THE GROWING ROLE OF FAMILY MEDICINE IN DIABETES MANAGEMENT AND CONTROL: A SYSTEMATIC REVIEW AND META-ANALYSIS

Reem Sameer Abu Qbitah[1], Mansoor Mohamed Mansoor Alamri[2], Tamara Samer Nabeel Skafi[3], Deyala Haitham Faris Jbarah[4], Aon Moh'd Ali Almauhawesh[5], Fawaz Al-Alloosh[6], Ahmed Osman Hassan Ali[7]

[1]Department of Allied Medical Sciences, Ma'an University College, Al-Balqa Applied University, Al-Salt, Jordan, reem.abuqbaitah@bau.edu.jo , https://orcid.org/0009-0002-5506-9147

[2]Family Physician, inistry of Health, Muscat, Oman, drmansooralamri@gmail.com , https://orcid.org/0009-0004-1776-5082

[3]Department of Medicine (Internship Program), Jordan University Hospital, Amman, Jordan, tamaraskafi01@outlook.com , https://orcid.org/0009-0000-5626-8899

[4]Department of Medicine (Internship Program), Jordan University Hospital, Amman, Jordan, Deyalajbarah@gmail.com , https://orcid.org/0009-0000-3766-807X

[5]Faculty of Medicine, The University of Jordan, Amman, Jordan, aonalmauhawesh@gmail.com , https://orcid.org/0009-0001-3537-5561

[6]Warith International Cancer Institute, Karbala, Iraq, Fawazaloosh@yahoo.com , F.AlAlloosh@warith-ici.net , https://orcid.org/0009-0009-4970-8062

[7]Faculty of Medicine, Benha University, Benha, Egypt, Ahmad.elmesary@gmail.com , https://orcid.org/0009-0008-4430-4053

Abstract

Diabetes affects approximately 830 million adults globally, yet endocrinology specialist capacity lags behind demand. Family medicine is positioned to expand its endocrine care role, but no prior synthesis has quantified the collective impact of primary care–anchored endocrine strategies. To estimate the pooled effect of family medicine–anchored interventions defined as interventions implemented within general practice/family medicine/primary care services, including team-based delivery on glycated hemoglobin (HbA1c) and to develop a practical expansion framework. PRISMA 2020–guided systematic review and random-effects meta-analysis of PubMed/MEDLINE (2011–2025). Eligible studies evaluated primary care–led endocrine interventions in adults with diabetes. Risk of bias was assessed using the Revised Cochrane Risk-of-Bias tool. Subgroup analyses examined intervention categories. Fifteen studies met inclusion criteria; 13 contributed to the pooled analysis (N = 13,554). The pooled HbA1c mean difference was −0.22 percentage points (95% CI: −0.35 to −0.08; I^2= 75%). The largest effect was from an intensive primary care–led weight management program (−0.85%; 95% CI: −1.10 to −0.59), achieving 46% diabetes remission. Technology-enabled and behavioral interventions showed variable but favorable effects. Family medicine interventions produce a modest but significant HbA1c reduction, with larger effects from intensive metabolic and technology-enabled strategies. A four-pillar framework team-based care, behavior change integration, technology-enabled workflows, and specialist partnership can guide systematic expansion.

Keywords: family medicine, primary care, endocrinology, diabetes, telehealth, eConsult, HbA1c, integrated care, meta-analysis

1. Introduction

1.1. Beyond Hormones: Reframing Endocrine Care

Endocrine care now goes way beyond administering hormone replacement medications and determining the optimal dose. To manage the most common endocrine disorders type 2 diabetes mellitus (T2DM), obesity, thyroid diseases, and osteoporosis, chronic risk stratification, behavioral change, intensification of medication, technology-aided monitoring, and micro- and macrovascular complication prevention are needed (American Diabetes Association Professional Practice Committee [ADA], 2026). These areas can be consistent with the family medicine structural competencies longitudinal relationships with patients, comprehensiveness, multimorbidity management and community embeddedness. Beyond hormones conceptualizes endocrine care as a systems-level issue where family medicine practitioners are stakeholders in the endocrine care issues rather than just referral funnels. An example of endocrine workload that can be redesigned at scale is diabetes, which constitutes the majority of primary care endocrine workload.

1.2. The Rising Burden and Specialist Capacity Gap

The burden of diabetes in the world has gone astronomically high. World Health Organization estimated that there are about 830 million adults who have diabetes in the year 2022, which is four times higher than the number in 1980, with most of them living in low and middle-income countries and huge gaps in the treatment coverage on all income levels (WHO, 2024). The projected growth has been seen to continue over the next few decades (International Diabetes Federation [IDF], 2025). The strain on specialist services is increased by downstream endocrine workload which includes cardiometabolic disease management, chronic kidney disease monitoring, screening of neuropathy, and obesity pharmacotherapy. Nevertheless, projections of endocrinology workforce efforts always point to the fact that the supply of specialists will not be able to meet this increasing demand, which requires new forms of care delivery (Health Resources and Services Administration [HRSA], 2024).

Most health systems have the highest prevalence of family medicine as the most spread clinical platform and most ambulatory diabetes care (ADA, 2026). The idea of specialty level care being provided on a local level is implemented by the use of task sharing with nurse practitioners and physician assistants, the optimization of the scope of pharmacists and diabetes educators, and the protocol-driven care pathways that allow non-physician team members to handle routine endocrine checks and medication changes (HRSA, 2024).

