

An Integrated Multidisciplinary Model for Diabetes Screening and Complication Prevention: Roles of Nursing, Health Informatics, Laboratory Testing, Dentistry, Nutrition, and Optometry

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ABSTRACT:

Background: Diabetes prevalence has risen sharply worldwide. WHO reports that the number of people living with diabetes increased from 200 million in 1990 to 830 million in 2022, while IDF estimates that 589 million adults aged 20–79 years were living with diabetes in 2024 and that almost one in two cases remained undiagnosed. Preventing complications therefore depends on both earlier case detection and reliable delivery of longitudinal risk-reduction processes.

Objective: To develop an evidence-based academic manuscript proposing an integrated multidisciplinary model for diabetes screening and complication prevention, explicitly defining the roles of nursing, health informatics, laboratory testing, dentistry, nutrition, and optometry in an unspecified health-system setting.

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Methods: A structured narrative review and integrative synthesis was undertaken using English-language official guidance and recent primary or synthesis literature, prioritising WHO, ADA, IDF, and NICE documents and major peer-reviewed journals. The synthesis focused on adult type 2 diabetes screening and prevention pathways, although selected evidence on type 1 screening, pregnancy, and young people was considered where it informed pathway design or surveillance timing. Because no country or service model was specified, recommendations were abstracted into a context-adaptable model with “minimum essential” and “enhanced digital” components.

Results: An effective integrated model begins with risk assessment in adults with overweight or obesity and additional risk factors, and universal screening from age 35 years for all others using fasting plasma glucose, 2-hour plasma glucose during a 75 g oral glucose tolerance test, or laboratory HbA1c. People with prediabetes require annual retesting and referral to structured lifestyle intervention targeting at least 5–7% weight loss and at least 150 minutes per week of moderate physical activity. After diabetes is diagnosed, the annual core prevention bundle should include HbA1c or equivalent glycaemic assessment, blood pressure, lipid profile, renal surveillance with creatinine/eGFR and urine albumin-to-creatinine ratio, foot examination, eye screening, smoking review, weight/BMI review, nutrition care, and oral/periodontal review. Nursing improves coordination and self-management; informatics improves coverage and treatment promptness; laboratory systems improve diagnostic accuracy and surveillance; dentistry contributes oral risk control and opportunistic dysglycaemia detection; nutrition reduces incident diabetes and improves metabolic outcomes; and optometry-based or teleophthalmology models can expand retinal screening capacity and improve cost-efficiency.

Conclusions: Diabetes complication prevention is best delivered through a common pathway with shared accountability across disciplines. The strongest model uses nursing-led coordination, registry-supported informatics, standardised laboratory surveillance, proactive nutrition intervention, oral-health integration, and accessible retinal care pathways. Policy support should prioritise preventive financing, interoperable information systems, workforce training, and equity-oriented monitoring.

Keywords: diabetes screening; multidisciplinary care; nursing; health informatics; laboratory testing; dentistry; nutrition; optometry; diabetic retinopathy; chronic kidney disease; prevention; interprofessional collaboration.

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1. Introduction

Diabetes has become one of the defining chronic disease challenges of contemporary health systems. WHO reports that global diabetes prevalence has increased dramatically, with 830 million people living with diabetes in 2022, and records ongoing increases in diabetes-related mortality and treatment gaps, especially in low- and middle-income settings. IDF's 2025 global clinical practice recommendations, drawing on the 2024 Diabetes Atlas estimates, place the burden at 589 million adults aged 20–79 years with diabetes and project continued growth to 2050; they also emphasise that around half of type 2 diabetes cases remain undiagnosed. These numbers matter clinically because delayed diagnosis allows microvascular and macrovascular injury to accumulate before treatment begins [1–4].

Complication prevention is not simply an issue of glucose lowering. WHO highlights regular screening and treatment for complications as a central part of diabetes care, and its 2030 diabetes coverage targets explicitly include diagnosis, glycaemic control, blood pressure control, and statin use. NICE's annual care-process framework captures the same logic operationally through nine basic processes: HbA1c, blood pressure, cholesterol, BMI/weight, smoking review, serum creatinine, urine albumin-to-creatinine ratio, foot examination, and digital retinal screening. ADA guidance similarly embeds kidney, eye, foot, cardiovascular, nutrition, and behavioural care within comprehensive diabetes management [3,5,9,12,21,22].

What remains problematic is fragmentation. Diabetes care often distributes tasks across separate clinics, disease programmes, and professional boundaries. Patients may receive HbA1c checks but miss retinal screening; be referred to a dietitian but never complete periodontal review; or be flagged as eligible for screening without the laboratory order, referral, or follow-up ever being closed. ADA population-health guidance therefore frames diabetes

management as a collaborative, interprofessional enterprise centred on the person with diabetes, supported by care coordinators, registered dietitian nutritionists, diabetes education specialists, eye professionals, social support, and specialist referral as needed. IDF likewise identifies person-centred care, a well-trained multidisciplinary team, and decision-support systems such as registries, reminders, audits, and feedback as core principles of high-quality diabetes management [2,5,10].

The purpose of this manuscript is to synthesise these converging strands into a single integrated model for diabetes screening and complication prevention. The setting is intentionally unspecified. This is important because the manuscript is intended to be portable across primary care networks, mixed public-private systems, hospital-linked ambulatory care, and lower-resource PHC programmes. Where guidelines vary by country or reimbursement context, the manuscript privileges the common international core and identifies where local adaptation is required. The emphasis is on operational questions: who does what, when, with which tests, how referrals are closed, what preventive interventions are triggered, which outcomes should be measured, what implementation barriers arise, and which policy levers support scale-up [3–12].

