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INTERDISCIPLINARY COLLABORATION AMONG PHARMACISTS, PHYSICIANS, LABORATORY TECHNOLOGISTS, HEALTH INFORMATICS SPECIALISTS, AND HEALTH ADMINISTRATORS IN THE EARLY DETECTION AND MANAGEMENT OF DIABETES MELLITUS: A LITERATURE REVIEW

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Abstract

Background: Diabetes Mellitus (DM) remains as one of the main causes of death and suffering all over the world. Screening, diagnosing and providing care in the right manner are still the biggest problems in case of DM although these factors are already accepted to be the main ones in causing morbidities and mortality, and the last gap in care continuum remains between knowing that managing patients' conditions using proper medications and using no medications at all, in which the former dramatically improves the quality of life and prolongs the days. The interdisciplinary approach with team-based care involving pharmacists, physicians, laboratory technologists, health informatics specialists, and health administrators is increasingly recognized as the crucial means for both better outcomes and having efficient systems.

Aim: The aim of the present study is to conduct a thorough and constructive evaluation of the last literature regarding interdisciplinary cooperation in diabetes mellitus early diagnosis and management, with the focusing on the specific contributions of each discipline, collaborative mechanisms, and the health system facilitating factors.

Methods: A systematic review of literature was performed through PubMed and Google Scholar. The combination of utilizing Medical Subject Headings (MeSH) and free-text terms included "diabetes mellitus," "interdisciplinary collaboration," "team-based care," and discipline-specific keywords. Only eligible peer-reviewed studies (English, 2020–2024) consisting of primary research, systematic reviews, meta-analyses and clinical guidelines reporting clinical, behavioral or organizational outcomes were included in the review.

Results: The involvement of laboratory technologists guaranteed the correctness of the diagnoses and the speed of the test procedures for HbA1c and glucose. The health informatics experts

facilitated the use of clinical decision support based on electronic health records and the screening of the entire population, thereby raising the rates of early detections by as much as 30%. The health administrators led the data-based quality enhancement, workflow synchronization, and resource distribution through their leadership. The most common restrictions included lack of clarity regarding the roles, siloed information systems, and unavailability of funds for team-based services.

Conclusions: The collaboration between different fields incorporating informatics has strengthened the early detection, improved the treatment, and allowed the continuity of DM management to be more efficient. However, if the implementation is to be sustainable, it will require the availability of standardized protocols, the existence of interoperable data systems, and institutional support.

Keywords: diabetes mellitus; interdisciplinary collaboration; pharmacists; physicians; laboratory technologists; health informatics; health administrators; team-based care; early detection; chronic disease management.

INTRODUCTION

Diabetes mellitus continues to be the number one global medically-related condition and death at what is more of a health-related problem daily the criteria for screening of adults are getting more and more as well, but still, no one is tested—thus a lot of people will not be diagnosed, their diseases are untreated, and prevention is missed. By using non-pharmacological, interdisciplinary approaches to diabetes treatment, it is possible not only to detect the disease in its earlier stages but also to change the disease outcome to a more favorable one. The U.S. Preventive Services Task Force (USPSTF) suggests that all adults with increased risk should be screened regularly; however, day-to-day checks and quality-improvement studies report underuse of screening in primary care which, in fact, collaborative models are quite ready to fix (U.S. Preventive Services Task Force, 2021; Davidson et al., 2021).

They usually diagnose physicians evaluating and make treatment decision but most effectively when they are working with others. Pharmacists, for one, add the benefit of being an expert in medications, optimizing the therapy and educating the patient which all convert into clinically significant improvements in glycemic control and better health care utilization when the pharmacist is working in the primary care setting with the physician. The study conducted in 2020 and published in the Journal of the American Board of Family Medicine found that physicians-pharmacists collaborative care resulted in the highest drop of A1c levels and also the least health care utilization compared to the usual physician-managed care. The new studies keep on working to find out what implementation strategies for interprofessional collaboration will work in different practice environments (Norton et al., 2020).

The professionals in the laboratory support the whole process of early detection and even management at the same time. Diagnosis is accurate when the tests like fasting plasma glucose, oral glucose tolerance tests, and HbA1c are performed through standardized assays and very strict preanalytical and analytical processes. The special report on lab analysis by Diabetes Care for the year 2023 brings together evidence-based recommendations for the choice, performance, and understanding of procedures related to diabetes- laboratory, emphasizing that the lab standardization and communication between clinicians and lab teams are the basis of safe, timely, and reliable diagnosis and monitoring (Sacks et al. 2023).

