

Primary care role in detection and management of diabetes mellitus; systematic review

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Abstract

Background: Diabetic complications are a chronic and complex condition that can be delayed or prevented with early interventions and effective treatment. The interdisciplinary care interventions that endocrinologists play a major role in within the primary care team were the focus of this systematic study.

Method: The PRISMA reporting guidelines were followed for this systematic study. We searched Google Scholar, SCOPUS, EMBASE, CINAHL, MEDLINE, and CINAHL to locate all pertinent articles published between 2013 and 2019. Full text studies and research articles authored in English were included. The terms we used were diabetes mellitus, clinical outcome, multidisciplinary team, and integrated health care systems.

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Result: In this systematic analysis, we considered 5 studies with a total of 1809 patients. A clinical audit, an open controlled trial, a longitudinal cohort study, and two randomized controlled trials made up the studies. HbA1c, blood pressure, cholesterol, eGFR, weight, BMI, and albumin creatinine ratio are among the outcomes that are assessed.

Conclusion: This study shows that patients with diabetes mellitus can benefit from improved treatment when utilizing an integrated PHC and secondary care strategy as opposed to standard care, which can result in noticeable improvements in results.

Keywords: Primary Health Care; Diabetes Mellitus; Integrated Care; Diabetic Care; Outcome

1. Introduction

463 million individuals worldwide suffer with diabetes, making it a global health issue. An additional 374 million people are at an elevated risk of getting the disease (1). Globally, it is expected that by 2045, 700 million people would have diabetes [1]. Health expenditures are heavily impacted by diabetes; in 2019, 760 billion USD was spent globally on the disease; by 2045, that amount is predicted to rise to 845 billion USD (1,2). Diabetes is linked to worse health outcomes, greater healthcare expenses, and early death (1). It can also result in chronic complications.

Early interventions and appropriate treatment can postpone or avoid the emergence of complications in diabetes, a chronic and complicated illness. People with diabetes mellitus (DM) who have numerous comorbidities may benefit from integrated care, which unites organizations offering varying degrees of care and offers them consistent management by a integrative team over an extended period of time (3). The care process may become disorganized in the absence of integrated care (4). Diabetes integrated care is characterized by inter-professional coordination, patient-centered treatment tailored to the patient's multifaceted needs, and collaborative decision-making that enhances the patient experience (5). People with DM should be treated by a multidisciplinary team, according to a 1998 American Diabetes Association policy statement and an article from 1982 (6,7).

Since then, the efficacy of various diabetes treatment techniques has been investigated by a number of diabetic care programs. Nonetheless, the prevalence of diabetes is rising, and in order to treat the disease, specialized care must be integrated into PHC and community care settings. In most countries, this care has not yet been implemented systemically or within the healthcare system. Patients may be able to save money out of pocket when using integrated care models in nations where public health systems do not offer specialized consulting. Apart from the possible enhancement of therapeutic results, it has the ability to offer collaborative learning experiences for primary healthcare (PHC) providers, shorten hospital stays, and minimize redundant services (8–10).

In order to give a general overview of the potential benefits of integrated care for DM, including its potential to enhance clinical outcomes, and hospital admissions, this systematic review focused on multidisciplinary care interventions in which endocrinologists play a prominent role within the PHC team.

2. Method

For this systematic review, we adhered to the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) reporting standards (11). We looked through MEDLINE, CINAHL, SCOPUS, EMBASE, and Google Scholar to find all relevant publications that were released between 2013 and 2019. Included were research papers and full text studies that were written in English. Diabetes mellitus, clinical result, multidisciplinary team, and integrated health care systems were the terms we selected.

RCTs and intervention studies evaluating the efficacy of integrated diabetes care strategies were included. Adults with either type 1 or type 2 diabetes mellitus were the participants. Interventions required active participation from endocrinologists, with patient cases reviewed in combined consultations with endocrinologists, general practitioners, and other PHC providers. Changes in glycaemia over time, along with other important metrics like systolic and diastolic blood pressure (SBP and DBP), weight, total cholesterol, and BMI, and impact on hospital admissions, had to be the main outcomes of interest.

Two writers extracted data on the following topics: outcomes, citation, study design, age, diabetes type, sample size, length of study, care treatments, and outcome measures. The main result was the difference in HbA1c between the final follow-up and the baseline. We collected changes in blood cholesterol levels, weight, BMI, cost-effectiveness, hypoglycemia, SBP and DBP, and blood pressure as secondary outcomes.

