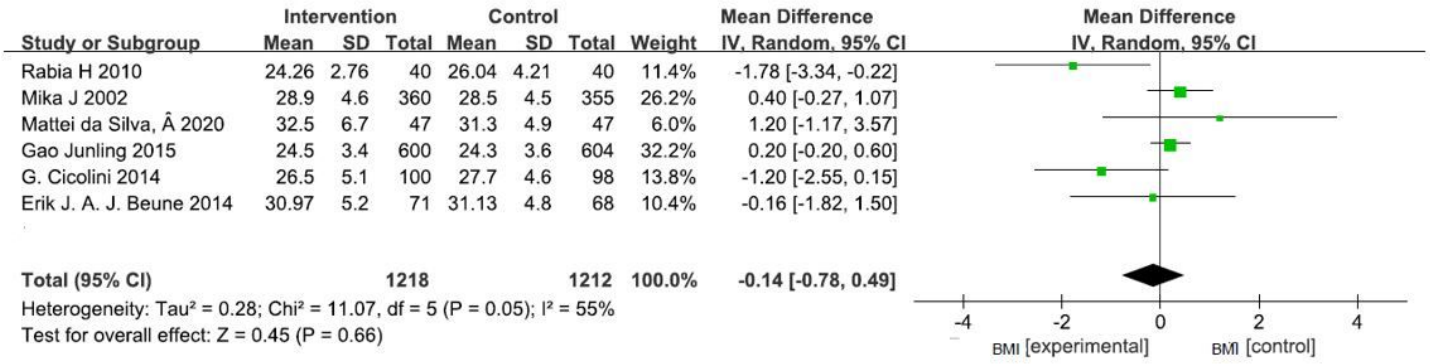


Figure 6

Effect sizes of comparable outcomes of body mass index after all months of intervention

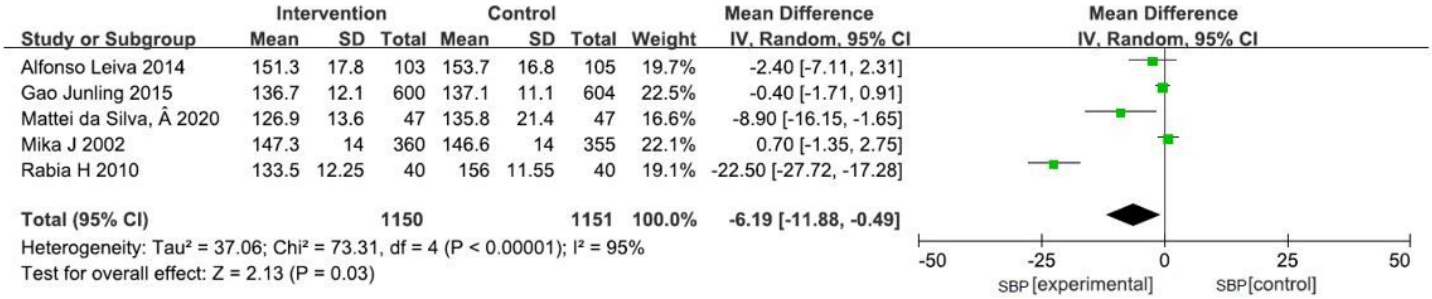


Figure 7

Effect sizes of comparable outcomes of systolic blood pressure after 12 months of intervention

