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INTEGRATED MANAGEMENT OF TYPE 2 DIABETES AND DEPRESSION IN PRIMARY CARE. A NARRATIVE REVIEW

Narrative Review

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ABSTRACT

Background: Type 2 diabetes mellitus (T2DM) and depression are among the most prevalent chronic conditions globally, frequently co-occurring and compounding one another's severity and management complexity. Their bidirectional relationship adversely impacts treatment adherence, glycemic control, and overall quality of life. Primary care settings, as the frontline of healthcare, offer an optimal platform for integrated management, yet conventional approaches often remain fragmented.

Objective: This narrative review aims to explore the current landscape of integrated care models for the concurrent management of T2DM and depression in primary care, highlighting their effectiveness, challenges, and future directions.

Main Discussion Points: The review synthesizes findings from recent literature emphasizing the value of multidisciplinary collaboration, including the use of case managers, mental health professionals, and primary care physicians. Integrated care models such as CIC-PDD demonstrate improvements in both metabolic and mental health outcomes, self-care behaviors, and patient satisfaction. Key themes include clinical efficacy, patient-centered care, health system efficiency, cultural adaptability, and cost-effectiveness. Limitations noted across studies include methodological inconsistencies, short follow-up durations, and challenges in scalability and generalizability.

Conclusion: Integrated care for T2DM and depression in primary settings shows strong clinical promise, with evidence supporting improved patient outcomes and system-level efficiencies. However, further high-quality, long-term, and diverse studies are essential to establish standardized, sustainable, and globally applicable models.

Keywords: Type 2 Diabetes Mellitus, Depression, Integrated Care, Primary Health Care, Multidisciplinary Management, Narrative Review.

INTRODUCTION

Type 2 diabetes mellitus (T2DM) and depression are two of the most prevalent chronic conditions globally, and their comorbidity represents a pressing concern for primary healthcare systems. Diabetes affects more than 537 million adults worldwide, a figure projected to reach 783 million by 2045, while depression affects an estimated 280 million people globally, contributing significantly to disability and healthcare burden (1). When these two conditions co-occur—as they often do—their mutual impact is profound, amplifying morbidity, diminishing quality of life, and complicating disease management. Patients with T2DM are twice as likely to experience depression compared to the general population, and conversely, those with depression are at increased risk for developing T2DM due to behavioral, neuroendocrine, and inflammatory mechanisms. This bidirectional relationship underscores the urgency of developing comprehensive care strategies that address both conditions simultaneously (2,3). Despite increasing awareness of this comorbidity, current healthcare delivery systems often fall short in effectively managing these intertwined conditions. Most treatment models address diabetes and depression separately, leading to fragmented care, poor adherence to treatment plans, and suboptimal outcomes. Depression is known to negatively influence glycemic control, self-care behaviors, and medication adherence, while poorly managed diabetes can worsen depressive symptoms through stress, fear of complications, and diminished physical health. Traditional care pathways lack the integrative structure needed to identify and manage these overlapping challenges effectively (4-6). Emerging research has shown that integrated care models—those that unify mental health and physical health treatment within the primary care setting—can offer a more holistic and effective approach. These models, often grounded in collaborative care principles, employ multidisciplinary teams including primary care physicians, mental health specialists, case managers, and educators to deliver coordinated interventions. Evidence from randomized controlled trials supports the effectiveness of integrated interventions in improving both depression and glycemic outcomes, increasing medication adherence, and enhancing patients' quality of life (7,8).

However, despite promising outcomes, several gaps persist in the literature. There is variability in how integration is defined and operationalized, particularly across different healthcare settings and populations. For instance, while community-based models such as the Community-based Integrated Care for Patients with Diabetes and Depression (CIC-PDD) have demonstrated effectiveness in Chinese primary care settings, questions remain about their adaptability in other regions and health systems (9). Moreover, few studies have systematically explored the cost-effectiveness and long-term sustainability of such models, despite preliminary data indicating favorable economic outcomes (10). This narrative review aims to explore the landscape of multidisciplinary and integrated care approaches for the concurrent management of T2DM and comorbid depression in primary healthcare settings. The review synthesizes recent evidence on the effectiveness, feasibility, and limitations of various models of care, drawing on randomized trials, observational studies, and real-world implementations. It includes literature from the past five years to ensure a contemporary perspective on evolving practices and innovations. By analyzing studies from diverse geographical and clinical contexts, this review seeks to highlight both universal and context-specific components of successful integration. For instance, models that incorporate cultural tailoring and patient-centered goal-setting have shown particular promise in marginalized populations, such as Latino and African American communities in the U.S. (11-13). Similarly, digital health components and telehealth have emerged as tools for scaling integrated care in resource-limited settings, though rigorous evaluations are still needed. Ultimately, the significance of this review lies in its effort to bridge existing knowledge gaps and to provide primary care practitioners, health policymakers, and researchers with a consolidated understanding of integrated management strategies. By capturing the state-of-the-art in integrative approaches to managing T2DM and depression, this work aims to inform future interventions, support the development of practical implementation frameworks, and ultimately improve patient outcomes in real-world healthcare systems.