2. Methods

This manuscript was developed as a structured narrative review and evidence-integrative model paper. Priority was given to official English-language guidance from WHO, ADA, IDF, and NICE, supplemented by recent primary studies, implementation evaluations, and selected systematic reviews that were especially informative for interprofessional workflow design. Emphasis was placed on sources published or updated between 2022 and 2026, while earlier seminal publications were retained where they remained foundational for practice, such as the WHO HbA1c diagnostic report, the ADA nutrition

consensus report, classic nurse-led disease-management studies, and dental chairside screening work [6–10,12–16,23].

The synthesis was guided by five design domains: screening eligibility and diagnostic testing; baseline and ongoing complication surveillance; role definition by specialty; information flow and referral closure; and implementation, cost, and policy implications. For each specialty, evidence was extracted on care roles, workflows, preventive interventions, measurable outcomes, barriers to implementation, and resource considerations. The final model was intentionally framed as a minimum common pathway that can be adapted to national screening intervals, reimbursement rules, workforce scope-of-practice boundaries, and digital maturity [2–13].

This is not a *de novo* systematic review with pooled meta-analytic estimates across all specialties. Rather, it is a policy-facing academic synthesis intended to support service design, manuscript submission, and programme implementation. Accordingly, the “results” section reports an evidence-informed model rather than a single original dataset. That approach is appropriate for the question posed, which concerns integrated multidisciplinary care architecture rather than the efficacy of one intervention in one setting [4,5,17–20].

3. Theoretical background

3.1. Nursing

Nursing is the discipline best positioned to act as the operational integrator of the pathway. Across guideline-based chronic care, nurses commonly perform risk assessment, patient education, foot checks, medication reconciliation, behavioural counselling, reminder calls, and referral tracking. The 2023 systematic review of nurse-led diabetes care found evidence that nurse-led models can reduce glycated haemoglobin in adults with type 1 or type 2 diabetes. A 2019 synthesis of nursing models reported significant improvements in several randomised trials, while classic nurse-

directed disease-management work showed reductions in urgent care and hospital utilisation in underserved minority populations. In practice, nursing therefore becomes the continuity engine that holds together screening, education, surveillance, and escalation [13–15].

In the proposed model, the nurse’s workflow begins before diagnosis. Nurses or advanced nurse practitioners can administer risk questionnaires, identify eligibility for laboratory screening, order or pend screening tests under protocol, and provide immediate counselling on why screening matters. After laboratory confirmation, the nurse completes a structured intake that records symptoms, blood pressure, BMI, smoking status, social context, foot-risk symptoms, and referral needs. The nurse then books the patient into a coordinated first-year bundle: nutrition consultation, renal surveillance, retinal screening, periodontal review, self-management education, and interval HbA1c testing. If the system has digital prompts, the nurse is the primary recipient of “care gaps due” tasks and is responsible for closing the loop, not merely documenting that a referral was given [5,13–16,20].

Nurses also play a particularly important role in complication prevention because many preventive tasks are behaviour-dependent. Daily foot inspection, prompt reporting of visual changes, attendance for retinal photography, oral-hygiene practices, dietary adherence, and programme retention in lifestyle interventions all depend on reinforcement over time. The ADA model explicitly centres care around self-management support, and WHO emphasises long-term, proactive, community-based NCD care. Nursing interventions therefore should include motivational interviewing, culturally sensitive education, medication and device coaching, and practical troubleshooting around transport, cost, language, and competing responsibilities [3–5,13,14].

A focused example comes from Indigenous Australian primary care, where nurse-led

integrated diabetes care was used to support diabetic retinopathy screening pathways. Although coverage remained mixed and context-specific, the study is important because it demonstrates nursing's practical ability to connect routine diabetes review with retinal imaging, follow-up, and patient navigation in settings where specialist access is constrained [16,21].

Key nursing metrics should include percentage of eligible people screened for dysglycaemia, percentage receiving complete first-year complication surveillance, diabetes self-management education completion, foot examination completion, HbA1c change, emergency attendance, unplanned hospitalisation, patient-reported confidence for self-management, and referral closure rates. Major barriers are workforce shortages, inadequate prescribing or ordering authority, documentation burden, and lack of interoperable referral systems. Resource-sensitive policies should therefore fund nurse coordinators, standardise standing orders where lawful, and protect time for non-visit care tasks such as outreach and recall [13–16,22].

3.2. Health Informatics

Health informatics supplies the architecture that prevents multidisciplinary diabetes care from collapsing into disconnected appointments. IDF's 2025 recommendations explicitly identify decision-support systems, including registries, reminders, audits, and feedback, as a core principle of type 2 diabetes care. ADA's population-health guidance similarly argues that collaborative teams need structured systems to avoid therapeutic inertia and to ensure timely intensification, referral, and support [2,5].

The contemporary evidence base shows several mature informatics functions. The Tayside/SCI-Diabetes programme demonstrates how a linked regional diabetes registry can connect laboratory results, prescribing records, general practice records, hospital data, retinal screening, neuropathy, nephropathy, and patient self-

management tools. In that system, clinical decision support prompted clinicians when required tests had not been recorded within 15 months, alerted them when foot or eye screening was overdue, and reminded them about evidence-based treatment gaps such as renin–angiotensin system blockade in microalbuminuria. The authors reported that this “simple support tool” doubled the likelihood of screening for most complications and improved HbA1c. The same ecosystem also included the My Diabetes My Way patient portal, which by the end of 2021 had more than 32,000 active users and was associated with improved satisfaction, quality of life, and cost savings [18,24].

