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The effects of multidisciplinary collaborative care on cardiovascular risk factors among patients with diabetes in primary care settings: A systematic review and meta-analysis

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ABSTRACT

Background: Multidisciplinary collaborative care has been widely recommended as an effective strategy for managing diabetes; however, the cardiovascular risk factors of patients with diabetes are often inadequately managed in primary care settings. This study aimed to assess the effect of multidisciplinary collaboration on cardiovascular risk factors among patients with diabetes in primary care settings.

Method: Five databases (i.e., Medline, Embase, CINAHL, SCOPUS and CENTRAL) were systematically searched to retrieve randomised controlled trials. Studies were eligible for inclusion if the interventions included a multidisciplinary team with professionals from at least three health disciplines and focused on patients with diabetes in primary care settings. A random-effects model was used to calculate the pooled effects.

Results: In total, 19 studies comprising 6538 patients were included in the meta-analysis. The results showed that compared with usual care, multidisciplinary collaborative care significantly reduced cardiovascular risk factors, including mean systolic blood pressure (-3.27 mm Hg, 95 % confidence interval [CI]: -4.72 to -1.82, p < 0.01), diastolic blood pressure (-1.4 mm Hg, 95 % CI: -2.32 to -0.47, p < 0.01), glycated haemoglobin (<0.06, 95 % CI: -0.06 to 0.16, p < 0.01), low-density lipoprotein (-0.16 mmol/L, 95 % CI: -0.26 to -0.06, p < 0.01) and high-density lipoprotein (0.06 mmol/L, 95 % CI: 0.00-0.12, p < 0.05). The subgroup analysis showed multidisciplinary collaboration was more effective in reducing cardiovascular risk factors when it comprised team members from a number of different disciplines, combined pharmacological and non-pharmacological components, included both face-to-face and remote interactions and was implemented in high-income countries.

Conclusion: Multidisciplinary collaborative care is associated with reduced cardiovascular risk factors among patients with diabetes in primary care. Further studies need to be conducted to determine the optimal team composition.

1. Introduction

Type 2 Diabetes is a major global public health crisis that affects 8.8 % of the world’s population and is responsible for 6.7 million deaths [1]. It is estimated that 537 million adults were living with diabetes worldwide in 2021, and it has been projected that its prevalence will rise to 783 million by 2045 [1]. Patients with diabetes have a two- to four-fold increased risk of cardiovascular diseases (CVDs) [2], which places a considerable strain on primary healthcare system. Given that CVD is a leading cause of morbidity and mortality in individuals with diabetes, international guidelines strongly recommend the optimal control of cardiovascular risk factors to reduce the incidence of cardiovascular complications and premature death [3,4]. Despite guidelines for the strict control of cardiovascular risk factors, there is a
significant gap in the management of cardiovascular risk factors among patients with diabetes, particularly in primary healthcare systems [4]. Patients with diabetes often have complex care needs in managing multifactorial risk factors [5]. These risk factors include physical inactivity, unhealthy diet, alcohol consumption, smoking and medication non-adherence [6]. With rising care demands, physician-centred care models alone are often unable to address all care needs. In response to this care burden, innovative models of care delivery, such as the chronic care model and integrated care model, have been recommended in primary care [7,8]. A key feature of these care models is the incorporation of a multidisciplinary team (MDT) to deliver care services using the expertise of multiple health professionals. It is found that approximately 77% of preventive care and 47% of chronic care could be effectively delegated to team members other than doctors [9]. To meet the specific care needs of patients, there has been a shift towards incorporating MDTs into primary care to provide high-quality integrated care that is patient-centred [10]. Evidence suggests that well-organised MDTs can optimise the care outcomes of patients, increase patient satisfaction and reduce doctor burnout [11].