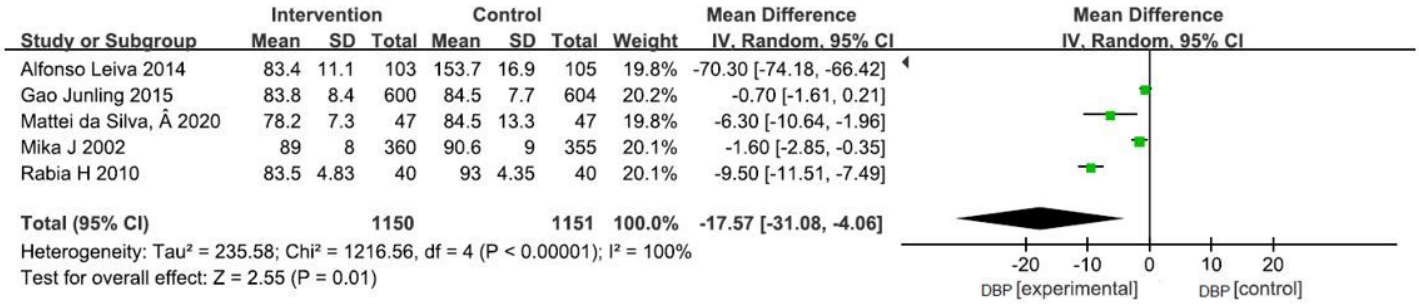


Figure 8

Effect sizes of comparable outcomes of diastolic blood pressure after 12 months of intervention

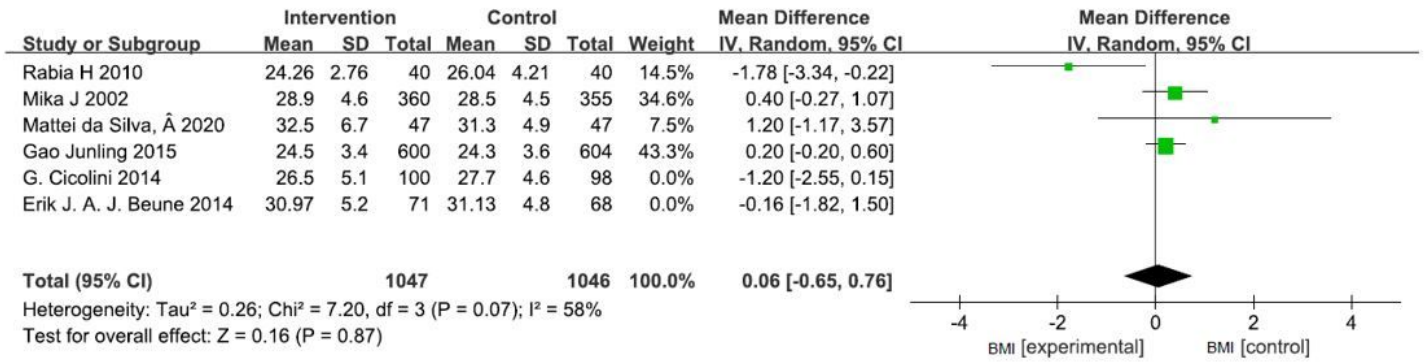


Figure 9

Effect sizes of comparable outcomes of body mass index after 12 months of intervention