Broader digital evidence points in the same direction. A 2024 review of clinical decision support systems for chronic disease management found positive effects on quality assurance and clinical benefits, especially in cardio-renal-metabolic conditions including diabetes. Meanwhile, the 2025 D-RISK study provides an example of EHR-driven risk prediction to identify undiagnosed dysglycaemia using routinely captured structured data; companion commentary reported area under the curve values of 0.75 in derivation and 0.71 in validation, suggesting practical value for targeted screening rather than universal opportunism alone [17,19,25].

Informatics also improves implementation of basic screening programmes. In a primary care quality-improvement study, baseline diabetes screening among eligible patients was only 51%; the intervention used an EHR report to identify eligible individuals and pended HbA1c orders for clinician signature. That study is significant because it illustrates a low-cost, high-yield informatics strategy: convert passive eligibility into active pending work items embedded in routine workflow [20,26].

The proposed informatics workflow should therefore include: a live diabetes and prediabetes registry; automated identification of screening-eligible adults; overdue-task prompts for

albuminuria, retinal screening, foot exam, lipid checks, nutrition review, and periodontal review; shared dashboards by clinician, clinic, and population subgroup; closed-loop referral tracking; patient-facing reminders by SMS, app, or portal; and exportable audit reports. Interoperability is crucial. Results of retinal AI screening, laboratory tests, and dental referrals should return to the shared record, and not remain locked in departmental silos [2,5,17–20].

Important informatics metrics include panel capture, percentage of eligible adults screened, percentage of people with diabetes completing all

annual care processes, time from abnormal result to action, referral completion, no-show rate, alert response time, portal engagement, and equity stratification by deprivation, geography, sex, age, and ethnicity where lawful and feasible. Major barriers include poor interoperability, alert fatigue, absent data governance, underdeveloped patient portals, digital exclusion, and insufficient implementation support. Policy implications include national or regional minimum datasets, data-sharing agreements, support for digital public infrastructure, and explicit reimbursement for asynchronous digital care tasks [3–5,12,17–20].

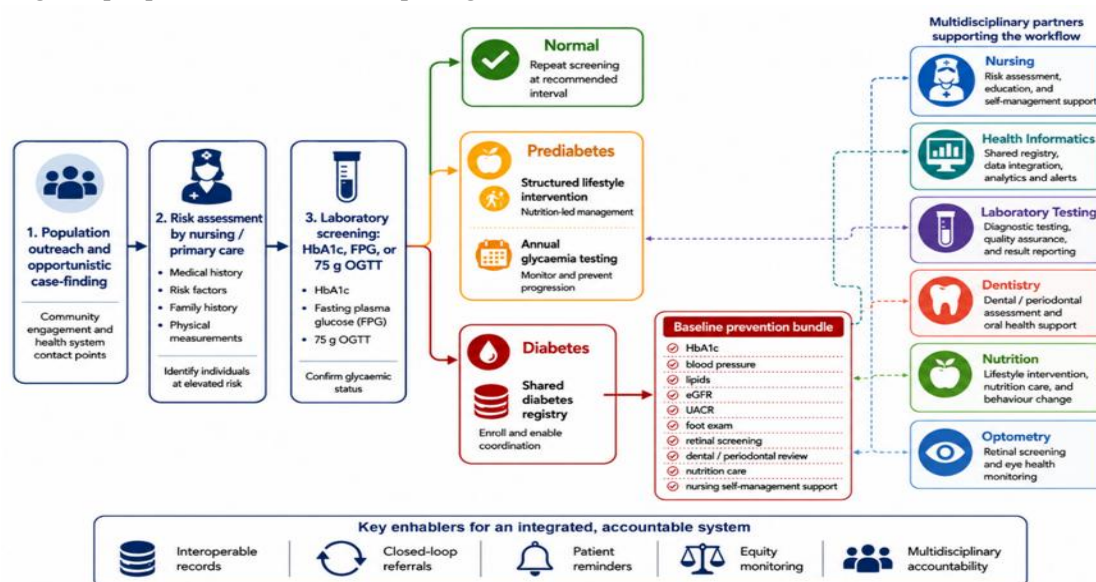


Figure 1. Integrated multidisciplinary workflow for diabetes screening and complication prevention

3.3. Laboratory Testing

Laboratory testing is the decision gateway of the model. Its first role is accurate diagnosis. ADA 2026 recognises three principal tests for screening and diagnosis—fasting plasma glucose, 2-hour plasma glucose during a 75 g OGTT, and HbA1c—and defines diabetes as HbA1c 6.5% or higher, fasting plasma glucose 126 mg/dL or higher, or 2-hour plasma glucose 200 mg/dL or higher on OGTT, with confirmatory testing required in the absence of unequivocal hyperglycaemia. WHO's HbA1c consultation remains highly relevant because it anchors the need for standardised, quality-assured HbA1c

assays and reminds clinicians that HbA1c below the diagnostic threshold does not rule out glucose-defined diabetes [6,7,29].

Its second role is surveillance. ADA recommends glycaemic assessment at least twice yearly, and more often—generally every three months—when targets are not being met or treatment changes occur. Lipid testing should be obtained at diagnosis or initial medical evaluation and then according to treatment status, including annual monitoring after statin initiation or dose change. Kidney surveillance should include annual albuminuria and eGFR monitoring so that CKD can be detected early, progression can be tracked,

and nephrology referral or renoprotective treatment can begin in time. NICE's annual care process indicator translates these biochemical requirements into a service-level performance denominator [12,21].