There is a growing body of literature on the effects of multidisciplinary collaborative care on diabetes management; however, certain limitations exist. A previous meta-analysis found that multidisciplinary collaborative care improved self-care capability, quality of life and satisfaction among patients with diabetes. However, the review only focused on subjective patient-reported outcomes and did not examine objective clinical outcomes such as cardiovascular risk factors [12]. Another review by Siaw only assessed the effects of multidisciplinary teams from various levels of health systems and did not specifically evaluate the team in the primary care settings [13]. Further, a recent meta-analysis on multidisciplinary care focused on patients with a broad range of chronic diseases and was not restricted to patients with diabetes [14]. Thus, the direct effects of multidisciplinary collaborative care on cardiovascular risk factors of diabetes in primary care remains unclear. To address the gap in the literature, we conducted a systematic review to examine whether a primary care-based multidisciplinary collaboration improves the management of cardiovascular risk factors in patients with diabetes.

2. Methods

This systematic review and meta-analysis was conducted and reported according to the criteria of the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) [15] and the Cochrane Handbook for Systematic Reviews of Interventions version 6.3 [16]. The review was registered in PROSPERO (CRD42023452679).

2.1. Search strategy

Five electronic databases (i.e., MEDLINE, CINAHL, CENTRAL, EMBASE and SCOPUS) were searched to retrieve relevant articles published from January 1995 to September 2023. The date of January 1995 was chosen because it was not until 1995 before multidisciplinary care became an increasingly important focus of attention in medical literature. Using Jan 1995 as the starting year of database search is consistent with the previous reviews that examined the effects of MDT in various diseases [17–19]. A combination of search terms, including ‘diabetes’, ‘multidisciplinary’, ‘primary care’ and ‘randomised controlled trial’, were used to search the databases. The detailed search strategies are shown in Supplementary table 1.

2.2. Inclusion and exclusion criteria

Studies were included in the review if they met the following criteria: [1] examined adult patients with type 2 diabetes; [2] evaluated an intervention implemented by a MDT, composed of professionals from at least three health disciplines; [3] had been conducted in primary care settings; [4] measured and reported on at least one of the following outcomes: glycated haemoglobin (HbA1c), fasting blood glucose (FBG) and cardiovascular risk factors, including systolic blood pressure (SBP), diastolic blood pressure (DBP), low-density lipoprotein (LDL), high-density lipoprotein (HDL), and total cholesterol (TC); [5] used a randomised controlled trial study design; and [6] had been published in the English language.

2.3. Study selection and data extraction

Two reviewers (QT and SLL) independently screened and excluded studies by reviewing the titles and abstracts of the articles. The full texts of the remaining articles were assessed according to the inclusion criteria. References from the retrieved articles were manually searched. Any discrepancies were resolved by discussion with a third assessor (NH).

The data extraction was performed independently by two assessors (QT and SLL) in accordance with a standardised data extraction form. The following data were extracted: author/s, year, country, design, age, sex, setting, population, team size, team composition, intervention characteristics and intervention length.

2.4. Risk of bias assessment


2.5. Statistical analysis

All the meta-analyses were performed using the Comprehensive Meta Analysis version 4.0. Random-effect models were used to calculate the pooled-effect estimates. The I² statistic was calculated to assess the heterogeneity among the studies. According to the Cochrane Handbook recommendation, an I² of 0%–40%, 30%–60%, 50%–90% and 75%–100% indicated important, moderate, substantial and considerable heterogeneity respectively. The pooled mean difference (MD) with 95% confidence intervals (CI) were calculated to produce an overall estimate of the effect. When a study reported effect estimates for an outcome at multiple timepoints, we selected the outcome at the longest follow-up timepoint.

A leave-one-out sensitivity analysis was performed to assess the influence of each study on the pooled estimate and the robustness of our findings. Publication bias was assessed by a visual inspection of funnel plots and Egger’s test. A two-tailed p value < 0.05 was considered statistically significant.

