Lifestyle Interventions for Treatment and Remission of Type 2 Diabetes and Prediabetes in Adults

A Clinical Practice Guideline From the American College of Lifestyle Medicine

Rosenfeld et al., Am J Lifestyle Med 2025; 19(2_suppl):10S-31S

INTRODUCTION

Diabetes has reached **epidemic proportions globally**, with Type 2 Diabetes (T2D) comprising approximately 90-95% of all cases. The substantial burden on healthcare systems and individual quality of life necessitates evidence-based interventions that address root causes rather than solely managing symptoms through pharmacological approaches.

PURPOSE

This clinical practice guideline provides **comprehensive, evidence-based recommendations** for lifestyle interventions targeting adults with T2D and prediabetes. The guideline synthesizes current best evidence to establish practical strategies for **preventing progression, achieving remission, and optimizing metabolic outcomes** through systematic lifestyle modifications including dietary interventions, physical activity, stress management, and behavioral change strategies.

Evidence Grade	Preponderance of Benefit or Harm	Balance of Benefit and Harm
A	Strong Recommendation	Option
B	Strong Recommendation / Recommendation	Option
C	Recommendation / Option	Option
D	Option	No Recommendation
X	Strong Recommendation / Recommendation	Not Applicable

Six Pillars of Lifestyle Medicine Interventions

🥬 Plant-Predominant Nutrition

Whole food, plant-based dietary patterns

🚴 Physical Activity

Regular exercise and movement

😴 Restorative Sleep

Quality sleep hygiene and duration

🧘 Stress Management

Stress reduction techniques and coping strategies

👥 Social Connectedness

Positive social relationships and support

🚭 Avoidance of Risky Substances

Tobacco cessation and alcohol moderation

Guideline
Key Action Statements
(KAS)

KAS 1: Advocacy for lifestyle interventions

Strong recommendation

Clinicians as Champions

Healthcare providers must advocate for lifestyle interventions as first-line management

Restorative Sleep

Stress Management

Physical Activity

Plant-Predominant Nutrition

Avoiding Risky Substances

Social Connections

Foundation for Comprehensive Diabetes Care

Clinical Impact

Lifestyle interventions

- improve self-management skills,
- increase access to evidence-based care,
- promote shared decision-making,
- empower individuals to take control of their health.

KAS 2: Assessment of baseline lifestyle habits

Strong recommendation

Evaluating the Six Pillars of Lifestyle Medicine

Assess Baseline Habits → **Educate Individual** → **Identify Opportunities** → **Evaluate Readiness**

Assessment Tools Available

Validated questionnaires, brief screening tools, and in-depth assessments are available for each lifestyle domain to facilitate comprehensive evaluation.

Foundation for Personalized Lifestyle Interventions

Motivational Interviewing Integration

Enhancing patient engagement and motivation

OARS Technique

Open questions, Affirmations, Reflective listening, Summary

Scaling Rulers

Assess importance, confidence, and readiness levels

Change Talk

Elicit and reinforce patient motivation for change

Rolling with Resistance

Navigate barriers and ambivalence constructively

Individualized Assessment Leads to Tailored Interventions

KAS 3: Establishing priorities for lifestyle change

Strong recommendation

Clinicians should establish priorities for lifestyle change through shared decision-making using the 6 pillars of lifestyle intervention

Target Population

- Adults with Prediabetes
- Type 2 Diabetes (T2D)
- History of Gestational Diabetes (GDM)

Shared Decision-Making Process

Collaborate with patients to prioritize which lifestyle interventions to focus on first, based on individual readiness, preferences, and circumstances

The SMART Goals Journey

Establishing Priorities for Lifestyle Change

S

SPECIFIC

Clear, detailed, and focused goals that answer what, why, and how

M

MEASURABLE

Quantifiable metrics to track progress and success

A

ACHIEVABLE

Realistic and attainable based on current circumstances

R

RELEVANT

Aligned with patient priorities and health needs

T

TIME-BOUND

Clear deadlines and timeframes for achievement

Goal Setting Examples

✅ SMART Goal Example

"I will walk for 30 minutes, 5 days per week, after dinner for the next 8 weeks, tracking my progress in a journal to improve my cardiovascular health."

❌ Vague Goal Example

"I want to exercise more and eat better to be healthier."