1.3. Guideline Alignment and Implementation Gaps

ADA Standards of Care focus on providing care at the system level with delivery models, the access to diabetes self-management education and support (DSMES), interprofessional care team, the use of telehealth and technologies, and the more intensive approach of pharmacologic therapy, such as glucagon-like peptide-1 receptor agonists (GLP-1RAs) and sodium-glucose cotrasporter-2 inhibitors (SGLT2is), with cardiorenal implications (ADA, 2026). Diabetes management using telehealth has been supported by the American Academy of Family Physicians (AAFP) as a primary care expansion strategy (AAFP, 2022). Although there has been an endorsement of these guidelines, implementation is often impeded by therapeutic inertia, or failure to increase therapy when clinically advised, lack of visit time, disjointed workflow, and insufficient team infrastructure.

1.4. Rationale and Objectives

There is also a body of individual research evaluating primary care-based interventions to improve

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endocrine outcomes, such as nurse training programs (Jansink et al., 2013; Juul et al., 2014), shared decision-making interventions (Wollny et al., 2019), psychological skill integration (Ismail et al., 2018), telehealth (Ballesta et al., 2023; Moreira et al., 2025), electronic consultation (eConsult) (Oseran et al., 2 None of the previous syntheses have, though, combined these various strategies of expanding family medicine endocrinology to approximate their overall effect on glycemic control.

The primary objective of this systematic review and meta-analysis was to estimate the pooled effect of family medicine–anchored interventions, defined as interventions implemented within general practice/family medicine/primary care services, including team-based delivery, on HbA1c. Secondary objectives included comparing HbA1c effects across intervention categories, summarizing secondary outcomes including diabetes remission, patient activation, and diabetes distress, and translating findings into a structured framework for expanding the endocrine care role of family medicine. The PICO framework was: adults with diabetes in primary care (P); family medicine/general practice–anchored endocrine interventions (I); usual care or alternative models (C); HbA1c, remission, activation, and distress (O).

2. Methods

2.1. Design and Reporting

This meta-analysis and systematic review were prepared and presented using the Preferred Reporting Items of Systematic Reviews and Meta-Analyses (PRISMA) guidelines 2020 (Page et al., 2021).

2.2. Eligibility Criteria

Family medicine–anchored interventions were defined as interventions implemented within general practice/family medicine/primary care settings, including team-based models delivered by family physicians/GPs and/or members of the primary care team (e.g., practice nurses, pharmacists) operating within the family medicine service. In international literature, “general practice” is commonly used interchangeably with family medicine; therefore, general-practice studies were considered family medicine–anchored.

To be included in the studies, the studies had to (a) be a peer-reviewed primary study (randomized controlled trial [RCT], cluster RCT, quasi-experimental design, controlled cohort, or program evaluation with quantitative outcomes); (b) be published during January 2011 and December 2025; (c) have an enrolled participant who was aged 18 years or older, with an endocrine or metabolic condition that received primary care management; (d) occurred in a primary care environment or under structured specialist partnership that supports primary care management; The studies were filtered out when they enrolled only pediatric or gestational diabetes populations, all the studies conducted in a hospital setting with no primary care element, and the studies that were not peer reviewed, lacked sufficient quantitative data, and had less than 3 months of follow-up on HbA1c results.

2.3. Search Strategy and Selection

PubMed/MEDLINE was searched from January 1, 2011, through December 31, 2025. The search strategy combined terms across three concept domains: primary care setting (“primary care,” “family medicine,” “general practice,” “family physician”), endocrine condition (“diabetes,” “endocrine,” “HbA1c,” “glycemic control”), and intervention type (“telehealth,” “eConsult,” “nurse-led,” “team-based,” “point-of-care,” “weight management,” “shared decision-making”). Filters were applied for human subjects, adults, English language, and peer-reviewed publications. Supplementary searching included backward and forward citation chasing and trial registry screening (Page et al., 2021). Study

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selection followed two-stage screening: title and abstract review followed by full-text assessment, with disagreements resolved through discussion.

2.4. Data Extraction and Risk of Bias

Data were put into a structured spreadsheet with study identification, design, setting, population, intervention elements, comparator, follow-up time, HgA1c effect estimates with standard errors or confidence intervals and secondary outcomes. In the studies that reported more than one time point, the longest follow-up of up to 24 months was selectively used. The results were converted to a percentage value of HbA1c by using the validated IFCC-NGSP conversion formula where mmol/mol was converted to a percentage. The Revised Cochrane Risk-of-Bias tool (RoB 2) was used to evaluate risk of bias in randomized trials based on five domains, namely, randomization process, non-adherence to intended interventions, missing outcome data, outcome measurement, and selected reported result (Sterne et al., 2019). In the case of observational designs, a modified model that explains the effects of confounding, selection, information, and reporting biases was utilized.