Given the highly diverse nature of the studies included, four prespecified subgroup analyses were performed to explore the source of heterogeneity. The influences of the following moderators were examined: number of team members (four or more members versus three members), countries (high-versus low- and middle-income countries), intervention components (combined non-pharmacological and pharmacological interventions versus either approach alone), delivery method (combination of face-to-face and remote delivery versus either approach alone).

2.6. Certainty of evidence

The certainty of the evidence was assessed using the Grading of Recommendations Assessment, Development and Evaluation (GRADE). Based on the five GRADE considerations (i.e., methodological quality, consistency of effect, imprecision, indirectness and publication bias), we
justified all decisions to downgrade the evidence quality of each outcome (Supplementary table 2).

3. Results

3.1. Study selection

The PRISMA flowchart for study selection is presented in Fig. 1. In total, 2670 nonduplicate publications were identified by our database searches and grey literature searches. Of these records, 138 were screened for the full-text review after the screening of title and abstract. Finally, 19 eligible studies were included in the meta-analysis [20–38].

3.2. Study characteristics

The demographic characteristics of the patients are summarised in Table 1. The included studies were conducted in 10 countries, including the United States (n = 8), the UK (n = 2), Canada (n = 2), Singapore (n = 2), Saudi Arabia (n = 1), Australia (n = 1), Malaysia (n = 1), China (n = 1) and Israel (n = 1). Overall, 6538 patients (3627 in the intervention group and 2901 in the control group) were enrolled in the 19 studies. The mean age of participants was 59.6 years. Male patients comprised 53.4% of the total study population. The mean HbA1c of patients with diabetes at the baseline was 8.56%.

Details of intervention characteristics are presented in Table 2. Most (68%) of the interventions involved professionals from four or more different disciplines rather than small teams of professionals from only three different disciplines. The team composition varied widely from the number of professionals involved to the types of professions included. In general, teams were composed of general practitioners, nurses, allied health professionals (e.g., dietitians, pharmacists and psychologists) and social workers; few studies had the same team composition. Nurse (18/19) was the most commonly represented professional in the intervention team, followed by primary care physician (15/19), dietitian (11/19) and pharmacist (10/19).

All the studies delivered complex multicomponent collaborative care and used various combinations of multifactorial interventions. Common components included health education and counselling (95%, 18/19), improvement in self-care capability to promote healthy diet and lifestyle (95%, 18/19), medication review and adjustment (74%, 14/19), goal setting and action planning (63%, 12/19) and the continuous monitoring of clinical outcomes (63%, 12/19). Among the studies, 14 applied both non-pharmacological lifestyle interventions and pharmacological interventions to manage patients. These interventions were delivered face-to-face, remotely (e.g., by telephone) or by a combination of both. Eight studies integrated digital health interventions into collaborative care. To facilitate the effective implementation of interventions, ten studies provided training for team members.

3.3. Quality assessment

The quality of the included studies was low. Eight studies had a high
risk of bias and 11 studies had an unclear risk of bias. Random sequence generation and allocation concealment were described adequately in 13 and nine studies, respectively. Due to the nature of the MDT interventions, it was difficult to blind participants, which led to a high risk of performance bias in all studies. Six studies adequately described the interventions, it was difficult to blind participants, which led to a high risk of performance bias in all studies. Six studies adequately described the binding of outcome assessment. Only three studies had a high risk of attrition bias. Fourteen studies had a low risk of selective reporting, as they reported all expected outcomes in accordance with the protocol or trial registration. The risk of bias summary and graph are shown in Fig. 2 and Fig. 3, respectively.

3.4. Data synthesis

3.4.1. HbA1c and FBG

The meta-analysis showed that multidisciplinary collaborative care resulted in a significant reduction of HbA1c compared with the control group (MD: −0.42, 95 % CI: −0.59 to −0.25, p < 0.01; I² = 63.68 %; 18 studies, 6302 participants; very low-certainty evidence) (Fig. 4). Further, there was a borderline significant reduction in FBG in favour of multidisciplinary collaborative care (MD: −0.7, 95 % CI: −1.5 to −0.1, p = 0.09; I² = 79.39 %; 3 studies, 1014 participants; very low-certainty evidence).