KAS 4: Prescribing aerobic and muscle strength physical activity

Strong recommendation

Clinicians should establish SMART goals using the FITT (frequency, intensity, time, type) framework for implementation in adults with prediabetes, T2D, or history of GDM

FITT Framework
Prescribing Aerobic and Muscle Strength Physical Activity

F

Frequency

Aerobic: Most days of the week
Strength: 2-3 days per week
Non-consecutive days for resistance

I

Intensity

Moderate to Vigorous
Based on individual fitness level
Progress gradually over time

T

Time

Aerobic: 150+ minutes/week
Strength: 8-12 reps per set
Can be accumulated throughout day

T

Type

Aerobic: Walking, cycling, swimming
Strength: Weights, bands, bodyweight
Choose enjoyable activities

Evidence-based recommendations for diabetes management

Aerobic Exercise

Cardiovascular Training

- 150+ minutes per week minimum
- Most days of the week
- Moderate-vigorous intensity
- Walking, cycling, swimming
- Progressive increase over time

Strength Training

Resistance Exercise

- 2-3 days per week
- All major muscle groups
- 8-12 repetitions, 2-3 sets
- Weights, bands, bodyweight
- 48-hour rest between sessions

KAS 5: Reducing sedentary time

Strong recommendation

Clinicians should prescribe physical activity to reduce sedentary time using SMART goals for adults with prediabetes, T2D, or history of GDM.

BREAK FREE From the Sedentary Trap

SMART Goals for Movement

S
Specific
Clear, defined activities like "walk during lunch break"

M
Measurable
Trackable metrics: "Stand every 30 minutes"

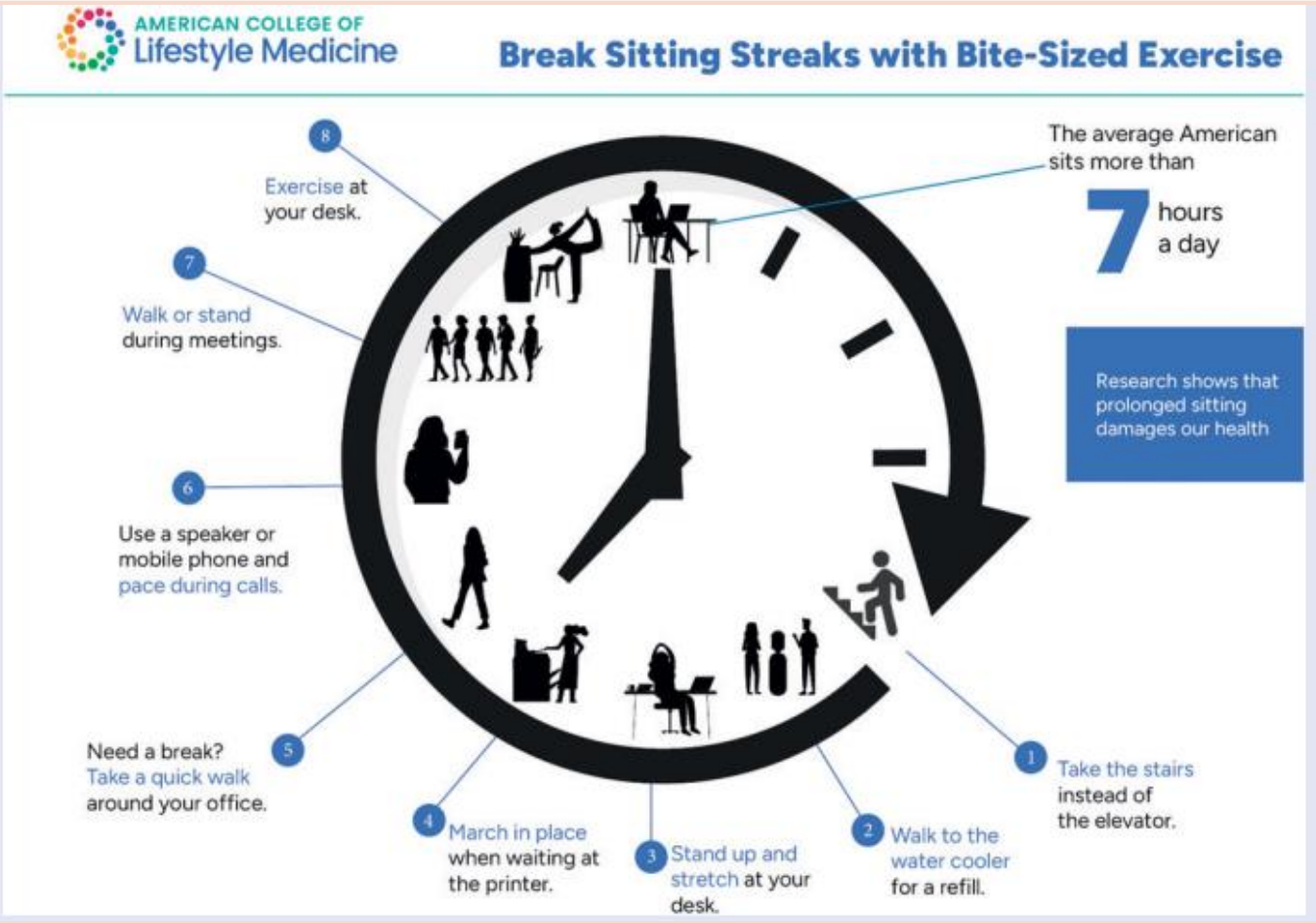
A
Achievable
Realistic for current fitness level and lifestyle