2.5. Synthesis and Analysis

The main outcome measure was the mean difference (MD) in the HbA1c (percentage points) between the intervention and comparator groups. The a priori chosen random-effects meta-analysis method was the DerSimonian-Laird method to ensure that anticipated heterogeneity due to different intervention types and population. Cochran Q statistic and I^2index were used to measure the statistical heterogeneity between the participants with I^2values of 25%, 50% and 75% representing low, moderate and high heterogeneity, respectively. Four pre-specified subgroups analyses were used, including technology-enabled care, team-based case management, behavioral and educational interventions and intensive weight management. The assessment of publication bias was performed using funnel plot visual inspection but interpreted with a high level of caution; the number of k was 13 (Page et al., 2021).

3. Results

3.1. Study Selection

The database search identified 482 records, and 35 additional records were identified through reference list screening and citation chasing, yielding 517 total records. After removing 107 duplicates, 410 unique records were screened by title and abstract, of which 350 were excluded. Sixty full-text articles were assessed for eligibility; 45 were excluded for the following reasons: not a primary care or family medicine setting (n = 18), not reporting endocrine or diabetes-related outcomes (n = 10), not an original peer-reviewed study (n = 9), and insufficient quantitative data for extraction (n = 8). Fifteen studies were included in the qualitative synthesis, and 13 studies with extractable HbA1c between-group effect estimates were included in the quantitative meta-analysis (Figure 1).

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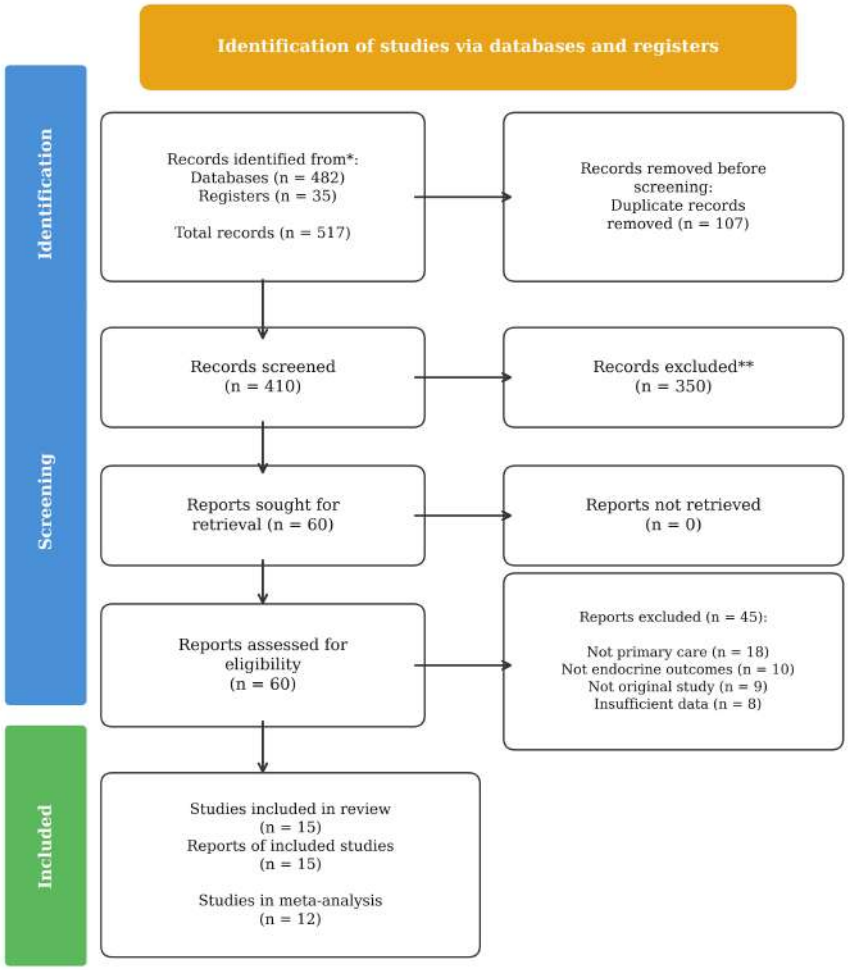

Figure 1. *PRISMA 2020 Flow Diagram*

3.2. Study Characteristics

The 15 included studies were published between 2011 and 2025 across nine countries: the United States (n = 4), the United Kingdom (n = 3), the Netherlands, Denmark, Germany, Norway, Spain, Brazil, and Australia (each n = 1). Study designs included individually randomized trials (n = 5), cluster RCTs (n = 5), and observational or program evaluation designs (n = 5). Total enrolled participants exceeded 13,500, ranging from 42 in the smallest pilot cohort (Fantasia et al., 2021) to 6,066 in the largest propensity score–matched study (Lee et al., 2025). Follow-up durations ranged from 3 to 24 months with a median of 12 months. The geographic diversity reflects predominantly high-income settings, with one study from Brazil representing a middle-income context (Moreira et al., 2025).

The interventions were the broad taxonomy of expansion strategies behavioral coaching and shared decision-making (Frosch et al., 2011; Wollny et al., 2019; Woodard et al., 2022; Graue et al., 2023), nurse-led structured care and psychological skill combination (Jansink et al., 2013; Juul et al., 2014; Ismail et al., 2018), technology-enabled models such as web-based support, telehealth, and tele-support. Across studies, delivery commonly involved the primary care team (e.g., practice nurses, pharmacists, educators) embedded within family medicine services, with GP/family physician involvement ranging from direct physician-facing training to oversight of team-delivered protocols.