The integrated laboratory workflow should start with reflexive protocol design. When a person screens positive on risk assessment, the order set should offer HbA1c, fasting glucose, or OGTT according to local standards, with automatic flags for repeat confirmation where necessary. Once diabetes is confirmed, a "new diabetes bundle" should populate baseline HbA1c, serum creatinine/eGFR, urine albumin-to-creatinine ratio, lipid profile, and other locally indicated tests. In low-resource settings, WHO PEN supports prioritised use of cost-effective essential diagnostics through PHC protocols, emphasising organised information and referral systems as part of equitable care [4,6,12,21].

Laboratory services also contribute to complication prevention through quality assurance and interpretation stewardship. HbA1c can be misleading in some contexts, including haemoglobinopathies, altered red-cell turnover, and certain anaemias, making glucose-based testing important. ADA notes that point-of-care HbA1c testing can enable immediate treatment decisions but may be less accurate than laboratory assays. Laboratories, therefore, are not passive processors of samples; they are active partners in algorithm choice, quality control, alert thresholds, and result interpretation [6,7,21].

Appropriate laboratory metrics include screening completion rate among eligible adults, turnaround time, rate of confirmatory follow-up after abnormal screening, percentage of people with diabetes with current HbA1c and kidney tests, detection rate of albuminuria and CKD, specimen rejection rate, and assay standardisation compliance. Barriers include absent fasting capacity for some patients, cost of NGSP/IFCC-standardised assays, inadequate specimen transport, fragmented test ordering, and clinician

uncertainty about which glycaemic test to use. Policy solutions include standardised order panels, laboratory accreditation, reflex reporting structures, and financing of essential diagnostics within universal coverage packages [3,4,6–9,21].

3.4. Dentistry

Oral health is often the least integrated part of diabetes care despite good biological and service-delivery reasons to include it. IDF's oral health guideline emphasises that poor glycaemic control is associated with infection risk, inflammation can worsen insulin sensitivity, and periodontal disease deserves attention within diabetes care. The document also explicitly notes that the growth of diabetes demands better communication between medical and dental professionals. More recent consensus work from the European periodontal and primary care communities reinforces that periodontitis is independently associated with diabetes and that periodontal treatment improves diabetes outcomes and surrogate cardiovascular-risk measures, while calling for closer collaboration between oral-health professionals and family doctors in early case detection and management [26].

The clinical role of dentistry in the integrated model is fourfold. First, patients with diagnosed diabetes should receive routine dental and periodontal review, because periodontal disease can impair quality of life, nutrition, and infection control. Secondly, diabetes teams should provide basic oral-health education, including symptoms of gum disease and the importance of regular dental checks; IDF specifically advises encouraging regular attendance and early attention for gum symptoms. Thirdly, dental professionals should communicate findings back to the diabetes team when periodontal disease suggests elevated inflammatory burden or when infection may be affecting glycaemic stability. Fourthly, dental settings can serve as opportunistic case-finding sites for dysglycaemia in high-risk patients with periodontitis, provided that referral pathways and consent processes are robust [26–29].

The evidence on periodontal treatment and glycaemic outcomes is now strong enough to justify inclusion in multidisciplinary prevention pathways. A 2025 systematic review and meta-analysis reported robust evidence that periodontal treatment reduces HbA1c and CRP at three and six months. Earlier and still widely cited intervention reviews also found statistically significant HbA1c reductions after periodontal therapy. The effect size is modest compared with major glucose-lowering drugs, but the importance is strategic rather than competitive: periodontal management addresses an otherwise neglected inflammatory comorbidity and may help improve metabolic control while also preserving dentition and function [27].

An integrated dental workflow can be simple. At annual diabetes review, nursing or primary care staff ask about bleeding gums, loose teeth, dry mouth, pain, chewing difficulty, and last dental attendance. Anyone without regular dental follow-up is advised and assisted to access dental care. Where dentists or dental hygienists participate directly in a diabetes network, shared templates should document periodontal status, treatment plan, and follow-up. In parallel, high-risk dental patients with chronic periodontitis may undergo chairside HbA1c or other locally approved screening with structured referral to primary care. Pilot work on dental-hygienist-led chairside HbA1c screening has shown feasibility, and recent dental-primary care referral pilots further support the concept of dental visits as opportunities to prevent delayed diabetes diagnosis [28,29].

Key dental metrics should include percentage of people with diabetes receiving annual dental or periodontal review, prevalence of reported periodontal symptoms, referral completion, periodontal treatment completion, oral-health quality-of-life measures, and HbA1c change in patients with treated periodontitis. Barriers include reimbursement silos, limited shared records, unclear professional roles, and uneven access to dental services. Since the country setting is

unspecified, the safest policy implication is that oral-health integration should be treated as a core preventive service, with flexible delivery ranging from simple annual symptom surveillance to fully interoperable medical-dental pathways [4,12,26–29].

3.5. Nutrition

Nutrition is central to both screening prevention and complication prevention because it addresses the pathway before diagnosis, at diagnosis, and throughout long-term care. NICE recommends individualised and ongoing nutritional advice delivered by professionals with specific expertise and competencies in nutrition, in forms sensitive to the person's culture, beliefs, readiness for change, and quality of life. For adults with type 2 diabetes, NICE emphasises high-fibre, low-glycaemic-index carbohydrate sources, healthy fats, and integration of dietary advice into a personalised diabetes management plan. ADA's nutrition consensus report similarly supports individualised nutrition therapy and concludes that strong evidence supports its efficacy and cost-effectiveness as part of quality diabetes care [11,23].