R
Relevant
Tailored to individual needs and health goals

T
Time-bound
Set timeframes: "2-week walking program"

AMERICAN COLLEGE OF Lifestyle Medicine

Break Sitting Streaks with Bite-Sized Exercise



KAS 6: Identifying sleep disorders

Strong recommendation

Sleep Detective Work

Identifying Sleep Disorders in High-Risk Patients

Prediabetes Patients

Adults showing early glucose dysregulation who may benefit from sleep quality assessment to prevent T2D progression

Type 2 Diabetes

Individuals with established T2D where sleep disorders can significantly impact glycemic control and complications

Clinical Assessment Protocol

Systematic Approach to Sleep Disorder Identification

1

Screen & Assess

Evaluate sleep quality, patterns, and duration. Look for signs of sleep disorders including OSA, chronic insomnia, and shift work sleep disorder.

2

Risk Evaluation

Assess diabetes-specific risks including glycemic control impact, cardiovascular complications, and metabolic syndrome progression.

3

Refer & Treat

Provide appropriate referrals for sleep studies when indicated and integrate sleep optimization into diabetes management plans.

KAS 7: Prescribing a nutrition plan for prevention

Strong recommendation

In adults with prediabetes, or a history of GDM, prescribe a nutrition plan using SMART goals that is consistent with the individual's cultural background and is framed in foodbased advice regarding caloric intake, nutrient needs, and the importance of a whole-food, plant-predominant eating plan.

🎯 Implementation Strategies

- 📋 **Assessment:** Evaluate current eating patterns, cultural preferences, and barriers
- 🤝 **Collaboration:** Work with patient to set realistic, culturally-sensitive goals
- 📖 **Education:** Provide practical, food-based guidance rather than just nutrient lists
- 🔄 **Follow-up:** Regular monitoring and adjustment of nutrition plan
- 🏠 **Environment:** Address home and social eating environments

Whole Food, Plant-Predominant Eating

Focus on Minimally Processed, Nutrient-Dense Foods

✅ EMPHASIZE

- Leafy Greens
- Legumes
- Whole Grains
- Nuts & Seeds
- Berries
- Root Vegetables
- Fresh Vegetables
- Whole Fruits

❌ MINIMIZE

- Ultra-processed
- Sugary Drinks
- Refined Sweets
- Processed Meats
- Refined Grains
- High-fat Dairy
- Fast Food
- Added Sugars

Minimally Processed — Moderately Processed — Ultra-Processed

Increase Fiber Intake

Target 25-35g daily from whole plant foods

Colorful Variety

Diverse phytonutrients & antioxidants

Hydration Focus

Water-rich foods & adequate fluid intake

🌎 Cultural Integration & Implementation

Making Plant-Predominant Eating Accessible & Sustainable

Nutrition plans must be consistent with the individual's cultural background and framed in food-based advice that respects traditions while promoting health.

Cultural Adaptation

Bean-based dishes, whole grain tortillas, fresh salsas

Traditional Grains

Brown rice, quinoa, millet integrated into familiar meals

Spice & Flavor

Herbs and spices maintain cultural taste preferences

Budget-Friendly

Dried beans, lentils, seasonal produce, frozen vegetables

Family Involvement

Engaging household members in meal planning

Education & Skills

Cooking classes, meal preparation techniques

KAS 8: Prescribing a nutrition plan for treatment

Strong recommendation

Food-based guidance promoting whole-food, plant-predominant eating patterns.

Dietary Approaches Comparison

Tailored Nutrition Strategies for T2D Management vs. Remission Goals

Glucose Management Focus

Approach	Key Features	Evidence Level
Low-Carb/Keto	Reduce processed/refined foods, limit sugars, focus on whole foods	High
Plant-Based	Emphasize fiber, plant foods, minimize animal products	High
Calorie Restriction	Energy restriction for possible weight loss	Moderate
Mediterranean	Whole grains, fruits, vegetables, healthy fats	High

Remission-Oriented Goals

Strategy	Implementation	Feasibility
Low-Fat Plant-Based	Whole-food focus, minimal processing	Long-term
Very Low-Calorie	Intensive supervision, structured plans	Short-term
Intermittent Fasting	Time-restricted eating patterns	Research-limited
Portion Control	Structured meal planning, education	Long-term