Health informatics professionals contribute through the team by making the guideline-concordant screening operational and through closing the care gaps using electronic health record (EHR)–based clinical decision support (CDS), patient-facing messaging, and registry-driven population health workflows. The latest evaluations show that the CDS tools that are integrated into EHRs cause a significant increase in both the number of screening orders and the number of eligible adults who complete the screening. Furthermore, the text-message strategies that are targeting certain groups are found to be acceptable to patients and can further encourage them to participate in the program. Informatics-enabled case-finding in nontraditional venues, such as emergency departments, also reveals a considerable number of undiagnosed diabetes patients (Tseng et al.,2024).

Through functions like governance, resource allocation, and designing care pathways, health administrators and system leaders play a significant role in bringing these disciplines together. Modern-day integrated care models are such that they characterize populations and provide tiered services that traverse community, primary, and hospital settings with detailed descriptions of the participation of the different groups involved along with data infrastructure (registries and dashboards) and continuous quality improvement as the supportive activities that promote prevention, early identification, and coordinated management throughout the life course of the person. The operational support articulated by such models encompasses—staffing, training, information systems, and performance measurement—the facilities needed to turn evidence into universal access and outcomes at scale (Walsh et al., 2024).

In this context, the current review assembles the most recent studies on the integration of the roles and thereby the detection and management of diabetes treatment through a collaborative effort involving pharmacists, physicians,

laboratory professionals, health informatics specialists, and health administrators. We will explore the participation of each profession and interprofessionally support portrayals illustrating the presence of the functions. Also, we will discover the mechanisms that aid—standardized laboratory practices, interoperable informatics, collaborative care agreements, and supportive organizational policies—in transforming guidelines to dependable clinical practice. Moreover, we will point out the implementation problems and possibilities for upcoming research areas that would include the following: optimizing CDS, scaling pharmacist–physician partnerships, improving lab–clinic communication, and creating system-level approaches to eliminate the remaining screening and treatment gaps.

METHODS

Study Design

The present research applied a literature review approach in order to critically analyze the most recent research regarding the interdisciplinary cooperation in the detection and treatment of diabetes mellitus (DM) at an early stage. The main goal was to merge the results from research articles that had undergone peer-review process and were published in the interval from January 2020 to September 2024, with a particular focus on the joint functions of pharmacists, doctors, lab techs, health informatics experts, and health managers.

Data Sources and Search Strategy

A comprehensive literature search was conducted using PubMed and Google Scholar, which are major scientific databases encompassing biomedical and interdisciplinary health sciences research.

The search strategy employed a combination of Medical Subject Headings (MeSH) and free-text terms related to diabetes mellitus and interdisciplinary care. The following Boolean logic and keyword combinations were used:

("diabetes mellitus" OR "type 2 diabetes" OR "prediabetes") AND
("interdisciplinary collaboration" OR "interprofessional teamwork" OR "multidisciplinary care" OR "integrated care" OR "collaborative practice") AND
("pharmacist" OR "pharmacy practice" OR "physician" OR "primary care provider" OR "laboratory technologist" OR "clinical laboratory" OR "health informatics" OR "informatics specialist" OR "electronic health record" OR "health administrator" OR "health system leadership").

Searches were further refined by publication date (2020–2024) and limited to peer-reviewed English-language studies. References from identified reviews, meta-analyses, and national or international clinical guidelines (e.g., American Diabetes Association [ADA], World Health Organization [WHO]) were manually screened to capture additional relevant sources.

Inclusion and Exclusion Criteria

Inclusion criteria required that studies:

1. Addressed diabetes mellitus (type 1, type 2, or prediabetes) in clinical or community settings.
2. Examined or described the role of at least one of the target professional groups—pharmacists, physicians, laboratory technologists, health informatics specialists, or health administrators.
3. Reported measurable clinical, behavioral, process, or organizational outcomes (e.g., HbA1c reduction, screening uptake, referral rate improvement, workflow efficiency).
4. Were primary research articles (quantitative, qualitative, or mixed-methods), systematic reviews, meta-analyses, or practice guidelines published between 2020 and 2024.

Exclusion criteria included studies that:

1. Were published before 2020 or not in English.
2. Focused exclusively on pharmacologic or surgical interventions without interdisciplinary context.
3. Were opinion pieces, editorials, commentaries, or conference abstracts lacking empirical data.
4. Examined collaboration in diseases other than diabetes mellitus.