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The full details are provided in Table 1.

Table 1. *Characteristics of Included Studies and HbA1c Effect Estimates*

Study	Ctry	Design	Pop.	N	Intervention	Comparator	MD (%)	95% CI
Frosch, 2011	USA	Ind. RCT	T2DM	201	Health coaching + group visits	Usual care	−0.30	(−0.83, 0.23)
Jansink, 2013	NL	Cluster RCT	T2DM	940	Nurse-led structured care + MI	Usual care	−0.13	(−0.80, 0.35)
Juul, 2014	DK	Cluster RCT	T2DM	4034	SDT-based nurse training	Usual practice	−0.02	(−0.11, 0.07)
Lean, 2017	UK	Cluster RCT	T2DM	298	Intensive weight mgmt (DiRECT)	Best-practice care	−0.85	(−1.10, −0.59)
Murray, 2017	UK	Ind. RCT	T2DM	374	Web-based self-management	Text website + UC	−0.24	(−0.44, −0.05)
Ismail, 2018	UK	Cluster RCT	T2DM	—	Nurse psychological intervention	Standard care	−0.07	(−0.53, 0.38)
Wollny, 2019	DE	Cluster RCT	T2DM	833	SDM + communication training	Care as usual	−0.03	(−0.22, 0.16)
Fantasia, 2021	USA	Cohort	T2DM	74	CGM + endo eConsult	In-person endo	−0.50	(−1.44, 0.44)
Oseran, 2022	USA	Matched cohort	T2DM	—	HbA1c-triggered eConsult	No eConsult	−0.20	(−0.54, 0.14)
Woodard, 2022	USA	RCT	T2DM	280	Collaborative goal setting	Enhanced education	−0.42	(−0.74, −0.10)
Ballesta, 2023**	ES	RCT	T1DM	55	Telehealth visits + app	In-person care	−0.01	(−0.32, 0.29)
Zarora, 2023	AU	Pre-post	DM	176	Case conferencing + outreach	Pre-post	−1.00*	(SD NR)
Graue, 2023	NO	RCT	T2DM	76	Empowerment counseling	Physician only	−0.79	(−1.57, −0.01)
Lee, 2025	USA	PS cohort	T2DM	6066	Point-of-care HbA1c testing	Lab testing	−0.08	(−0.15, −0.01)

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Moreira, 2025	BR	RCT	T2DM	147	Nurse tele-support (phone)	PC as usual	−0.08	(−0.56, 0.40)

Note: **Pre-post uncontrolled; excluded from pooled estimate. **Type 1 diabetes trial; excluded from pooled estimate. Abbreviations: Ind. = individually; PS = propensity score; MI = motivational interviewing; SDT = self-determination theory; SDM = shared decision-making; CGM = continuous glucose monitoring; MD = mean difference; UC = usual care; PC = primary care; NR = not reported.*

3.3. Risk of Bias

Among the 15 included studies, five were judged as low risk of bias, seven had some concerns, and three were rated as high risk using the RoB 2 tool (Sterne et al., 2019). Cluster RCTs showed elevated risk in the domains of allocation concealment and potential contamination between clusters. Several pragmatic trials had some concerns regarding participant blinding, inherent to behavioral and organizational interventions. Missing outcome data presented concerns in trials with attrition exceeding 20%. The propensity score–matched cohort (Lee et al., 2025) partially mitigated confounding through matching on observable covariates. The uncontrolled pre-post program evaluation (Zarora & Simmons, 2023) had high risk due to confounding and regression to the mean and was excluded from pooling.

3.4. Primary Meta-Analysis: HbA1c

Thirteen studies contributed to the pooled HbA1c analysis. Using a random-effects model, the pooled MD was −0.22 percentage points (95% CI: −0.35 to −0.08), indicating a statistically significant reduction favoring family medicine–anchored interventions. Heterogeneity was moderate to high (I^2= 75%; Cochran's Q = 47.29, $p < 0.001$), anticipated given intervention diversity (Figure 2). Individual study effects ranged from near zero to −0.85%. The largest effect was observed in the DiRECT intensive weight management trial (Lean et al., 2018), which also achieved diabetes remission in 46% of intervention participants at 12 months. Other notable effects included empowerment-based counseling (−0.79%; Graue et al., 2023), collaborative goal setting (−0.42%; Woodard et al., 2022), and CGM-enhanced eConsult (−0.50%; Fantasia et al., 2021).