Dietary Approaches Comparison

Tailored Nutrition Strategies for T2D Management vs. Remission Goals

1

Assess & Clarify

Determine T2D remission vs. improvement goals with patient input

2

Individualize

Consider cultural background, preferences, and social context

3

Design SMART

Create specific, measurable, achievable nutrition goals

4

Educate & Support

Provide food-based guidance and implementation strategies

5

Monitor & Adjust

Track adherence, outcomes, and modify approach as needed

🎯 Key Considerations

- ✓ Risk assessment for individual overwhelm or harm
- ✓ Cost implications and food access barriers
- ✓ Cultural food preferences and traditions
- ✓ Social support systems and family dynamics
- ✓ Existing eating patterns and lifestyle constraints
- ✓ Comorbidities and medication interactions

🤝 Collaborative Elements

- ✓ Shared decision-making with patient autonomy
- ✓ Interdisciplinary team coordination
- ✓ Regular follow-up and plan modifications
- ✓ Patient education on whole-food benefits
- ✓ Practical implementation strategies
- ✓ Addressing barriers to adherence

Healthy Foods are Everywhere

ITALIAN

MINESTRONE SOUP
A hearty vegetable soup with beans and pasta.

PASTA PRIMAVERA
A pasta dish with fresh vegetables.

CAPRESE SALAD
Tomatoes, fresh basil, and mozzarella with balsamic vinegar.

MEXICAN

GUACAMOLE
A dip made from avocados, lime juice, onions, and tomatoes.

VEGETARIAN TACOS
Tacos filled with beans, rice, lettuce, tomatoes, and avocado.

CHILES RELLENOS
Poblano peppers stuffed with rice, beans, and vegetables.

INDIAN

DAL
A lentil stew, often served with rice or flatbread.

CHANA MASALA
A spiced chickpea curry.

ALOO GOBI
A dish made from potatoes and cauliflower.

MIDDLE EASTERN

TABBOULEH
A salad made from parsley, bulgur, tomatoes, and mint.

FALAFEL
Balls or patties made from ground chickpeas or fava beans.

HUMMUS
A dip made from blended chickpeas, tahini, lemon juice, and garlic.

CHINESE

MAPO TOFU
Tofu in a spicy sauce made with fermented beans and chilies.

VEGETABLE STIR-FRY
Mixed vegetables stir-fried with soy sauce and garlic.

SPRING ROLLS
Rice paper rolls filled with fresh vegetables and sometimes tofu.

JAPANESE

VEGETABLE SUSHI
Sushi rolls filled with cucumber, avocado, and other vegetables.

EDAMAME
Steamed young soybeans.

MISO SOUP
A soup made from miso paste, tofu, seaweed, and green onions.

THAI

GREEN PAPAYA SALAD
A salad made from shredded green papaya, tomatoes, and green beans.

PAD THAI (VEGETARIAN)
Stir-fried rice noodles with tofu, peanuts, bean sprouts, and lime.

GREEN CURRY (VEGETARIAN)
A spicy curry made with green curry paste, coconut milk, and vegetables.

ETHIOPIAN

INJERA
Spongy flatbread served with a spicy lentil stew.

GOMEN
Collard greens cooked with onions, garlic, and ginger.

SHIRO WAT
A stew made from ground chickpeas or broad beans, onions, garlic, and berbere spice.

Healthy Foods are Everywhere

AMERICAN

BLACK BEAN BURGER
A patty made from black beans, vegetables, and spices.

COLLARD GREENS
Greens cooked with onions and spices.

SWEET POTATO "FRIES"
Baked sweet potato sticks seasoned with salt

GREEK

GREEK SALAD
A salad with tomatoes, cucumbers, olives, onions, and feta cheese.

DOLMADES
Grape leaves stuffed with rice and herbs.

GIGANTES PLAKI
Baked giant beans in a tomato sauce.

VIETNAMESE

FRESH SPRING ROLLS
Rice paper rolls filled with fresh vegetables, herbs, and tofu.

PHO CHAY
A vegetarian version of the traditional Vietnamese noodle soup.

BANH MI (VEGETARIAN)
A sandwich with marinated tofu, pickled vegetables, and fresh herbs.

KOREAN

KIMCHI
Fermented vegetables, often cabbage, seasoned with chili pepper and garlic.

BIBIMBAP (VEGETARIAN)
A rice dish topped with various vegetables, tofu, and a spicy sauce.

JAPCHAE
Stir-fried glass noodles with vegetables.

SPANISH

GAZPACHO
A cold tomato-based vegetable soup.

PATATAS BRAVAS
Fried potatoes served with a spicy tomato sauce.