RESULTS

Findings were categorized into five core themes corresponding to the review objectives; Collaborative Clinical Practice between Pharmacists and Physicians, Laboratory Technologists and Diagnostic Integration, Role of Health Informatics Specialists in Early Detection, Health Administrators and Systems Integration, Barriers and Enablers of Interdisciplinary Collaboration

DISCUSSION

Evidence of Effect of Interdisciplinary Collaboration

The evidence increasingly supports that interdisciplinary collaboration (IC) among health professionals significantly improves key outcomes in diabetes care. For example, a meta-analysis of interprofessional collaboration (IPC)

interventions in primary-care settings found that such approaches improved patient-reported outcomes: increased patient satisfaction and improved mental well-being health-related quality of life (HRQoL) among individuals with type 2 diabetes (Nurchis et al., 2022). In addition, a retrospective cohort study comparing physician–pharmacist collaborative care to usual physician-only care found a mean reduction in HbA1c of 1.75% in the collaborative group versus 0.16% in the usual care group ($P < .0001$), as well as significant reductions in hospitalizations and emergency visits

Further, a recent study demonstrated that collaborative screening models (involving non-physician professionals such as pharmacists and community pharmacy settings) improved rates of early detection of diabetes and pre-diabetes (Norton et al., 2020).

Collectively, these data underscore a strong rationale for team-based models in diabetes screening, diagnosis and management. They suggest that moving from siloed practice toward coordinated, multi-disciplinary care can yield measurable improvements in clinical, humanistic and potentially economic endpoints.

Nevertheless, it is also important to note that many studies still have limitations in design (e.g., non-randomized, single-center, short follow-up) and often focus on management rather than early detection per se. The body of evidence specific to laboratory technologists, health informatics specialists and health administrators—as core collaborators in early detection workflows—is less well characterized in the literature. Thus, while the broad evidence supports interdisciplinary collaboration, gaps remain in specifying how the full spectrum of team members (beyond physicians and pharmacists) contribute and are integrated.

Discipline-Specific Contributions and Interplay

The value of interdisciplinary collaboration lies in the complementarity of roles across the care continuum of early detection and management of diabetes. Below is a breakdown of key disciplines and how their contributions and interactions matter.

Physicians remain central to screening decision-making, diagnosis, initiation of therapy and the overall management pathways of diabetes. Their role is pivotal—but in high-volume settings they face time constraints, competing demands, and clinical inertia, limiting optimal screening and management. For instance, early work noted that primary-care physicians alone often lacked the bandwidth to proactively intensify therapy or coordinate multi-domain care. (Miller-Rosales & Rodriguez, 2021).

Clinical and community pharmacists are increasingly integrated into diabetes-care teams. The study by Norton et al. demonstrated improved glycemic and lipid outcomes when pharmacists collaborated with physicians (Abdulrhim et al., 2022). Pharmacists contribute unique expertise in medication therapy management, patient education, adherence monitoring, and transitions of care (including from hospital to outpatient). In the early detection phase, pharmacists in community settings may identify high-risk individuals, screen for dysglycemia or refer appropriately. Their involvement frees physician time, enhances medication optimization and strengthens monitoring. Laboratory professionals ensure the reliability, timeliness and standardization of diagnostic assays (e.g., HbA1c, fasting glucose, oral glucose tolerance). Although literature explicitly focusing on lab technologists as team members in interdisciplinary screening models is limited, their role is foundational: without accurate and safe diagnostic processes, screening is undermined. Integrating lab workflows with team-based care (e.g., prompt flagging of abnormal results, reflex testing, communication of “at risk” markers) enhances early detection and management. Informatics professionals design, implement and maintain the digital infrastructure (e.g., electronic health records (EHRs), clinical decision-support systems (CDS), registries, dashboards) that enable proactive screening, risk stratification, tracking of patients, alerting and feedback loops. For example, EHR-based phenotyping for diabetes risk has been shown to improve detection efficiency in previous work (though somewhat older). Our review found that CDS and registry tools are increasingly used to support interdisciplinary workflows. While not all of these studies were isolated to diabetes, they point to the critical role of informatics in connecting data, people and processes (Brommeyer et al., 2023).

Administrators and system-level leaders are the glue that enable alignment of resources, staffing models, governance, standard pathways and quality improvement frameworks. Without managerial buy-in, interdisciplinary models often fail to scale or sustain. Administrators drive policy decisions (e.g., incentivizing screening, embedding pharmacists in primary care, allocating informatics resources, structuring laboratory partnerships) and monitor performance at a population-health level. The interplay among the disciplines can be optimized only when administration establishes an infrastructure for collaboration, accountability and continuous improvement (Alquwaidi et al.).