3.4.2. SBP and DBP

The use of multidisciplinary collaboration resulted in a significant reduction of SBP (MD: −3.27 mmHg, 95 % CI: −4.72 to −1.82, p < 0.01; I² = 58.7 %; 16 studies, 5881 participants; very low-certainty evidence) and DBP (MD: −1.4 mmHg, 95 % CI: −2.32 to −0.47, p < 0.01; I² = 67.03 %; 11 studies, 4992 participants; low-certainty evidence) compared to usual care (Fig. 5).

3.4.3. LDL, HDL and TC

The meta-analysis revealed that there was a significant reduction in LDL (MD: −0.16, 95 % CI: −0.26 to −0.06, p < 0.01; I² = 50.06 %; 12 studies, 3182 participants; low-certainty evidence) and HDL (MD: 0.06 mmol/L, 95 % CI: 0.00–0.12, p = 0.04; I² = 43.71 %; 5 studies, 1144 participants; low-certainty evidence) in favour of multidisciplinary collaborative care (Fig. 6). Further, the intervention showed a marginally positive effect on TC (MD: −0.06 mmol/L, 95 % CI: −0.16–0.03, p = 0.19; I²= 26.58 %; 7 studies, 4149 participants; very low-certainty evidence).

3.5. Subgroup analysis

The subgroup analysis showed multidisciplinary collaboration was more effective in reducing cardiovascular risk factors when it incorporated a greater number of members (i.e., four or more members), combined pharmacological and non-pharmacological components, included both face-to-face and remote interactions and was implemented in high-income countries. Detailed results can be found in Supplementary table 3.

3.6. Publication bias and sensitivity analysis

Based on a visual inspection of the funnel plot and Egger’s regression test, there was no evidence of publication bias, except in relation to HbA1c, SBP and TC, for which there was a slight asymmetry in the funnel plot, and the level of statistical significance (Egger p < 0.05) was reached based on Egger’s test (Supplementary Fig. 1). Further, no single study in this meta-analysis was found to overly influence the results in the one-study-removed analyses, indicating that the results were robust.

4. Discussion

This is the first systematic review and meta-analysis of the effects of multidisciplinary collaboration involving at least three health professionals from different disciplines on the cardiovascular risk factors of diabetes in primary care settings. Our meta-analysis provided evidence that multidisciplinary collaborative care produced favourable changes in cardiovascular risk factors, leading to a mean reduction of 0.42 % in HbA1c, 3.27 mm Hg in SBP, 1.4 mm Hg in DBP and 0.16 mmol/L in LDL and an improvement of 0.06 mmol/L in HDL. The United Kingdom Prospective Diabetes Study revealed that each 1 % decrease in HbA1c was associated with a 35 % reduction in microvascular complications, a 25 % reduction in diabetes-related mortality, an 18 % reduction in myocardial infarction, and a 7 % reduction in all-cause mortality [39]. In addition, a recent meta-analysis of 21 clinical trials showed that each 1 mmol/L reduction in LDL was associated with a relative risk reduction in vascular events of 29 % after 7 years follow-up [40]. Therefore, the 0.42 % reduction in HbA1c and 0.16 mmol/L reduction in LDL found in our study may imply a significant reduction in CVD risk.

The beneficial effects on the outcomes found in the review show the importance of integrating multiple disciplines to comprehensively manage patients with diabetes in primary care. A collaborative practising environment contributes to the optimal use of the skills, knowledge and experience of each team member in managing various aspects...
Table 2: Characteristics of included studies.