PISTO
A Spanish ratatouille made with tomatoes, peppers, zucchini, and onions.

BRAZILIAN

FEIJOADA
A black bean stew with vegetables.

MOQUECA DE PALMITO
A palm heart stew with tomatoes, peppers, and coconut milk.

COUVE À MINEIRA
Sautéed collard greens with garlic and onions.

CARIBBEAN

CALLALOO
A leafy green vegetable stew.

RICE AND PEAS
Rice cooked with kidney beans or pigeon peas and coconut milk.

JAMAICAN PATTIES (VEGETARIAN)
Tomatoes, fresh basil, and mozzarella with balsamic vinegar.

AFRICAN (WEST AFRICAN)

JOLLOF RICE
A spiced rice dish with tomatoes and vegetables.

EGUSI SOUP
A thick soup made with ground melon seeds and leafy greens.

KELEWELE
Spicy fried plantains.

KAS 9: Peer/familial support and social connections

Strong recommendation

Counsel adults with prediabetes, T2D, or a history of GDM regarding the importance of cultivating positive social connections provided by peers, family members, and/or other professionals trained in lifestyle change methods to achieve SMART goals and optimize glucose management.

Family Support

Include family members in diabetes education and lifestyle changes. Strong family relationships provide emotional foundation and practical help.

Professional Team

Trained lifestyle professionals, healthcare providers, and specialists work together for comprehensive care.

Peer Connections

Connect with others managing diabetes. Shared experiences create understanding, motivation, and practical strategies.

Community Resources

Utilize local programs, support groups, and community wellness initiatives for broader network support.

Implementation Strategies

Assessment & Planning

Evaluate current support systems and identify gaps. Develop personalized social support plans.

Connect & Engage

Facilitate connections through peer programs, support groups, and family education sessions.

Professional Integration

Coordinate with healthcare teams and lifestyle medicine professionals for comprehensive support.

Monitor & Adjust

Regularly assess support effectiveness and adapt strategies based on individual needs and outcomes.

KAS 10: Identifying need for psychological interventions

Recommendation

In adults with prediabetes, T2D, or a history of GDM, identify or refer to someone who can identify serious mental illness such as severe mood/affective disorders, anxiety disorders, or psychotic disorders.

Mind-Body Connection

Psychological Health in Diabetes Care

- 🧠 **Mental Health Screening**
  Identify mood disorders, anxiety, and psychotic conditions
- 💙 **Stress & Depression**
  Address emotional barriers to diabetes management
- 🎯 **Evidence-Based Interventions**
  CBT and mindfulness-based therapies
- 🔄 **Improved Outcomes**
  Better diabetes control and quality of life

Validated Assessment Tools

Comprehensive Psychosocial Screening for Diabetes Care

Depression

Identifying depressed mood, loss of interest, sleep disturbances, appetite changes, and feelings of worthlessness

- Patient Health Questionnaire (PHQ-9) - 9 items
- Beck Depression Inventory (BDI-II) - 21 items
- Hospital Anxiety and Depression Scale (HADS) - 14 items

Anxiety

Assessing restlessness, excessive worrying, difficulty concentrating, muscle tension, and irritability

- Generalized Anxiety Disorder-7 (GAD-7) - 7 items
- Beck Anxiety Inventory (BAI) - 21 items
- Hospital Anxiety and Depression Scale (HADS) - 14 items

Stress

Measuring emotional responses to external triggers, life changes, irritability, anger, and physical symptoms

- Perceived Stress Scale (PSS) - 10 items
- Physical signs: Muscle pain, digestive issues
- Sleep disturbances and difficulty concentrating

Diabetes Distress

Evaluating emotional burden, stress, guilt, and denial feelings specific to diabetes self-management

- Problem Areas in Diabetes (PAID) - 20 items
- Diabetes Distress Scale (DDS) - 17 items
- Burden of self-management and care concerns

Intervention Strategies

Evidence-Based Psychological Interventions for Diabetes Care

Identify & Screen

Use validated assessment tools to identify serious mental illness including mood disorders, anxiety disorders, and psychotic conditions.

Action: Refer to qualified mental health professionals when serious conditions are identified

→

Prescribe Evidence-Based Therapy

Implement mindfulness-based interventions, Cognitive Behavioral Therapy (CBT), or CBT-based approaches for stress and depression management.

Focus: Address diabetes-related distress, anxiety, and depressive symptoms

→

Monitor & Improve Outcomes

Track improvements in diabetes clinical outcomes, mental health status, and overall quality of life through ongoing assessment.

Result: Enhanced diabetes self-management and better glycemic control

KAS 11: Tobacco, alcohol, and recreational drugs

Strong recommendation

Healthcare providers should assess adults with T2D for tobacco, alcohol, and recreational drug use, and counsel them on how these substances can adversely impact diabetes management.