3. Result

We included 5 studies in this systematic review (Fig 1) with a total of 1809 patients. Two of the studies were randomized controlled trial, one longitudinal cohort study, one clinical audit and one open controlled trial. Outcomes measured include; HbA1c, Cholesterol, Blood Pressure, estimated glomerular filtration rate (eGFR), Weight, BMI, and Albumin creatinine ratio (Table 1).

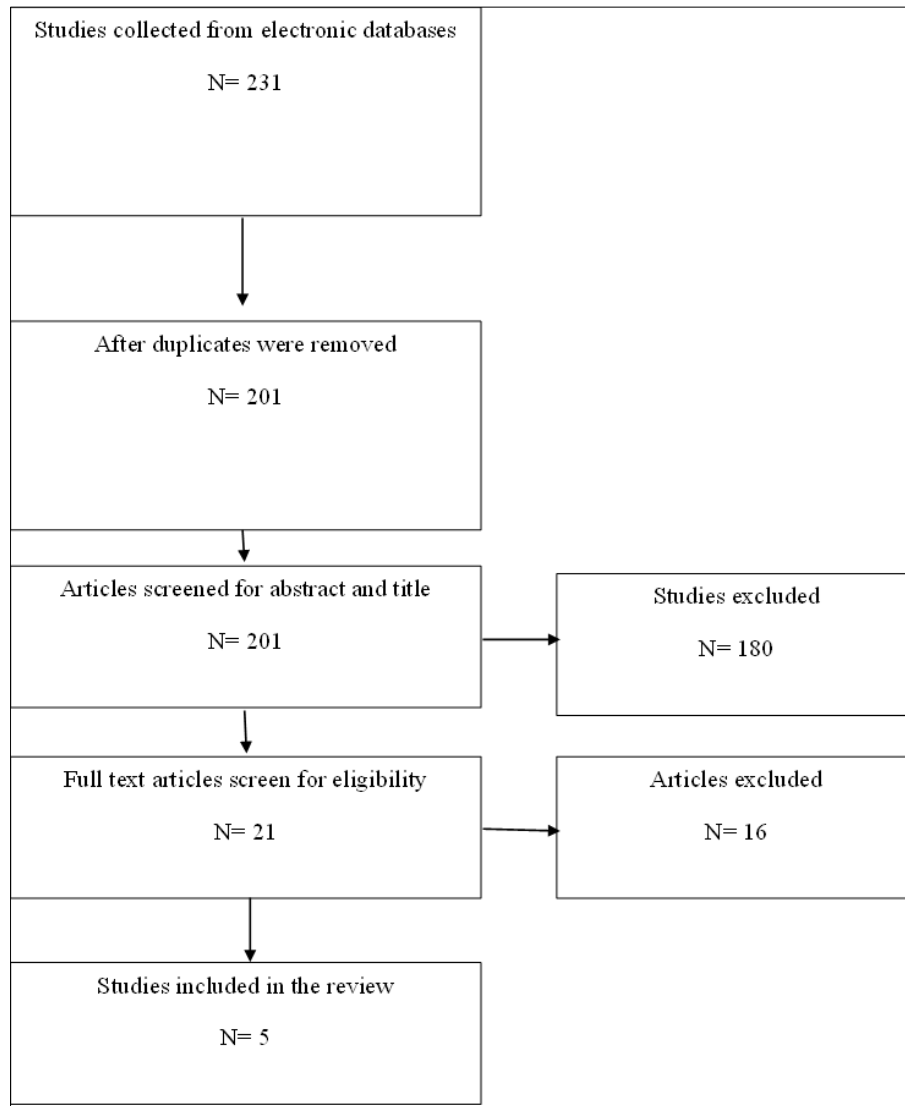


Figure 1 PRISMA consort chart of study selection

A collaborative patient consultation and interdisciplinary case discussion were conducted in the Meyerowitz et al. (2018) study. The BMI, HbA1c, and blood pressure reductions that were sustained after three years for patients were among the noteworthy improvements in patient management measures that the authors observed at the practice level. Furthermore, GPs and patients embraced the initiative well, the authors report.

The intervention group's expenses for PHC and community clinics were significantly higher than those of the hospital or for healthcare overall (Wilson et al., 2014). Patients in the intermediate diabetes care clinic (ICCD) were assessed and managed by a diabetologist and a specialized nurse. The odds ratio for achieving the primary result was 1.56 in the intervention group.