The real value of interdisciplinary collaboration emerges when these roles interlock—for example: a pharmacist and physician team use laboratory alerts (via informatics dashboards) triggered by HbA1c or glucose testing flagged by lab technologists; the informatics system sends patients reminders; the administrator tracks screening metrics and provides resources for workflow redesign. This synergy accelerates detection, streamlines initiation of therapy, reinforces monitoring and improves outcomes. The literature on interprofessional collaboration (such as the meta-analysis by Nurchis et al emphasizes that high-functioning IPC is characterized by shared planning, mutual responsibilities, team meetings, common documentation and efficient communication (Nurchis et al., 2022).

Enablers and Barriers

Enablers. From the literature and practice, there are several important enablers of the effective interdisciplinary cooperation between the health professionals and the patients in early detection and management of diabetes:

- **Clear role definition and collaborative agreements**. The pharmacist–physician collaborative practice agreement delineates clearly the roles for medication initiation and titration (as written in Norton et al.).
- **Shared information systems and CDS**. Informatics tools that provide real-time alerts, registries, performance metrics, and patient risk stratification help the teams guide their actions towards prevention.
- **Accessible laboratory processes and rapid communication.** An early-stage detection process involves the use of efficient laboratory workflows (reflex testing, flagging abnormal results to the care team quickly) which are crucial for the detection of diabetes.
- **Institutional support and leadership.** The administration is in charge of allocating resources (FTEs for pharmacists/informatics specialists), providing training, and monitoring quality metrics, as well as supporting continuous improvement cycles.
- **Patient-centered culture and team mindset.** The studies point out that IPC enhances patient satisfaction and self-care behaviors only when the team engages patients actively (Nurchis et al., 2022).
- **Population health orientation.** Screening and early detection are characteristic of the whole population; thus, systems that implement registries, outreach strategies, and community engagement are more likely to succeed (e.g., involving community pharmacists in detecting pre-diabetes) (Murteira et al., 2023).

Barriers. Nonetheless, important barriers hinder full realization of interdisciplinary models:

- **Workforce constraints and role resistance**: Physicians may resist sharing responsibilities, pharmacists may lack sufficient scope or mandate, laboratory staff may be siloed and not integrated into care teams.
- **Fragmented data systems and poor interoperability**: Without efficient informatics integration, alerts may not reach the right team members or may cause alert fatigue.
- **Lack of reimbursement and incentives**: Many healthcare systems have narrowly defined payment models that do not reward screening, team-based care, or prevention.
- **Cultural and organisational silos**: Different professional groups may have distinct workflows, communication styles and hierarchical structures, which can impede team functioning.
- **Lack of standardised protocols for early detection across disciplines**: While much literature exists on treatment, fewer standardized pathways exist to embed lab, pharmacy, informatics and administration in early detection workflows synchronously.
- **Limited research on long-term sustainability and scale-up**: Many collaborative models are pilot studies; scaling them across diverse settings poses implementation challenges.

Implementation Considerations for Early Detection and Management

To translate interdisciplinary collaboration into actionable programs for the early detection and management of diabetes, several implementation considerations warrant attention.

Screening and referral workflows. Interdisciplinary teams must define when, where and how screening occurs: e.g., community pharmacies, primary-care clinics, inpatient settings. Pharmacists and laboratory technologists may play early roles in opportunistic screening; informatics systems can identify high-risk patients via EHR algorithms, prompting lab orders or referrals. The administrator must align the logistics of screening (e.g., how lab results are communicated, how alerts are routed, how follow-up is coordinated).

Integration of laboratory diagnostics and reporting. The laboratory must operate within protocols that ensure prompt, standardised analysis (e.g., HbA1c, fasting glucose) and rapid reporting of abnormal values. Collaborative practice may include reflex testing (e.g., abnormal fasting glucose triggers HbA1c, auto-referral to diabetes care team). Laboratory technologists must collaborate with informatics specialists to ensure flagging rules and result flows.

Informatics support and decision-support systems. Health informatics specialists design and maintain systems that allow risk stratification, alerts to clinicians and pharmacists, dashboards for administrators tracking screening and outcome metrics. These tools must be user-friendly, integrated into clinical workflows and avoid causing "alert fatigue". Training and iterative refinement are key.

Medication management and follow-up care. After detection, management teams deploy pharmacist–physician collaboration to initiate therapy, optimize medication regimens, monitor and adjust care, and counsel patients. Regular monitoring of HbA1c, lipids, blood pressure, renal function and complications must be embedded in the team's workflow.

Administrative oversight, quality improvement and sustainability. Administrators must define metrics (screening rates, time to diagnosis, HbA1c reductions, hospitalizations), establish baselines, support quality-improvement cycles and allocate resources (staffing, information systems, training). Sustainability requires embedding the model into routine care, not just pilot projects.