THEMATIC DISCUSSION

The Burden of Comorbid Depression in Type 2 Diabetes

The co-occurrence of type 2 diabetes mellitus (T2DM) and depression is both clinically significant and complex, leading to worsened outcomes for both conditions. Depression in patients with diabetes has been shown to significantly impair self-care practices, reduce medication adherence, and increase the risk of diabetic complications. Integrated care models have emerged as necessary strategies,

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moving beyond traditional siloed management that often fails to address the bidirectional and reinforcing nature of these chronic conditions. Current evidence confirms that patients with coexisting T2DM and depression experience lower health-related quality of life and higher rates of healthcare utilization, highlighting the urgent need for holistic and integrated approaches within primary care (14).

Integrated Care Models in Primary Healthcare Settings

Integrated care models designed for the management of T2DM and depression have gained increasing attention in the last five years. One of the most comprehensive and widely studied models is the Community-based Integrated Care for Patients with Diabetes and Depression (CIC-PDD), developed in China. This model involves multidisciplinary teams, including general practitioners, mental health specialists, and case managers, who jointly develop and execute care plans tailored to both physical and mental health needs. Evidence from a cluster-randomized trial demonstrated significantly higher rates of improvement in both glycemic control and depressive symptoms in the intervention group compared to standard care, with 62.1% achieving a ≥50% reduction in depressive symptoms and 32.4% achieving at least a 0.5% drop in HbA1c levels at 12 months (15).

Impact on Self-Care Behaviors and Medication Adherence

An essential benefit of integrated models is their influence on patients' self-management behaviors. Multiple studies confirm that such approaches significantly enhance adherence to both antidepressant and antidiabetic medications, promote lifestyle modifications, and improve disease-related self-efficacy. For example, the CIC-PDD model led to notable gains in self-care activity scores (mean difference of 0.69) and medication adherence (mean difference of 0.72) at 12 months. These behavioral outcomes are particularly critical given the self-regulated nature of diabetes care (16). Similarly, an integrated primary care trial in the U.S. among Latino patients (the LUNA-D study) showed significant reductions in depression and anxiety symptoms as well as enhanced diabetes self-management behaviors, further reinforcing the model's effectiveness across cultural contexts (12).

Patient-Centeredness and Quality of Life Outcomes

Patient-centeredness is a cornerstone of successful integration, as evidenced in several studies where improvements in health-related quality of life were reported. The interim analysis of the CIC-PDD trial found statistically significant enhancements in mental quality of life (group difference of 4.98; $p < 0.001$), especially among rural patients who traditionally face limited access to mental health care (13). Furthermore, patient experience scores improved significantly in the intervention group, emphasizing the acceptability and perceived value of integrated care. These findings align with other culturally tailored models that have demonstrated patient satisfaction and improved emotional resilience when depression and diabetes are addressed jointly.

Health System Efficiency and Economic Value

Cost-effectiveness is increasingly recognized as a vital metric in evaluating healthcare interventions. A recent economic evaluation of the CIC-PDD model demonstrated cost-effectiveness across healthcare system, multipayer, and societal perspectives. The model's cost per quality-adjusted life year (QALY) gained was approximately $7,800, with cost-effectiveness probabilities exceeding 90% when societal willingness-to-pay thresholds were applied. Such findings validate the financial viability of integrated approaches in low- and middle-income countries and provide a scalable blueprint for global adaptation (14,15).

Provider Collaboration and Multidisciplinary Coordination

Integrated care thrives on effective interprofessional collaboration. One study conducted across Midwestern Federally Qualified Health Centers revealed that perceived levels of integration among primary care providers were directly associated with better glycemic control, with a 3% reduction in uncontrolled diabetes per one-level increase in integration stage ($p = 0.01$) (16). These findings point to the structural importance of communication, shared decision-making, and team-based coordination in optimizing chronic disease outcomes.