Table 1 Characteristics of the included studies

Citation	Study type	Intervention	Study population	Duration of study	Sample size	Outcome measures
Meyerowitz et al., 2018 (12)	Longitudinal cohort study	During patient visits, a multidisciplinary case discussion and collaborative patient consultation took place. A report and treatment plan were created after all participants reviewed and approved the management plan. A phone assistance line was given to general practitioners to help them with distant decision-making. Diabetes's duration was not stated.	Type 2 diabetes patients	3 years	n = 41	HbA1c, Cholesterol, Blood Pressure, eGFR, Weight.
Wilson et al., 2014 (13)	Cluster-randomized trial	In order to improve diabetes and cardiovascular risk factors, patients were evaluated and managed in the ICCD by a diabetologist and a specialized nurse. After that, they were returned back to their regular practices. Diabetes's duration was not stated.	Type 2 diabetes patients	18 months	Control group (n = 636) Intervention group (n = 644),	HbA1c, Cholesterol, Blood Pressure
Basudev et al., 2015 (14)	Randomized controlled trial	A "virtual clinic was the foundation for integrated cooperation between PHC and specialized diabetes teams when the patient was not present.	Type 2 diabetes patients	12 months	Control group (n = 88) Intervention group (n = 79)	HbA1c, Cholesterol, Blood Pressure, BMI, eGFR, weight
Atkinson et al., 2015 (15)	Clinical audit	The diabetes virtual clinic included the following elements: a methodical approach to case identification; a virtual clinic wherein cases (n = 15–20) were collaboratively discussed by the general practitioner (GP) and DVC teams to identify clinical and therapeutic needs, self-management needs, and the most suitable care provider; creation of a management plan; and a face-to-face meeting with the most suitable clinical team member to establish a mutually agreed-upon care plan. Diabetes's duration was not stated.	Type 1 and Type 2 diabetes mellitus	6 months	n = 73	HbA1c, Cholesterol, Blood Pressure, BMI, Albumin creatinine ratio, eGFR
Russell et al., 2013 (16)	Open controlled trial	During the first appointment, participants entered the Chronic Disease Management Service multidisciplinary clinic after a 45-minute thorough screening. After a quick assessment of the treatment plan with the endocrinologist, the GP Clinical Fellow co-consulted with the patient to determine the best course of action. Years of diabetes (years), mean (SD): 13.7 (10.2) for the control group, 12.8 (9.7) for the intervention group	Type 2 diabetes patients	12 months	control group (n = 121) Intervention group (n = 127),	HbA1c, Cholesterol, Blood Pressure, BMI, Serum creatinine, eGFR

A research by Basudev et al. (2015) When the patient was not present, a "virtual clinic served as the basis for integrated collaboration between specialized diabetes teams and PHC." The 12-month findings showed that the control group and the virtual clinic had clinically significant reductions in HbA1c of 10 and 8 mmol/mol, respectively, suggesting equivalence for glycaemic treatment. The virtual clinic group fared better than the intervention group in terms of blood pressure control, with a mean systolic blood pressure decline of 6–16 mmHg compared to an increase of 2–18 mmHg in the control group.

Atkinson et al. (2015) employed a rigorous approach to case identification in the diabetic virtual clinic. The intervention resulted in a statistically and clinically substantial improvement in HbA1c. It has also meant that fewer patients need referrals to experts in order to get PHC treatment. The intervention may prove to be a successful paradigm for integrated collaboration across primary and diabetic specialist care since it provides an opportunity for shared learning.

The mean HbA1c concentration decrease at 12 months was 0.8% in the intervention group and ~0.2% in the control group according to Russell et al. (2013). The percentage of patients in the intervention group increased from 21% to 42% in order to attain the < 7% HbA1c target; in the control group, this number increased by 1% to 39% of patients. The individuals in the intervention group showed substantial improvements in their total cholesterol and blood pressure when compared to those in the control group. The proportion of patients in the intervention group who met clinical objectives for the combined goals of LDL, BP, and HbA1c concentration was greater (Table 2).