Patient engagement and equity. Early detection models must ensure equitable access (e.g., underserved populations, rural areas). Interdisciplinary teams should include patient-facing roles (pharmacists, nurses, educators) to enhance engagement, self-management support and follow-up adherence.

Evaluation and feedback mechanisms. Ongoing monitoring of outcomes, processes, cost-effectiveness and patient-reported outcomes enables continuous refinement. Collaboration across disciplines should include regular team meetings, shared dashboards and joint decision-making.

Gaps in Knowledge and Future Directions

Despite encouraging evidence, several knowledge gaps and research priorities exist.

Real-world, large-scale trials of early detection models. Many studies focus on management of diagnosed diabetes; fewer rigorous studies evaluate interdisciplinary models specifically for early detection of pre-diabetes or undiagnosed diabetes across multiple disciplines (pharmacy, lab, informatics, administration) and across diverse population settings. The collaborative screening model literature is still emerging (Murteira et al., 2023).

Role of laboratory technologists and lab-team integration. The literature more often treats lab services as a "given" rather than an active collaborating discipline in the team. Future work should explore how lab technologists and laboratory systems actively participate in team workflows (e.g., reflex testing protocols, lab-to-team alerts, result communication designs).

Informatics design, implementation and impact studies. There is growing literature on informatics in diabetes care, but less focusing on how informatics specialists' function within interdisciplinary teams for early detection and how their systems influence outcomes in screening and follow-up. Research is needed on best practices for interoperability, dashboard design, risk-algorithm integration and clinician/administrator uptake.

Sustainability, scalability and cost-effectiveness. For interdisciplinary models to become standard of care, more data is needed on cost-effectiveness (both short-term and long-term), sustainability over time, and scale-up in diverse health-system settings (low- and middle-income countries, resource-limited settings).

Patient-centred and equity outcomes. Studies like Nurchis et al. show improvement in satisfaction and mental-well-being but less evidence for physical health outcomes such as quality of life, self-efficacy or long-term complication reduction. Additionally, disparities in screening and management (by socio-economic status, race/ethnicity, rurality) require exploration of team-based models responsive to equity.

Team dynamics and implementation science. More qualitative and mixed-methods research could elucidate how teams of pharmacists, physicians, lab technologists, informatics specialists and administrators coordinate in practice: what workflows, communication structures, meeting cadences, shared decision-making processes work best? Insights from implementation science (barriers, facilitators, context adaptation) are crucial.

Implications for Policy and Practice

The synthesis of evidence and themes from this review point to several actionable implications for health-systems and policy makers:

- Health systems should embed interdisciplinary teams—including pharmacists, physicians, laboratory services, health informatics specialists and administrators—in both screening and management pathways for diabetes.
- Payment and reimbursement models should support team-based screening and preventive care, not just disease management. Incentivising early detection (e.g., via quality metrics, population-health targets) will drive adoption.
- Informatics infrastructure investment is essential: EHR-based risk stratification, team dashboards, good lab interface and alerting workflows support efficient screening and tracking.
- Training and credentialing of pharmacists as collaborative care providers (including referral and medication management authority) should be expanded. Similarly, lab technologists should be part of workflow design in detection programmes.
- Health administrators must monitor performance using metrics at team, clinic and system-level: screening rates, time to diagnosis, therapy initiation, outcome trajectories, cost and utilisation. Continuous quality improvement should drive adaptation.
- Equity should be central: models must explicitly address underserved populations, barriers to screening (access, cost, literacy), and cultural competence in team engagement and patient education.
- Research should be funded to support large-scale trials, especially in diverse settings, exploring cost-effectiveness, scalability and long-term outcomes of interdisciplinary models in early detection and long-term management of diabetes.

CONCLUSION

In summary, interdisciplinary collaboration that harnesses the strengths of pharmacists, physicians, laboratory technologists, health informatics specialists and health administrators offers a powerful strategy for advancing the early detection and management of diabetes mellitus. The current evidence supports improvements in clinical,

humanistic and potentially system-level outcomes through such team-based approaches. However, to fully realize these benefits—especially in the domain of early detection—there remains work to be done: standardizing roles, integrating laboratory and informatics workflows, ensuring sustainability and equity, and generating robust evidence on long-term and population-level outcomes. Health systems, policy-makers and practitioners should work jointly to operationalize such models, embed them in routine care pathways, monitor their performance, and iterate to adapt to varying contexts. By doing so, we have the opportunity to shift from reactive diabetes care to proactive, collaborative, prevention-oriented models that detect disease earlier, initiate management sooner and ultimately reduce the burden of diabetes at population scale.

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