For diabetes prevention, the evidence is even more compelling. ADA 2026 recommends referral of high-risk individuals to diabetes prevention programmes targeting at least 5–7% weight loss and at least 150 minutes per week of moderate-intensity physical activity. NICE PH38 recommends an effective intensive lifestyle-change programme for adults at high risk. In the Diabetes Prevention Program, intensive lifestyle intervention originally reduced diabetes incidence by 58% over approximately three years, and long-term follow-up has shown sustained reductions in cumulative diabetes incidence over 21 years. In 2026, further DPP follow-up reported that the original lifestyle intervention was associated with lower multimorbidity risk over long-term follow-up, reinforcing the broader preventive value of lifestyle care [9,10,16, 24,25].

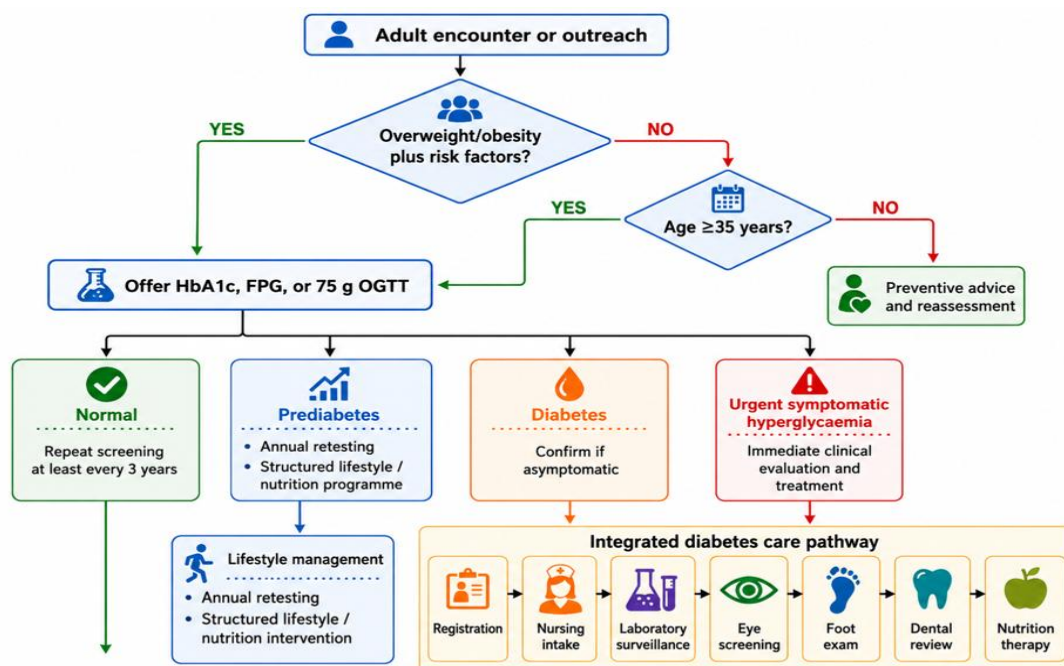


Figure 2. Integrated diabetes detection and complication prevention.

Within the proposed multidisciplinary model, nutrition work should be stratified into three streams. The first is prediabetes prevention: structured lifestyle programmes with weight, eating-pattern, and physical-activity goals. The second is new diabetes care: rapid nutrition assessment addressing meal pattern, food security, cultural eating practices, weight trajectory, medication-related eating risks, and cardio-renal priorities. The third is complication-sensitive nutrition: adaptation for CKD, frailty, wound healing, oral-health limitations, and obesity treatment. Since the country is unspecified, the model should not over-prescribe one dietary pattern. Instead, it should insist on evidence-based individualisation, energy deficit for those needing weight loss, and frequent follow-up rather than one-off advice [9–12,23–25].

The nutrition workflow should be tightly coupled to nursing and informatics. Adults identified with prediabetes should be referred automatically to a structured prevention programme. Adults with diabetes should receive dietetic or nutrition-specialist review as part of the baseline bundle, with plans documented in the shared record.

Follow-up intensity should reflect risk: monthly or bimonthly in active weight-loss phases, then maintenance monitoring thereafter. Outcomes should include weight change, waist or BMI trajectory, HbA1c, lipids, blood pressure, diabetes incidence in prediabetes cohorts, attendance and retention rates, food-security screening, and patient-reported dietary self-efficacy [11,23–25].

Important barriers include limited access to registered dietitians or trained nutritionists, low reimbursement, short consultation times, inequitable access to healthy food, and poor integration between weight-management, diabetes, and social-support services. Policy implications are therefore substantial: commissioners should cover medical nutrition therapy and diabetes prevention programmes, link them to EHR referral pathways, and align them with broader healthy-food and weight-management policy. NICE's population and high-risk prevention guidance both support this broader whole-system perspective [9–11].

3.6. Optometry

Eye care is the clearest example of a complication-prevention domain that benefits from

multidisciplinary redesign. ADA 2026 recommends that adults with type 1 diabetes receive an initial dilated and comprehensive eye examination five years after onset, and that people with type 2 diabetes receive one at the time of diagnosis. If there is no retinopathy and glycaemic targets are met, screening every one to two years may be considered; if retinopathy is present, at least annual examination is required, and more frequent examination is needed if disease is progressing or sight-threatening. ADA also states that programmes using retinal photography with remote reading or FDA-approved AI algorithms are appropriate strategies to improve access, provided that timely referral pathways for comprehensive eye examination are in place. High-quality fundus photographs can detect most clinically significant disease, but retinal photographs are not a substitute for comprehensive eye examination when abnormalities are found or image quality is poor [22].