Table 2 Main findings of the included studies

Citation	Main findings
Meyerowitz et al., 2018 (12)	The authors discovered notable advancements in patient management metrics at the practice level as well as in BMI, HbA1c, and blood pressure reductions that were maintained at three years for patients. Additionally, the program was well accepted by GPs and patients, according to the authors.
Wilson et al., 2014 (13)	In the intervention group, the odds ratio for reaching the primary result was 1.56. The intervention group's expenses for PHC and community clinics were much greater than those of the hospital or for healthcare as a whole.
Basudev et al., 2015 (14)	According to the 12-month results, the virtual clinic and control groups had clinically meaningful decreases in HbA1c of 8 and 10 mmol/mol, respectively, indicating equivalency for glycaemic management. In terms of blood pressure control, the virtual clinic group outperformed the intervention group, with a mean systolic blood pressure drop of 6–16 mmHg as opposed to an increase of 2–18 mmHg in the control group. The groups did not significantly vary in terms of weight, renal function, or cholesterol. Process metrics revealed that the group receiving virtual clinic therapy had a higher degree of therapy adjustment.
Atkinson et al., 2015 (15)	The HbA1c dropped by 8.3% after six months. With 57% of patients seeing a decrease in their HbA1c of $\geq 0.4\%$ and 85% of patients seeing improvements in their glycaemic management, the audit requirements were surpassed. The intervention improved HbA1c in a way that was both statistically and clinically significant. Additionally, it has meant that fewer people require referrals to specialists in order to receive treatment in PHC. By offering a chance for shared learning, the intervention may prove to be a successful model for integrated collaboration across PHC and diabetes specialty care.
Russell et al., 2013 (16)	At 12 months, the mean HbA1c concentration change was 0.8% in the intervention group and ~0.2% in the control group. In the intervention group, the proportion of patients reaching the < 7% HbA1c goal rose from 21% to 42%; in the control group, this number climbed by 1% to 39% of patients. When compared to patients in the control group, the intervention group's blood pressure and total cholesterol significantly improved. For the combined aim of HbA1c concentration, BP, and LDL, the intervention group's proportion of patients reaching clinical targets was higher.

4. Discussion

In this study we aimed to give a general overview of the potential benefits of integrated care for DM, including enhanced clinical outcomes, reduced hospital admission rates, and cost-effectiveness, particularly in integrated care programs with endocrinologists actively participating in the PMC team. When compared to a tertiary DM outpatient clinic, we

found that a community-based, integrated approach of complicated diabetes care, provided by GB with advanced training, offered advantages in both the clinical and procedural domains. The DVC improved HbA1c in a way that was both statistically and clinically meaningful. Additionally, it has meant that fewer people require referrals to specialists in order to receive treatment in PHC. Glycaemic control improved in a way that was clinically significant according to the virtual clinic model. Diabetes patients' aim attainment can be enhanced by intermediate care clinics.

Patients participated in a combined consultation with the multidisciplinary team in certain trials. A treatment plan and report were created after all participants examined and approved the management plan collectively (12,16). Only one study in this study covered type 1 and type 2 DM; the majority of the included research concentrated on type 2 DM. The major issue in managing type 1 DM is still controlling bouts of hypoglycemia and hyperglycemia in individuals with the disease, even with the introduction of newer technology. The management of type 1 DM is primarily the responsibility of specialists, and collaboration between PHC and secondary care is still critical to the comprehensive care of these patients. GPs do not always have to be experts in treating DM and its complications, thus interdisciplinary input offers a chance for shared learning and decision-making.

An endocrinologist's role in a patient's DM care was either passive, minimal, or nonexistent in earlier systematic studies that examined a variety of therapies. A systematic review conducted by a healthcare professional evaluated the impact of treatments on DM management in patients. The influence on patient outcomes was not as clear-cut because these were not frequently evaluated (17). Another systematic review concentrated on various integrated care intervention types and their results; most strategies encompassed every element of Chronic Care Model (18) with little to no involvement from endocrinologists. A limited number of included publications reported on patient outcome measures, which were found to have favorable effects on outcome measures and to enhance process measures (18).

The impact of integrated care, which includes e-health and peer support, on outcomes in patients with type 2 DM was examined in a meta-analysis, which found improvements in outcomes. However, endocrinologists' involvement in patient care within a multidisciplinary team was either minimal, nonexistent, or passive (19). A different meta-analysis assessed the outcomes of patients with uncontrolled DM who were under the care of a multidisciplinary team of healthcare professionals. The pooled studies indicated that the patients' blood pressure and systolic blood glucose were improved, with the HbA1c being reduced by 0.55%, the SBP being reduced by 4.89 mmHg, and the DBP being reduced by 2.3 mmHg (20).

5. Conclusion

This study demonstrates that, in comparison to usual care, patients with DM can receive better treatment when using an integrated PHC and secondary care approach, leading to notable improvements in outcomes. When specialist and general practitioner collaborates to treat patients with type 1 and type 2 DM in an underfunded environment, such strategies may prove beneficial. There are opportunities for more research into more diverse integrated DM care approaches, including "tools" to enhance communication.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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