Substance Use Assessment & Counseling

Tobacco Assessment
Screen for current and past tobacco use patterns

Alcohol Evaluation
Assess drinking habits and potential risks

Recreational Drugs
Evaluate use of recreational substances

Assessment & Screening Tools

Interactive evaluation methods for comprehensive substance use assessment

Readiness Ruler

Assess patient's readiness to change using 0-10 scale

0 3 5 7 10

Importance • Confidence • Readiness

AUDIT-C Screening

Alcohol Use Disorders Identification Test

- Frequency of drinking
- Typical daily consumption
- Heavy drinking episodes

NIDA Quick Screen

Rapid screening for substance use

- Alcohol use patterns
- Tobacco products
- Prescription drugs
- Illegal substances

Implementation Roadmap

Evidence-based approach to substance use counseling in diabetes care

KAS 12: Achieving persondriven, sustained positive behavior change

Strong recommendation

For adults with prediabetes, T2D, or a history of GDM, help individuals achieve sustained, personcentered, positive behavior change using evidence-based approaches including, but not limited to, coaching, motivational interviewing, and cognitive behavioral therapy.

The Behavior Change Journey

Assessment

Identify individual needs, readiness, and barriers to change

Coaching

Person-centered collaborative support and guidance

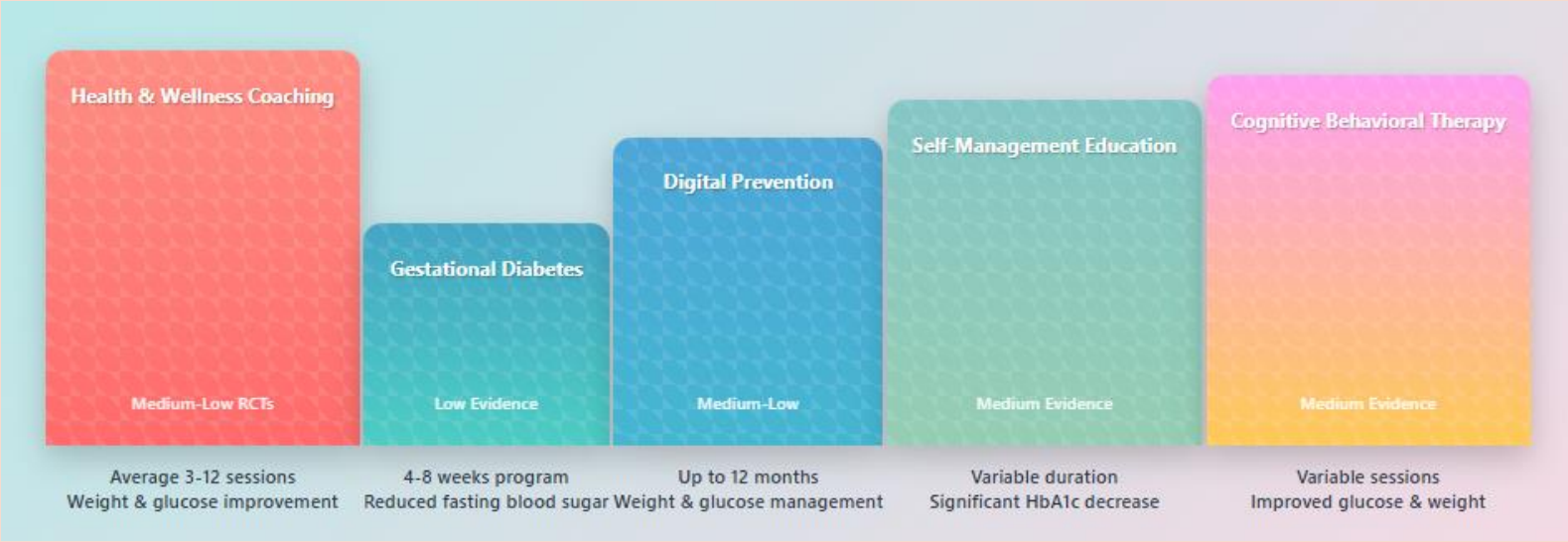
Motivational Interviewing

Explore and resolve ambivalence about change

CBT

Cognitive behavioral therapy for sustained change

Balanced approach focusing on lifestyle, accountability, and health education	Coaching-based lifestyle activity with self-monitoring and family support	Technology-enhanced coaching and counseling with progress tracking	Structured intervention allowing progress tracking and family feedback	Behavior-centered techniques focusing on thought patterns and coping strategies



KAS 13: Establishing a plan for continuity of care

Strong recommendation

For adults with prediabetes, T2D, or a history of GDM, establish a plan for continuity of care that prescribes lifestyle interventions and specifies the frequency of visits, anticipated duration of care, potential need for adjustments of pharmacologic therapy, and expectations regarding the individual's engagement.