Optometry's role in the integrated model is broader than "vision testing." Optometrists can provide baseline or follow-up retinal evaluation, capture and assess fundus images, manage non-urgent review clinics for stable disease, educate patients about retinal risk, improve recall and attendance, and communicate findings back to primary care and diabetes coordinators. Emerging primary-care optometry models are especially promising. A 2024 study of primary care optometry-based diabetic retinopathy review clinics concluded that the service was a novel, safe, and effective addition to hospital-based care. Community and primary care location matter because it reduces travel and can lower non-attendance [30].

AI-enabled and teleophthalmology pathways add further capacity. A Northern Ontario pilot reported that autonomous AI-based screening in primary care was feasible and acceptable, with very high patient satisfaction. Real-world evaluations also indicate that AI systems can

achieve high sensitivity for referable disease and can reduce the human grading burden, allowing ophthalmologists to focus on treatment-requiring cases. Cost studies support this direction: in a universal public health system, a telemedicine optometric-based diabetic retinopathy screening programme achieved the same utility as physician- and ophthalmologist-based models at lower cost per patient, with 100% sensitivity and 74.1% specificity in the evaluated sample [31,32].

The integrated eye-care workflow should therefore use a tiered model. At diagnosis, the diabetes team books the eye examination rather than merely advising it. In places with conventional eye services, this means direct referral to optometry or ophthalmology. In places with imaging infrastructure, it may mean retinal photography in primary care or community clinics, interpreted by trained graders, optometrists, or approved AI, with positive or ungradable cases routed onwards. Every result must flow back into the shared diabetes record. ADA explicitly states that results of all screening examinations should be documented and transmitted to the referring health-care professional, making data return a core quality standard rather than an optional extra [22].

Performance metrics should include screening uptake, time from diabetes diagnosis to first eye screen, image gradability, sensitivity and specificity of screening pathway, referral completion after abnormal findings, time to ophthalmology review, treatment initiation for sight-threatening disease, and non-attendance rate. Major barriers are equipment costs, grader shortages, poor patient awareness, difficulty identifying who is due, and incomplete referral pathways. Qualitative teleophthalmology work has shown that patients and primary care clinicians often have limited familiarity with teleophthalmology, while clinicians struggle to determine when screening is due. These are informatics and pathway-design problems as much as they are eye-care problems [22,30–33], as shown in **Table 1**.

Table 1. Summary of evidence and operational roles by specialty

Specialty	Core role in the pathway	Representative evidence	High-value metrics
Nursing	Risk assessment, triage, education, foot checks, referral closure, self-management support	Nurse-led care improves HbA1c; nursing models improve clinical care processes; nurse-led integrated pathways can support retinal screening and follow-up	HbA1c, screening completion, DSMES completion, emergency utilization, referral closure
Health Informatics	Registries, reminders, dashboards, patient portals, EHR risk prediction, audit and feedback	CDSS improves quality assurance and clinical outcomes; registry-linked systems improve complication screening and HbA1c; EHR reports improve diabetes screening	Eligible adults screened, overdue-task closure, all annual care processes completed, time to action
Laboratory Testing	Diagnostic confirmation, glycemic surveillance, kidney monitoring, lipid monitoring, QA	ADA and WHO diagnostic standards; annual UACR/eGFR for CKD surveillance; standardized HbA1c essential	Turnaround time, confirmatory testing, current HbA1c, current UACR/eGFR, assay quality
Dentistry	Oral-health assessment, periodontal disease management, symptom surveillance, opportunistic dysglycaemia detection	Periodontitis linked to diabetes burden; periodontal treatment improves HbA1c and inflammatory markers; chairside screening feasible in selected dental settings	Dental review completion, periodontal treatment completion, oral-health symptoms, referral uptake
Nutrition	Diabetes prevention, weight management, MNT, culturally tailored dietary care	DPP and follow-up show long-term prevention benefit; NICE and ADA support individualized nutrition therapy	Weight change, diabetes incidence, HbA1c, retention in prevention programs, dietary self-efficacy
Optometry	Baseline and repeated retinopathy surveillance, retinal imaging, teleophthalmology, patient recall	ADA endorses photography and AI-supported access pathways; primary care optometry and telemedicine can reduce costs and expand capacity	Eye-screening uptake, image gradability, abnormal result referral completion, time to treatment

*Table note: Synthesized from references [5, 12–23, 26–33].

4. Multidisciplinary team model

The evidence above supports a team model in which each specialty has a distinct task, but accountability is shared. The person at risk or living with diabetes remains the centre of the pathway. Nursing leads coordination and self-management support; informatics maintains the

live registry and care-gap engine; laboratory testing determines diagnostic status and biochemical risk; nutrition drives prevention and metabolic optimisation; dentistry addresses inflammatory oral disease and opportunistic detection; and optometry or retinal imaging pathways prevent avoidable sight loss. The primary clinician remains

responsible for diagnosis, prescribing, and escalation, but the pathway fails unless the surrounding disciplines are activated early and

their outputs return to a common record [2,4,5,18,21,22], as shown in **Table 2**.