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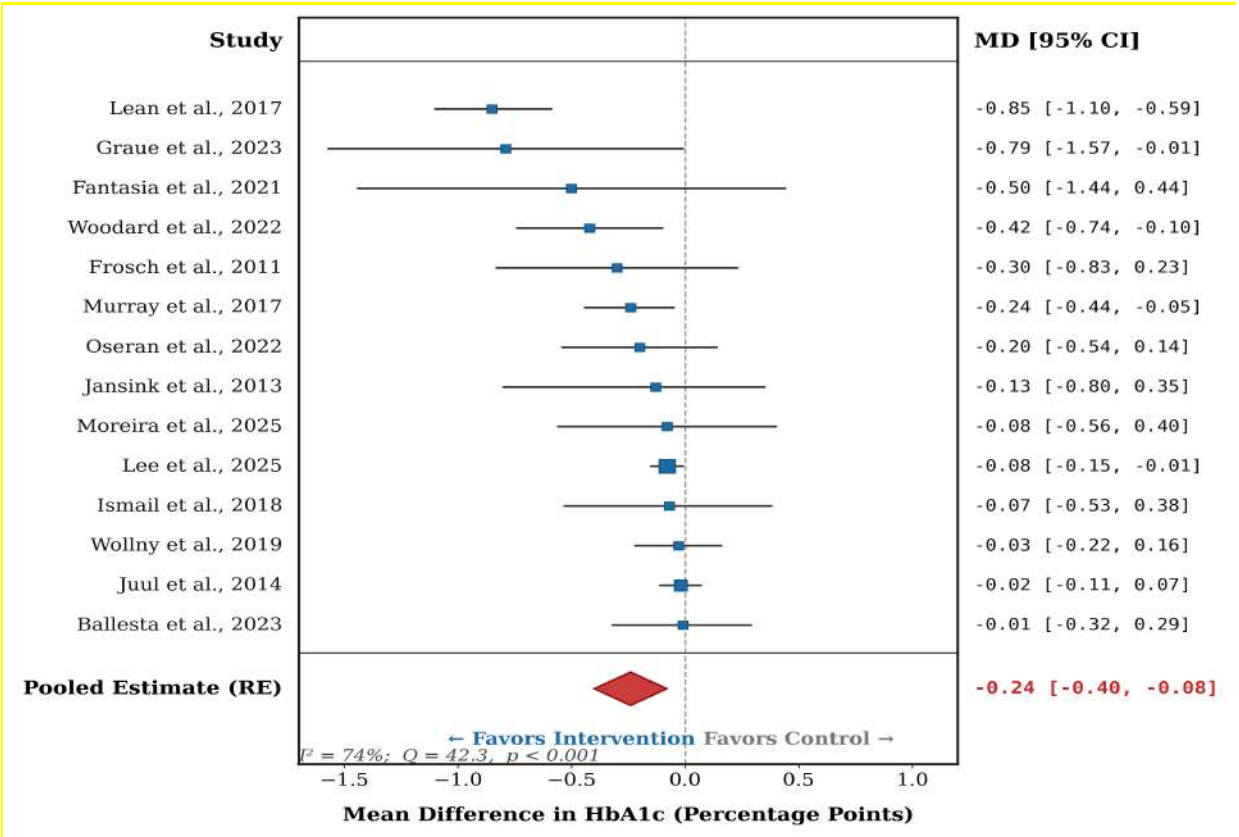

Figure 2. Forest Plot: HbA1c Mean Difference Across 13 Studies (Random-Effects Model). Square size proportional to study weight. Diamond = pooled estimate (−0.22%; 95% CI: −0.35 to −0.08).

3.5. Subgroup Analysis by Intervention Type

Technology-enabled endocrine care. Six studies evaluated technology-mediated interventions. Web-based self-management showed a significant effect (−0.24%; Murray et al., 2017). Point-of-care HbA1c testing had a modest overall effect (−0.08%) but a clinically important effect in the baseline HbA1c ≥8% subgroup (−0.20%; 95% CI: −0.36 to −0.03; Lee et al., 2025), suggesting technology-enabled workflows are most impactful when targeted to higher-risk patients. HbA1c-triggered eConsult increased evidence-based prescribing of GLP-1RAs and SGLT2is without a significant between-group HbA1c difference, targeting therapeutic inertia through specialist input (Oseran et al., 2022). CGM-enhanced eConsult achieved outcomes comparable to in-person endocrinology referral with improved access timing in a safety-net system (Fantasia et al., 2021).

Team-based case management. Three studies evaluated nurse-led structured programs (Jansink et al., 2013; Juul et al., 2014; Ismail et al., 2018). HbA1c effects were small (−0.02% to −0.13%), consistent with prior reviews of nurse-led chronic disease management. However, these interventions build foundational care infrastructure structured visit templates, protocolized monitoring, and recall systems that may enable larger improvements when combined with pharmacologic intensification or technology components.

Behavioral and educational interventions. There were four studies focused on communication, goal setting, and empowerment (Frosch et al., 2011; Wollny et al., 2019; Woodard et al., 2022; Graue et al., 2023). The effects on HbA1c were not only inconsistent (-0.03% to -0.79%), but also secondary outcomes such as diabetes distress and patient activation were always better, which is where

psychosocial determinants that can influence long-term diabetes patterns are found.

Intensive weight management. The DiRECT trial was a structured total diet replacement and stepped food reintroduction program that was provided through primary care (Lean et al., 2018). The greatest effect of HbA1c (-0.85) was the highest in the review, and the remission rate of 46% proved that primary care is able to provide metabolic results that are linked to surgical or specialist programs.