Gaps, Variability, and Implementation Challenges

Despite accumulating evidence, several challenges persist. Variability in study designs, population characteristics, and definitions of integration make comparisons difficult. For instance, while the CIC-PDD model emphasizes structured, protocol-based interventions with case management, other models rely more on the behavioral activation or cognitive restructuring without pharmacological oversight. Moreover, there remains limited understanding of long-term sustainability and the optimal duration or intensity of integrated interventions. Issues such as health literacy, stigma, and resource constraints further complicate implementation, especially in underserved areas.

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Cultural Adaptability and Equity Considerations

Culturally tailored models such as LUNA-D have shown that cultural and linguistic sensitivity is critical in improving engagement and outcomes in ethnic minority populations (16). Likewise, rural patients have shown greater gains from integrated interventions than urban counterparts, suggesting potential for integrated care to address health inequities (17). Nonetheless, most interventions are still designed with urban, resource-rich settings in mind. Future models must prioritize inclusive design, with adaptations based on socio-economic, cultural, and infrastructural realities.

CRITICAL ANALYSIS AND LIMITATIONS

While recent research underscores the potential benefits of integrated care models for managing comorbid type 2 diabetes mellitus (T2DM) and depression, a critical evaluation of the existing literature reveals several methodological and conceptual limitations that affect the overall reliability and applicability of findings. One of the most recurrent issues is the limited robustness of study designs. Although some high-quality cluster-randomized controlled trials (RCTs) such as the CIC-PDD trial in China provide strong evidence, many studies continue to rely on pragmatic or quasi-experimental designs without adequate blinding or control conditions (18). Others, such as pilot and feasibility studies, often feature small sample sizes and short intervention durations, limiting statistical power and the ability to assess long-term effects (19). Methodological biases are also prevalent and warrant attention. Several studies, including those evaluating care models in real-world primary care settings, lack adequate randomization or blinding, introducing potential performance bias. For example, studies depending on self-reported outcomes for depression and self-care behaviors are vulnerable to reporting and observer bias, particularly when participants are aware they are part of an intervention group. Furthermore, selection bias may occur when studies recruit participants with pre-existing motivation for self-management or exclude those with severe psychiatric comorbidities or cognitive impairment, thus skewing results toward more favorable outcomes (20). Another notable concern is the underreporting of negative or inconclusive results, which introduces publication bias. Many published studies emphasize statistically significant improvements in glycemic control or depressive symptoms, while failing to comprehensively present null findings or secondary outcomes that showed no meaningful change. This imbalance may overinflate the perceived effectiveness of integrated models. For instance, interim results from the CIC-PDD model demonstrated limited improvement in physical health-related quality of life, yet this finding received minimal analytical attention despite its clinical relevance (21).

A further complication lies in the variability of outcome measurements across studies. Depression is measured using diverse scales, such as PHQ-9, CES-D, and SCL-20, each with differing thresholds for clinical response. Glycemic control, often assessed by HbA1c levels, is influenced by various extraneous factors, including diet, medication, and stress, which are not always adequately controlled for in study designs. These inconsistencies in definitions and endpoints make cross-study comparisons challenging and dilute the strength of synthesis efforts (22). Generalizability of the reviewed literature also presents limitations. Many integrated care trials are concentrated in specific populations—such as urban communities in China or ethnic minority groups in the U.S.—raising questions about their applicability in broader or more heterogeneous populations. Cultural, socioeconomic, and healthcare infrastructure differences can significantly influence outcomes, and models that prove successful in one setting may not be scalable or effective in others without significant adaptation. Additionally, most studies do not stratify outcomes based on age, gender, or severity of depression, limiting insights into which subgroups may benefit most from integration (23). Moreover, the long-term sustainability and implementation fidelity of integrated care models remain underexplored. While short-term results are promising, few studies extend beyond 12 months, leaving the durability of improvements in question. The lack of longitudinal data makes it difficult to assess whether behavioral and psychological gains are maintained or if repeated interventions are necessary to sustain outcomes (24) In summary, while integrated care for T2DM and depression demonstrates clear clinical promise, critical limitations in design quality, methodological rigor, and external validity underscore the need for more comprehensive, diverse, and long-term research efforts. Addressing these gaps is essential to establish reliable, generalizable, and sustainable models of care within the complex reality of primary healthcare systems.