Table 2. Recommended screening tests and intervals for an unspecified integrated-care setting

Domain	Suggested test or review	Recommended timing
Diabetes risk screening	HbA1c, FPG, or 75 g OGTT in adults with overweight/obesity plus risk factors; all others from age 35 years	At eligibility; if normal, at least every 3 years; sooner if risk changes
Prediabetes follow-up	HbA1c or glucose-based testing	Annually
Glycaemic control after diagnosis	HbA1c or equivalent glycaemic assessment	At least twice yearly; every 3 months if not at target or therapy changes
Lipids	Lipid profile	At diagnosis or initial evaluation; thereafter according to risk and therapy, including annual monitoring after statin initiation or dose change
Kidney	Serum creatinine/eGFR and urine albumin-to-creatinine ratio	At least annually; more often with established CKD
Feet	Comprehensive foot evaluation including skin, deformity, neurological and vascular assessment	At least annually; more often in higher-risk feet
Eyes	Dilated eye exam by optometrist or ophthalmologist, or validated retinal imaging pathway with referral backup	Type 2 diabetes: at diagnosis; repeat 1–2 yearly if low risk and no retinopathy, at least annually if retinopathy present
Nutrition	Structured nutrition assessment and MNT	At diagnosis and whenever goals, medications, weight, CKD, frailty, or food access change
Dentistry	Dental and periodontal review, especially where symptoms or access barriers exist	At baseline or first-year bundle, then regular review according to local dental schedule
Lifestyle prevention	Structured diabetes prevention programme	Immediately after prediabetes detection

Table note: synthesized from references [6–12,21,22,26].

5. Results

The evidence synthesis supports an integrated pathway with three linked phases: case-finding and diagnosis, immediate post-diagnosis risk stratification, and a recurring annual prevention cycle. ADA 2026 recommends screening adults with overweight or obesity and one or more risk factors at any age, and screening all others beginning at age 35 years. Fasting plasma glucose,

2-hour plasma glucose during a 75 g OGTT, and HbA1c are each appropriate for screening and diagnosis; prediabetes warrants yearly testing, while normal results should usually be followed by repeat screening at least every three years. HbA1c for diagnosis should be measured in a laboratory using NGSP-certified methods standardised to the DCCT assay, and the WHO 2011 consultation remains explicit that HbA1c of 6.5% or higher can diagnose diabetes but that values below this do

not exclude glucose-defined diabetes. IDF's 2024 position statement on 1-hour plasma glucose adds an important emerging option for earlier risk identification where local capacity supports it, but this is not yet the universal baseline standard [6–9].

Once dysglycaemia is detected, the pathway must immediately differentiate between normal testing, prediabetes, overt diabetes, and urgent symptomatic hyperglycemia. Prediabetes should trigger intensive behavioral intervention. ADA prevention guidance recommends referral to a diabetes prevention programme aiming for at least 5–7% weight loss through a healthy reduced-calorie eating pattern and at least 150 minutes per week of moderate-intensity physical activity. NICE similarly calls for an effective intensive lifestyle-change program for adults at high risk. Long-term trial data from the US Diabetes Prevention Program show durable reductions in cumulative diabetes incidence over 21 years with the original lifestyle intervention, and newer 2026 follow-up data indicate lower long-term

multimorbidity risk after intensive lifestyle intervention compared with placebo [9,10,24,25].

After a diagnosis of diabetes, the integrated care bundle should be initiated without delay. NICE's nine annual care processes and ADA's comprehensive evaluation together provide the operational backbone: glycemic assessment, blood pressure, lipids, renal surveillance with creatinine/eGFR and albuminuria testing, retinal screening, foot risk examination, smoking review, weight/BMI assessment, and targeted referral to dietetic, dental, and other specialist services. ADA also recommends glycemic status assessment at least twice yearly, and more frequently, typically every three months, when goals are not met or therapy changes occur. Lipid profiles should be obtained at diagnosis or the initial evaluation and then monitored according to statin use and cardiovascular risk. Among people with kidney disease or risk, albuminuria and eGFR should be monitored annually, with more frequent monitoring as disease advances [5,12,21,22], as shown on **Figure 3**.