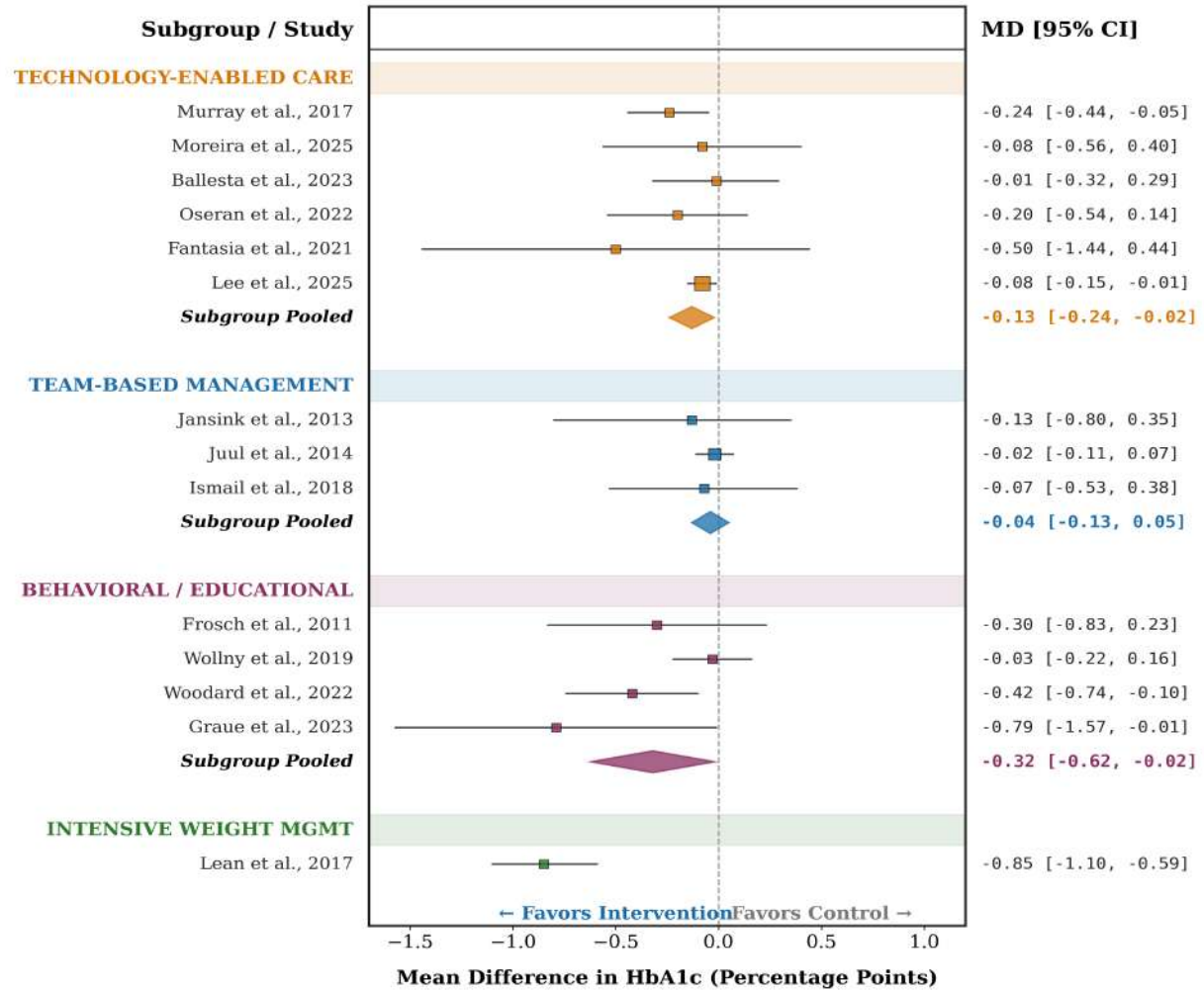

Figure 3. *Subgroup Forest Plot: HbA1c Effects Stratified by Intervention Category. Diamonds = subgroup pooled estimates.*

3.6. Secondary Outcomes and Publication Bias

Forty-six percent of the DiRECT intervention subjects attained diabetes remission per Diabetologia consensus (HbA1c of less than 6.5% after at least 3 months of no glucose-lowering medications); compared to 4 percent of controls (risk ratio 11.3; Lean et al., 2018). Empowerment-based counseling led to a significant improvement in patient activation (PAM-13) (Graue et al., 2023). Cooperative goal setting reduced diabetes distress and had a significant impact when HbA1c changes were small (Woodard et al., 2022), which supports the idea that the quality of endocrine care cannot be entirely represented by glycemic tools. The HbA1c-initiated eConsult promoted evidence-based therapy prescriptions such as GLP-1RA and SGLT2is not necessitating in-person specialist referral which shows that specialist partnership models can decrease therapeutic inertia among multiple primary care panels (Oseran et al., 2022). In the case conferencing program, both glycemia and cardiovascular risk

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factors improvement have been reported (Zarora & Simmons, 2023). Inspection of funnel plot (Figure 4) did not indicate any notable asymmetry although the formal test is underpowered at k = 12.