<table>
<thead>
<tr>
<th>Study</th>
<th>Number of team members</th>
<th>Team composition</th>
<th>Intervention components</th>
<th>Training for team member</th>
<th>Delivery method (face-to-face; remote or both)</th>
<th>Team functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bellary  2008</td>
<td>4</td>
<td>Practice nurse; GP; diabetes-specialist nurse; link worker</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>✓</td>
<td>Face-to-face</td>
<td>Shared medical appointments/group visits</td>
</tr>
<tr>
<td>Berry 2016</td>
<td>6</td>
<td>Nurse; dietitian; GP; community health center director; nurse educator; exercise educator</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>✓</td>
<td>Face-to-face</td>
<td>Shared medical appointments/group visits</td>
</tr>
<tr>
<td>Browning 2016</td>
<td>3</td>
<td>Nurse; GP; psychologist</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>✓</td>
<td>Both</td>
<td>Joint group educational sessions</td>
</tr>
<tr>
<td>Chwastiak 2018</td>
<td>3</td>
<td>Nurse; GP; psychiatrist</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>✓</td>
<td>Both</td>
<td>Joint group educational sessions</td>
</tr>
<tr>
<td>Cohen 2011</td>
<td>4</td>
<td>Nurse; dietitian; pharmacist; physical therapist</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>✓</td>
<td>Face-to-face</td>
<td>Joint group educational sessions</td>
</tr>
<tr>
<td>Crowley 2022</td>
<td>6</td>
<td>Nurse; dietitian; pharmacist; GP; psychiatrist; medication manager</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓</td>
<td>Both</td>
<td>Telehealth (phone encounter)</td>
</tr>
<tr>
<td>Edelman 2010</td>
<td>4</td>
<td>Nurse; pharmacist; GP; diabetes educator</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>✓</td>
<td>Both</td>
<td>Shared medical appointments/group visits</td>
</tr>
<tr>
<td>Lum 2022</td>
<td>4</td>
<td>Nurse; dietitian; pharmacist; GP</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>✓</td>
<td>Both</td>
<td>Shared medical appointments/group visits</td>
</tr>
<tr>
<td>Maislos 2004</td>
<td>3</td>
<td>Dietitian; nurse educator; GP</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>✓</td>
<td>Face-to-face</td>
<td>Shared medical appointments/group visits</td>
</tr>
<tr>
<td>McLean 2008</td>
<td>3</td>
<td>Nurse; pharmacist; GP</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>✓</td>
<td>Face-to-face</td>
<td>Shared medical appointments/group visits</td>
</tr>
<tr>
<td>Naki 2019</td>
<td>5</td>
<td>Nurse; pharmacist; GP; community social worker; psychologist</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>✓</td>
<td>Remote</td>
<td>Joint group educational sessions</td>
</tr>
<tr>
<td>Ramli 2016</td>
<td>6</td>
<td>Nurse; dietitian; pharmacist; GP; medical officer; medical assistant</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>✓</td>
<td>Face-to-face</td>
<td>Joint group educational sessions</td>
</tr>
<tr>
<td>Russell 2019</td>
<td>3</td>
<td>GP; endocrinologist nurse educator</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>✓</td>
<td>Face-to-face</td>
<td>Shared medical appointments and group visits</td>
</tr>
</tbody>
</table>