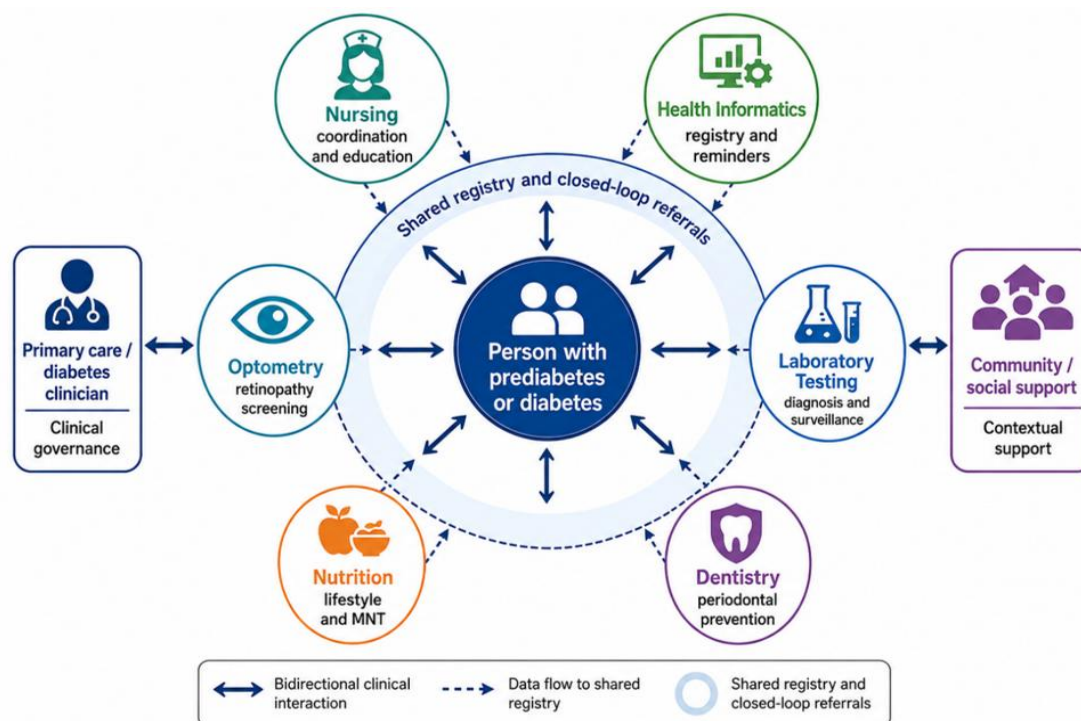


Figure 3. Multidisciplinary team model for integrated diabetes care

6. Discussion

The principal finding of this synthesis is that the most effective diabetes prevention pathway is not a sequence of isolated specialist referrals but a managed cycle with shared data, clear role allocation, and accountability for completed—not merely recommended—preventive actions. This conclusion is consistent with ADA population-health guidance, WHO PEN, and IDF's 2025 multidisciplinary recommendations. It is also supported indirectly by implementation studies: nurse-led disease management improves continuity, EHR-supported screening raises coverage, registry-based systems improve complication detection, and optometric or AI-enabled retinal pathways reduce bottlenecks in specialist capacity [2–5,17–20,30–33].

A key practical implication is that diabetes services should be redesigned around the patient journey rather than the organisational chart. For example, laboratory diagnosis should automatically trigger nursing intake and first-year bundle booking; periodontal symptoms should not wait for the next dental visit to be recognised; retinal screening results must return to the diabetes record; and prediabetes should trigger an active prevention programme rather than casual verbal advice. This “bundle logic” is important because partial completion of surveillance processes is common and leaves high-risk complications undetected until they are clinically advanced [1–5,12,18,20,22,26].

Cost and resource considerations reinforce rather than weaken the case for integration. WHO PEN explicitly argues that integrated PHC approaches are particularly important in low-resource settings because they use limited resources more efficiently and reduce expensive downstream complications. Retinal telemedicine and optometrist-led models can lower per-patient costs; patient portals can generate savings and improve quality of life; and early lifestyle intervention reduces long-term diabetes incidence and multimorbidity burden. The main cost problem in diabetes care is rarely

that preventive care is too expensive; it is that fragmented care finances acute treatment while underfunding coordinated prevention [3,4,18,24,25,31].

Policy implications follow directly. First, health systems should define a mandatory diabetes minimum dataset spanning diagnosis, kidney, eye, foot, weight, smoking, lipid, and oral-health fields. Secondly, commissioners should reimburse structured diabetes prevention programmes, medical nutrition therapy, retinal screening pathways, and care coordination. Thirdly, shared digital infrastructure should support registries, prompts, and closed-loop referrals. Fourthly, service performance should be reported through equity-sensitive measures, not only aggregate averages, because diabetes burden and treatment coverage are strongly shaped by geography, income, and access barriers [1–5,9–12,17–20].

7. Limitations

This manuscript has several limitations. It is an evidence-integrative narrative review rather than a full systematic review with explicit risk-of-bias assessment and quantitative pooling across all included studies. Some areas, especially dentistry and optometry service redesign, rely on heterogeneous implementation studies or pilot designs rather than large multicentre randomised evaluations. The country setting was unspecified, which improves generalisability but limits the precision of recommendations on financing, professional scope of practice, and interval scheduling. Finally, some emerging technologies, including EHR risk scores and retinal AI, have promising evidence but still depend on local validation, regulatory approval, governance, and workflow fit before broad adoption [8,17,19,22,26–33].

8. Recommendations

An implementable service model for an unspecified health system should adopt the following recommendations. All adults meeting risk criteria, and everyone from age 35 years if not

already screened, should undergo structured diabetes screening with a standard ordering pathway and active follow-up of abnormal results. Every new diagnosis should trigger a baseline multidisciplinary bundle comprising nursing assessment, glycaemic and renal laboratory work-up, retinal screening booking, foot-risk examination, nutrition review, and oral-health review. A live registry should track each element and issue reminders until completion. People with prediabetes should be referred automatically to structured lifestyle intervention, with coverage and retention treated as core performance metrics rather than optional extras [6–12,17–22].

Services should train nurses as pathway coordinators, not merely visit support staff. They should finance dietetic or nutrition expertise early in the pathway, not only after complications or treatment escalation. They should build stable referral agreements with dental and eye-care providers. And they should audit performance using coverage, timeliness, and closed-loop communication indicators rather than counting referrals issued. Where digital maturity permits,

EHR-based risk tools, patient portals, telehealth DSMES, retinal imaging, and AI triage may be layered onto this core model [5,17–20,30–33].

9. Conclusion

An integrated multidisciplinary model for diabetes screening and complication prevention is both evidence-based and operationally necessary. The strongest version of such a model is not defined by any single profession; it is defined by reliable coordination among professions. Nursing provides continuity and behaviour-change support; informatics provides visibility and accountability; laboratory services provide accurate diagnosis and longitudinal biochemical surveillance; dentistry addresses an inflammatory and functional domain that diabetes services often neglect; nutrition delivers the most powerful non-pharmacological prevention strategy currently available; and optometry or teleophthalmology protects against avoidable visual loss. When these components are combined within a shared pathway, diabetes care becomes earlier, more preventive, more measurable, and more equitable.

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