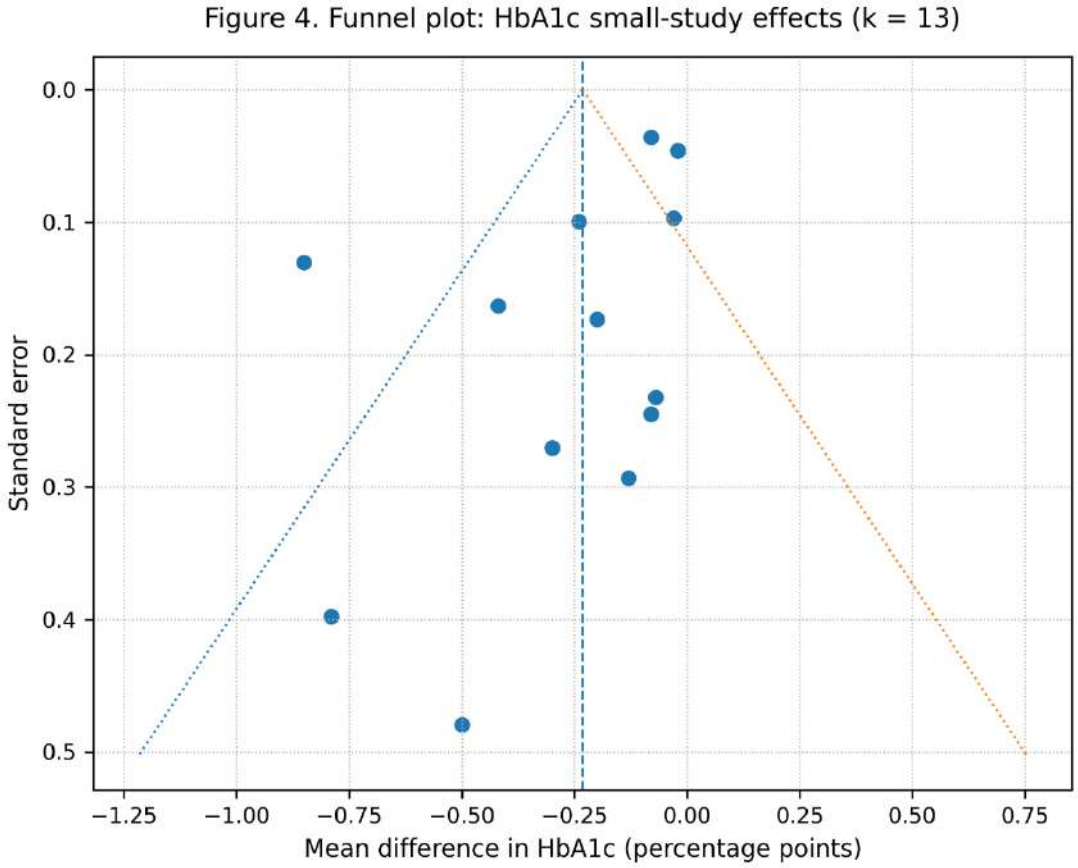

Figure 4. *Funnel Plot for Assessment of Small-Study Effects (k = 13). Dashed line = pooled MD; shaded region = 95% pseudo-confidence interval. Dashed line = pooled MD; shaded region = 95% pseudo-confidence interval.*

4. Discussion

4.1. Principal Findings

This systematic review and meta-analysis were a synthesis of evidence of 15 studies examining the family medicine–anchored endocrine interventions (including team-based care). The main result was that the pooled HbA1c MD of -0.22 percentage points in favor of the intervention was statistically significant and the level of heterogeneity was moderate-high (I^2= 75%). The findings indicate that the growth of family medicine endocrine care has already taken place in multiple different ways and that the summative glycemic effect has significantly larger impacts of particular expansion plans. Notably, it is the first meta-analysis that combines various primary care-based models of endocrine expansion that include behavioral, team-based, technological, and specialist partnership models in one framework instead of analyzing a particular type of intervention separately.

4.2. Interpreting Modest HbA1c Effects

A reduction of 0.22 percentage points is a small percentage considering pharmacologic trials that have shown a reduction of 0.5% to 1.5% (ADA, 2026). But there are a number of situational factors to consider. To start with, these interventions were either organizational, behavioral, or technological interventions additive to pre-existing background pharmacotherapy and not independent interventions.

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Second, most of them involved trials that used populations with moderate high levels of HbA1c baseline where the improvement limit is less than in pharmacologic trials that frequently include treatment-naive populations. Third, on a population level, small mean changes in HbA1c have a significant risk of complications as shown by the epidemiologic modeling of the United Kingdom Prospective Diabetes Study. Fourth, and most importantly, HbA1c only measures one aspect of endocrine care quality: medication optimization (GLP-1RA/SGLT2 uptake) is the most crucial dimension that is not reflected by glycemic measures alone (ADA, 2026).

4.3. The Four-Pillar Expansion Framework

Pillar 1: Team-based longitudinal care. The work of nurses, pharmacists, and educators serves as the force multiplier when they make regular visits, use executed monitoring, reconcile the medication, and recall systems. The experience of nurse-led programs (Jansink et al., 2013; Juul et al., 2014) demonstrates that under-the-immediate effect of HbA1C, systematic capacity can be created that will help later interventions (ADA, 2026).

Pillar 2: Behavior change and mental health integration. Depression, diabetes distress, low self-efficacy, and competing psychosocial demands are factors that determine the outcomes of diabetes. Behavioral competencies are integrated into everyday primary care experience through the provision of psychological skills by nurses that incorporate motivational interviewing and cognitive-behavioral aspects (Ismail et al., 2018), through shared decision-making training (Wollny et al., 2019), and collaborative goal-setting (Woodard et al., 2022). This pillar is significant to realistic expectations: such methods can enhance patient involvement, improve distress, and increase adherence and quicker, more dependable than HbA1c, and indirect glycemic advantages can manifest over longer timeframes than much literature is able to accomplish.