Lifestyle Interventions

- ✓ Structured nutrition counseling
- ✓ Physical activity planning
- ✓ Behavioral modification strategies
- ✓ Stress management techniques

Visit Planning

- ✓ Frequency of appointments
- ✓ Anticipated duration of care
- ✓ Potential therapy adjustments
- ✓ Individual engagement expectations

Key Implementation Components

Essential elements for successful continuity of care programs

📈 Frequency & Duration

- → Regular scheduled visits
- → Extended care duration planning
- → Flexible scheduling options

🎯 Glucose Monitoring

- → Track glucose levels consistently
- → Use technology when available
- → Monitor treatment response

💊 Medication Management

- → Regular medication reviews
- → Prompt therapy adjustments
- → Side effect monitoring

🤝 Team Coordination

- → Interdisciplinary care approach
- → Referral to specialists when needed
- → Regular team communication

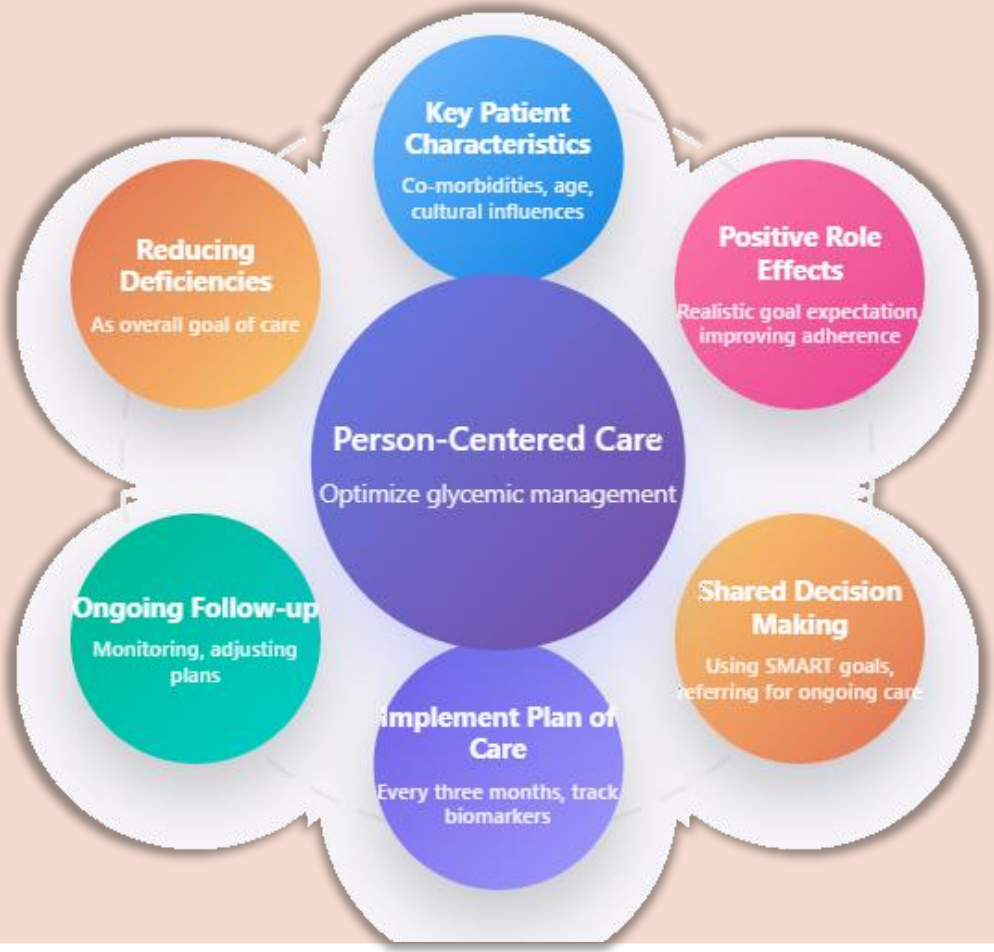
Key Questions for Healthcare Professionals at Follow-Up Visits

What to Bring: Glucose meter, medications, vaccination updates, questions

Be Ready to Discuss: Glucose readings, diet choices, exercise progress, symptoms

Care Team: Doctor, nurse, diabetes educator, foot doctor, eye doctor, pharmacist

Follow-up Schedule: Regular intervals, most often every 3 months with team coordination


Key Patient Characteristics
Co-morbidities, age, cultural influences
Reducing Deficiencies
As overall goal of care
Positive Role Effects
Realistic goal expectation, improving adherence
Person-Centered Care
Optimize glycemic management
Ongoing Follow-up
Monitoring, adjusting plans
Shared Decision Making
Using SMART goals, referring for ongoing care
mplement Plan of Care
Every three months, track biomarkers

KAS 14: Adjusting pharmacologic therapy

Recommendation

For adults with prediabetes, T2D, or a history of GDM, adjust the type and dosing of an individual's pharmacologic therapy based on the impact of lifestyle intervention on their medication needs.