(continued on next page)
<table>
<thead>
<tr>
<th>Study</th>
<th>Number of team members</th>
<th>Team composition</th>
<th>Intervention components</th>
<th>Training for team member</th>
<th>Delivery method (face-to-face; remote or both)</th>
<th>Team functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Siaw 2017</td>
<td>4</td>
<td>Dietitian; pharmacist; GP; nurse educator</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>✓</td>
<td>Both</td>
<td>Shared medical appointments and group visits; joint group educational sessions; disease management system (shared electronic health record; wireless uploading of HbA1c; disease report; treatment record; online messaging with team and patients)</td>
</tr>
<tr>
<td>Talavera 2021</td>
<td>4</td>
<td>GP; community social worker; behavioural health provider; medical provider</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓</td>
<td>Face-to-face</td>
<td></td>
</tr>
<tr>
<td>Tang 2013</td>
<td>3</td>
<td>Nurse case manager; dietitian; GP;</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓</td>
<td>Remote</td>
<td>Online disease management system (shared electronic health record; wireless uploading of HbA1c; disease report; treatment record; online messaging with team and patients)</td>
</tr>
<tr>
<td>Taveira 2010</td>
<td>4</td>
<td>Nurse; dietitian; pharmacist; physical therapist</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓</td>
<td>Face-to-face</td>
<td>Shared medical appointments and group visits; joint group educational sessions</td>
</tr>
<tr>
<td>Taylor 2005</td>
<td>4</td>
<td>Nurse; dietitian; GP; exercise specialist</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td></td>
<td>Face-to-face</td>
<td>Shared home visits</td>
</tr>
<tr>
<td>Tourkmani 2018</td>
<td>6</td>
<td>Dietitian; pharmacist; GP; community social worker; diabetes educator; health educator</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓</td>
<td>Both</td>
<td>Multidisciplinary team meetings</td>
</tr>
</tbody>
</table>
of diabetes and reducing clinical inertia [41,42]. A significant variation in team composition and operation procedures was observed in the review. Typically, the teams were composed of primary care physicians, nurses and allied health professionals (e.g., dieticians, pharmacists and social workers), all of whom played important roles in the management of these patients. As patients’ needs may vary with disease progression and circumstances, the composition of teams may differ accordingly [43]. In addition, our findings highlight that non-professional health care workers (e.g. social workers, care coordinator) could make important contribution to the interprofessional teamwork and serve as an important component of MDT. Their roles identified in our review included supporting implementation of health care, treatment and referral plans established by health professionals [20,34], coordinating patient care activities [20,34], and providing necessary social support.

Fig. 2. Risk of bias summary: review authors’ judgements about each risk of bias item for each included study.
Previous studies demonstrated that clearly defined roles of non-professional health care workers are important for establishing a strong team and providing high-quality team-based care [44,45].

The subgroup analysis revealed that a team with four or more health professionals from different disciplines is associated with a greater reduction of cardiovascular risk factors than a team with three professionals alone. This finding is consistent with the results of a systematic review by Schepman that showed that patients with chronic conditions had more positive clinical outcomes if the collaborations involved more disciplines [46]. Given that few studies had the same team composition, it is difficult to explicate which specific teams are associated with a greater CVD risk reduction. The focus of the study was to evaluate the effectiveness of collaborative care rather than the additional effects of specific healthcare professionals. Thus, more studies need to be conducted to identify the optimal team composition and causal relationships between specific team members and positive outcomes.

The integration of diverse disciplines in diabetes care is important in...
providing multifaceted interventions [47]. The multicomponent interventions included in this review were heterogeneous. The interventions delivered by the MDTs varied widely in terms of the components, doses and frequency. The interventions mainly comprised non-pharmacological interventions (physical activity, healthy diet and behavioural modification) and pharmacological interventions (medication review, adjustment and optimisation), which are proven strategies in improving cardiovascular outcomes [48]. Thus, it appears that the benefit of multidisciplinary collaborative care on cardiovascular risk factors is related to a combination of strategies and not one isolated element. The subgroup analysis provides evidence of the superiority of pharmacological and non-pharmacological interventions integrated within multidisciplinary collaborative care in managing cardiovascular risk factors for patients with diabetes. However, it is difficult to estimate the specific contributions of individual components to overall estimates. Thus, further investigations are warranted to specifically elucidate the successful elements of interventions to achieve the best outcomes.