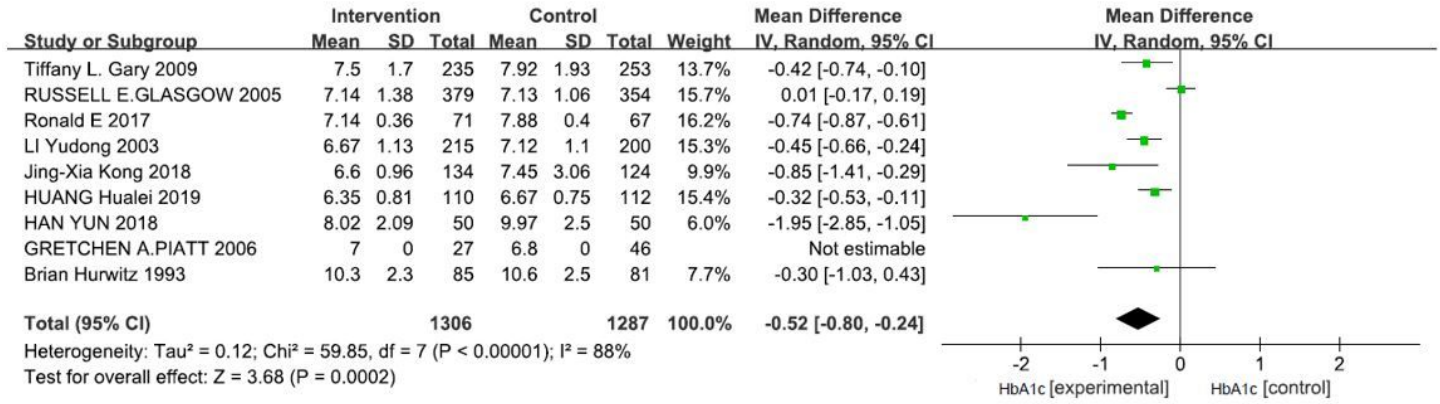


Figure 10

Effect sizes of comparable outcomes of glycated hemoglobin after all months of intervention

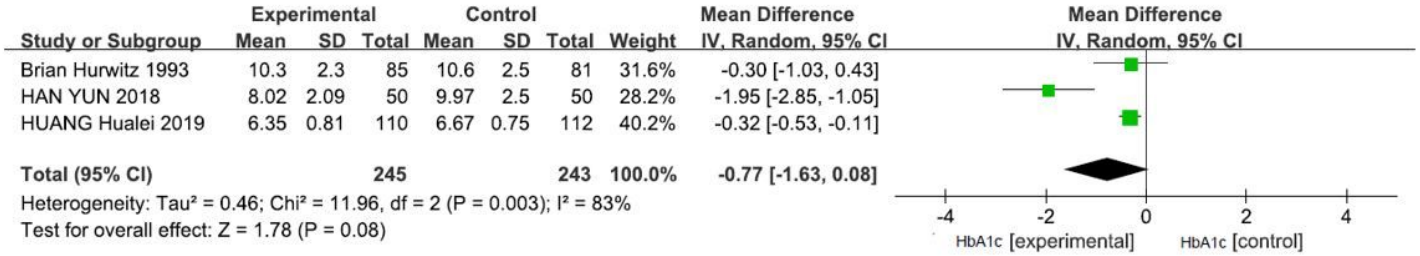


Figure 11

Effect sizes of comparable outcomes of glycated hemoglobin after 6 months of intervention

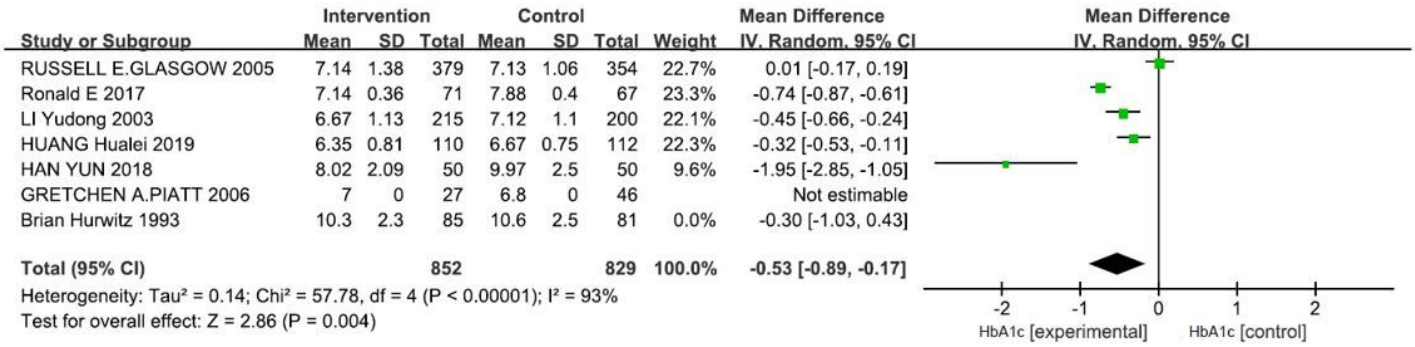


Figure 12

Effect sizes of comparable outcomes of glycated hemoglobin after 12 months of intervention