IMPLICATIONS AND FUTURE DIRECTIONS

The growing body of evidence supporting integrated care models for patients with type 2 diabetes mellitus (T2DM) and comorbid depression holds meaningful implications for clinical practice. Primary care practitioners, often the first point of contact for both physical and mental health concerns, are uniquely positioned to implement these integrated approaches. The findings suggest that embedding

psychological screening and structured mental health interventions within diabetes management protocols can significantly improve patient adherence, glycemic control, and mental health outcomes. For instance, multidisciplinary models like CIC-PDD, which involve coordinated care teams including general practitioners, mental health professionals, and case managers, have been shown to enhance both depression remission and metabolic parameters in a primary care context (25). These insights encourage a shift from fragmented treatment to a holistic, patient-centered model that recognizes the psychological components of chronic disease management. From a policy standpoint, the effectiveness and cost-efficiency demonstrated in integrated care trials warrant the inclusion of such models in national and international clinical guidelines. Current diabetes care frameworks rarely mandate routine depression screening or structured mental health support, despite clear evidence of their clinical value. Policymakers and healthcare systems should consider formalizing integrated care pathways, incentivizing multidisciplinary collaboration, and allocating resources to build the necessary infrastructure. The documented cost-effectiveness of models like CIC-PDD—showing favorable quality-adjusted life year outcomes within primary care budgets—supports their scalability and inclusion in universal healthcare delivery strategies, especially in low- and middle-income countries (26).

Despite these advances, several unanswered questions remain that limit the full translation of findings into routine practice. One of the most pressing gaps is the lack of long-term data assessing the sustainability of integrated care effects. Most existing studies report outcomes over short time frames—typically 3 to 12 months—and do not provide insight into whether clinical benefits are maintained or require reinforcement. Additionally, the heterogeneity in study populations, outcome measures, and definitions of integration limits the ability to generalize results. There is also insufficient exploration of how these models perform in resource-constrained or rural settings, where access to both diabetes and mental health services is often limited. Questions persist regarding optimal intervention intensity, frequency of follow-ups, and necessary provider training to achieve consistent outcomes across settings (25,26). To advance the field, future research must prioritize methodologically rigorous study designs that address these limitations. Large-scale, multi-country randomized controlled trials with long-term follow-up—preferably 24 months or more—are needed to assess the durability of treatment effects. These trials should use standardized outcome measures for both glycemic control and mental health, allowing for meta-analytical synthesis and global applicability. Stratified analysis by age, sex, socioeconomic status, and baseline severity of depression would enhance understanding of subgroup-specific responses. In addition, implementation science frameworks should be integrated into research protocols to examine the feasibility, fidelity, and contextual adaptability of integrated care models in diverse clinical environments (27). Furthermore, mixed-methods approaches that incorporate patient-reported experiences can enrich quantitative findings and identify real-world barriers to engagement. Economic evaluations should be embedded within trials to determine not only clinical efficacy but also health system affordability, especially in under-resourced regions. Finally, future studies should explore digital health innovations, such as telehealth and mobile health apps, as scalable tools to support integration, particularly in remote or underserved populations. In conclusion, the evidence for integrated management of T2DM and depression in primary care is compelling and offers a path toward improved outcomes and system efficiency. However, meaningful adoption into practice and policy depends on further addressing the gaps in evidence and refining delivery strategies for global and sustainable implementation.

CONCLUSION

This narrative review highlights that integrated care models, particularly those incorporating multidisciplinary collaboration, patient-centered planning, and behavioral health support, show significant promise in managing the dual burden of type 2 diabetes mellitus and depression within primary care settings. Evidence from recent trials consistently demonstrates improvements in glycemic control, depression remission, self-care behaviors, and patient satisfaction, especially when interventions are tailored to the needs of underserved populations. While the strength of current evidence is encouraging, much of it is derived from short-term studies with methodological heterogeneity, limiting broader generalizability and long-term interpretation. Clinicians are encouraged to adopt holistic, collaborative approaches where feasible, embedding mental health screening and coordinated treatment pathways into routine diabetes care. Researchers should prioritize large-scale, longitudinal, and culturally diverse studies that standardize outcome measures and assess real-world implementation, sustainability, and cost-effectiveness. Further research is crucial to validate integrated care as a global standard for chronic disease management and to ensure its adaptability across various healthcare systems.

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AUTHOR CONTRIBUTION

Author	Contribution
Mehwish Farooq	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Akif Saeed Ch*	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Hamd E Yazdaan	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Tahir Hafeez	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Mahwish Ashraf	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Numan Akram	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published

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