The study showed that digital health could play an important role in improving primary care services. This finding supports previous evidence from a meta-analysis that telehealth care had a beneficial effect on diabetes management in primary care settings [49]. Remote support in digital health interventions could provide proactive care by overcoming barriers to setting up cooperation due to physical disability, social isolation, a lack of time and inaccessibility to in-person services [50,51]. Digital health could be an effective approach to providing continuous and coordinated care via the enhancement of patient-provider communication and intensive follow-up [52]. In addition, digital health can facilitate multidisciplinary team meetings and enhance interprofessional communication on complex cases which are important in providing a person-centred quality care [53]. Importantly, shift towards digital health can create a close collaborative environment by providing better information sharing among healthcare professionals and linking healthcare professionals who are geographically dispersed [54]. Thus, it is of importance to adopt a digital collaborative care model via integration of digital health into the existing collaborative care to improve the treatment process and reach a wider population [55].

Our review showed that MDTs were predominantly available in high-income countries and were more effective than low- and middle-income countries. This might be attributed to the stronger primary care system in high-income countries that have comprehensive financial and
workforce resources and well-established care pathways that favour multidisciplinary engagement, leading to greater clinical effectiveness [56]. It implies that there is a need to strengthen primary care systems for team collaboration and establish MDTs with a highly skilled workforce in low- and middle-income countries [57,58]. Notably, to build a structured collaboration system and ensure quality care, a large number of the included studies provided intervention-specific training for team members, developed protocols that were shared among members and implemented protocol-driven care. Thus, organisational changes in the primary healthcare system achieving these factors are necessary for the successful delivery of context-relevant collaborative care models.

Despite the known benefits of MDT in reducing CVD risks, challenges still exist in translating multidisciplinary care into routine clinical practice, particularly in low- and middle-income countries. In many low resource settings, a shortage of health professionals (e.g. diabetes experts) is a common barrier of delivering multidisciplinary care. In the short term, utilising a telehealth approach to foster remote collaboration of health professionals might be a promising approach to tackle the shortage of health professionals, and improve patients’ access to multidisciplinary care. In the long-term, efforts are needed to develop training initiatives of health professionals and strengthen health professional training programmes to increase the supply of health professionals and improve primary care workforce. In addition, there is a need to continue optimising strategic investment in health professionals’

Fig. 6. Forest plots of LDL, HDL and TC.
and be tailored to the capacity of healthcare systems [62]. Further, publication.

Third, substantial heterogeneity (e.g., large variations in the team roles and responsibilities of team members and team communication for patients with diabetes. Our findings suggest that greater clarity of the manuscript. SLL and NH validated the data. All authors reviewed and be tailored to the capacity of healthcare systems [62]. Further, professional development programs should seek to improve the workforce of health professionals and support collaborative activities.

This study had some limitations. First, the search was limited to English language publications and thus there is a possibility that articles published in other languages were omitted, which indicates a possible existence of selection bias. Second, the results may be subject to publication bias. Studies with unfavourable results might not be published. Third, substantial heterogeneity (e.g., large variations in the team collaboration structures and types of collaborative activities) and the methodological limitations of the included studies might have affected the combined results. Therefore, larger and more rigorous trials need to be conducted to verify the results and strengthen the evidence base. Fourth, we were unable to provide a more comprehensive CVD risk estimate because none of the included studies assessed cardiovascular risk scores by using risk scoring system (e.g. Framingham Risk Score). Therefore, future studies using risk scoring system to evaluate CVD risk scores are needed. Finally, most of the studies were conducted in high-income countries, which limits the generalisability of the findings to the global community and suggests that further research needs to be conducted in low- and middle-income countries.

5. Conclusions

This study found robust evidence that multidisciplinary collaboration is an integral component of primary care and has a positive effect on the management of CVD risk reduction in patients with diabetes. It is essential to embed pharmacological and non-pharmacological interventions in collaborative practice in primary health care to optimise health outcomes of patients. Further, the greater integration of digital health into collaborative care might have significant benefits for clinical outcomes. Refining the roles and responsibilities of health professionals should be an important area for future research to reach a consensus on the most effective team composition.

Declaration of Competing Interest

The authors have no conflict of interest to declare.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.pcd.2024.05.003.

References