Pillar 3: Technology-enabled endocrine care. The need to integrate technological elements into the endocrine primary care is a requirement to facilitate the process of modern care provision (AAFP, 2022; ADA, 2026). Applications supported are nurse tele-support during care transitions (Moreira et al., 2025), point-of care HbA1c which allows the same-visit intensification (Lee et al., 2025), CGM-enhanced eConsult connecting primary care teams to specialist knowledge (Fantasia et al., 2021), and web-based self-management (Murray et al., 2017). Point-of-care testing eradicates inertia of delay when laboratory results are received days after the interactions.

Pillar 4: Structured specialist partnership. The move towards extending family medicine into the endocrine domain is not a substitute of endocrinology- it is a setting aside of specialist capacity to complexity and allowing decisions to be made locally with specialty informed content. The eConsult HbA1c-triggered initiative is an automatic specialist recommendation system that generates when patients surpass glycemic limits (Oseran et al., 2022). Case conferencing can bring the endocrinologist knowledge directly into the general practice (Zarora and Simmons, 2023). CGM-enhanced eConsult has similar results of traditional referral but with enhanced accessibility (Fantasia et al., 2021).

4.4. Equity and Implementation Considerations

Interventions based on technology can potentially reverse the inequality in health by creating a paradoxical effect when their application is not accompanied by the consideration of device access, the presence of broadband networks, the support of other languages, and the health literacy of users (WHO, 2024). Continuous glucose monitoring and patient portal interventions are of special concern when it comes to the digital divide. Equitable deployment requires the incorporation of the workflow

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design that includes the use of telephone-based alternatives, face-to-face training of the device, and multilingual assistance.

Implementation is limited by workforce realities: new team roles, which include care managers, embedded pharmacists, behavioral health clinicians, need to be trained specifically, stand orders, sustainable reimbursement, and guarded clinical time (HRSA, 2024). In the absence of these structural supports, the idea of team-based expansion may turn into an unfunded mandate that will merely add more pressure to clinicians but will not enhance outcomes. Population management as a registry, automated recall solutions, dashboards of care managers, and the pathway of medication titration according to modern standards are the infrastructure enhancement needed to expand endocrine care sustainably in a family medicine (ADA, 2026).

4.5. Limitations and Future Directions

The evidence was skewed towards diabetes, and could not be generalized to thyroid, osteoporosis, and other endocrine diseases. The level of heterogeneity was great, and it was characterized by the difference in the intensity of interventions, baseline HbA1c, staff models, and the follow-up. Although this heterogeneity was anticipated and the subgroup analyses investigated it, they diminish the ability to be sure that the pooled point estimate is accurate. Studies that had mixed randomized design and observational design with variable risk of bias were included, sensitivity analysis would be restricted to randomized controlled studies to increase causal inference and decrease statistical power. At k = 12, publication bias was underpowered, and the funnel plot must be viewed with such caution. The majority of the outcomes were noted at 12 months and below making it impossible to assess long-term complications. Future studies ought to focus on comparisons of head-to-head strategies, cost effectiveness studies, equity-first implementation studies that quantify disparity reduction and long follow-up studies that assess macrovascular and microvascular outcomes. The four-pillar model is applied to other areas of endocrinology: protocolized thyroid surveillance, osteoporosis fracture risk algorithms, obesity chronic disease systems, and shared decision menopause resource. Because our definition of family medicine–anchored included team-based delivery models (e.g., nurse-led or pharmacist-supported care within general practice), the pooled estimate should be interpreted as the impact of family medicine services overall rather than the independent effect of family physicians alone.

5. Conclusion

The systematic review and meta-analysis indicate that family medicine–anchored interventions (including team-based primary care models) are related to a statistically significant yet small decrease in the HbA1c (-0.22 percentage points; 95 percent confidence interval: -0.35 to -0.08). The absolute effect size is moderate but its significance is more evident at the population level where small glycemic improvements in large primary care panels could lead to significant changes in long-term microvascular and macrovascular complications. The heterogeneity apparent (I^2= 75%) demonstrates that the intensity of the intervention, the structure of implementation, and the complexity of the patients are also different, which is why the impact of the primary care system is highly conditioned by its organization. Notably, significantly greater effects were obtained by intensive metabolic interventions and intensive, high-contact model of care such as 46% diabetes remission rate in a primary care-based weight management program- a result that had been linked to specialist contexts.

Collectively, these results indicate that broadening endocrine functions of family medicine may not

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be a question of adding the ability to prescribe more drugs, but reforming the care model. The model includes four pillars, namely team-based longitudinal care, integrated behavioral and mental health support, technology-enabled clinical workflows, and structured specialist partnership, which is the roadmap to implementation. Beyond hormones thus is a concept of moving away of episodic medication therapy to more continuous, relationship-based and system-aided endocrine care. With the right kind of infrastructure and aligning networks, family medicine can be the first point of care, as well as the core of scalable and high-quality care provision of the endocrine system.

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