🎯 Target Conditions

- **Prediabetes** - Early intervention opportunity
- **Type 2 Diabetes** - Optimize existing therapy
- **History of GDM** - Prevent progression

⚖️ Adjustment Principle

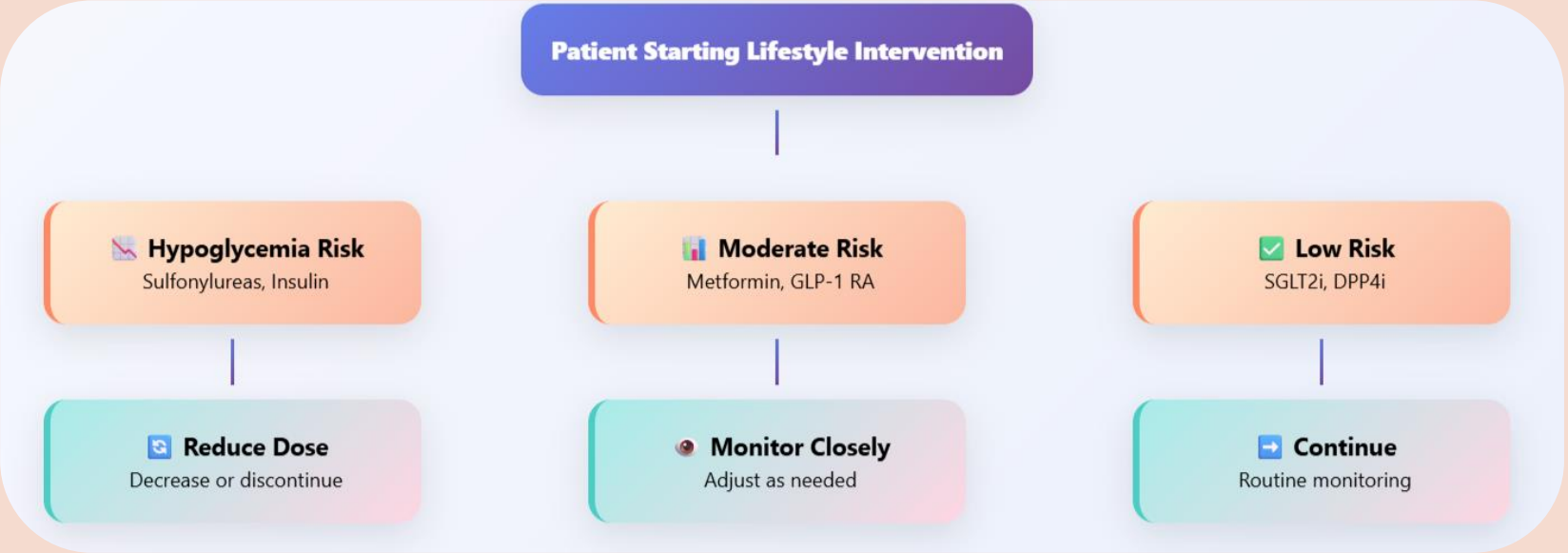
Lifestyle interventions impact medication needs

As patients adopt healthier lifestyles, their pharmacologic requirements may change, requiring careful monitoring and adjustment.

📊 Continuous Monitoring Required

HbA1c	BP	Weight
Primary Target	Secondary	Lifestyle Impact

Smart Medication Adjustment Framework



Key Insight: Deprescribing Approach

- The goal is to achieve remission while minimizing medication burden. Use the ACLM framework to systematically reduce medications as lifestyle improvements take effect.

Implementation & Monitoring Protocol

Pre-Implementation Assessment

- Review current medications
- Identify hypoglycemia risk
- Establish baseline glucose patterns
- Set monitoring frequency

Continuous Glucose Monitoring

- Use CGM when possible
- Self-monitoring blood glucose
- Track patterns and trends
- Document hypoglycemic events

Systematic Dose Reduction

- Start with highest-risk medications
- Reduce by 25-50% initially
- Monitor for 1-2 weeks
- Adjust based on glucose trends

Long-term Optimization

- Aim for medication-free remission
- Maintain lifestyle interventions
- Regular follow-up assessments
- Prevent medication re-escalation

Thank you