

SECTION 2

Diabetes Management Challenges Facing the Patient, Physician, and Payer

The content in this section is based on a presentation at the roundtable meeting by Bruce Niebylski, MD

Guidelines, Consensus Statements, and Incentives for Improved Outcomes in Diabetes

Numerous guidelines and consensus statements concerning diabetes management have appeared within recent years. Newer classes of blood glucose-lowering agents have also been introduced to supplement older therapies such as lifestyle intervention, insulin, and sulfonylureas. Lowering A1C levels through intensive glycemic control has demonstrated improved cardiovascular outcomes in type 1 DM; however, in T2DM, intensive glycemic control over the short term has not demonstrated beneficial CVD effects.³⁴⁻³⁶ These findings, coupled with the added complication of newer and more complex diabetes therapies available to the clinician, have left some practitioners without a clear therapeutic pathway. In light of this, the ADA and the European Association for the Study of Diabetes recently published a consensus management guideline for hyperglycemia management in patients with T2DM.³⁸

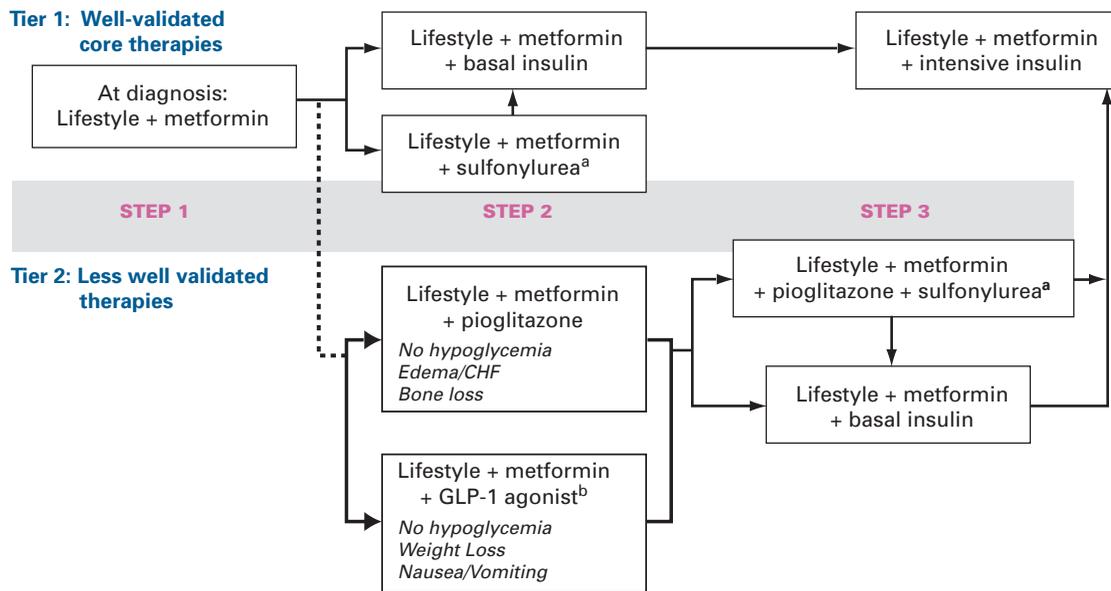
The goal of antidiabetic therapy is to achieve and maintain A1C levels less than 7%. Immediately upon failure to maintain this target, the consensus recommendation calls for a change in interventions as quickly as allowed until the target goal is reached. Also reviewed in the consensus statement is a growing body of evidence indicating that normoglycemia can be achieved by aggressively lowering glycemic levels, especially through the use of insulin, which results in sustained remission that does not require glucose-lowering drugs. Upon diagnosis and initiation of therapy, patients with T2DM should be informed about the progressive nature of the disease, and told that they will likely require upward dosage titration and the addition of glucose-lowering medications as the disease progresses.³⁸

For most patients with T2DM, the tier 1 algorithm represents the preferred therapeutic venue (Figure 2). Over the

years, these practices have demonstrated the greatest success in achieving and maintaining therapeutic and cost-effective A1C target glycemic goals. Metformin therapy is recommended upon diagnosis along with lifestyle intervention; it should be maximally titrated over 1 to 2 months as tolerated. If metformin therapy and lifestyle intervention fails to maintain glycemic goals, within 2 to 3 months of metformin initiation (or whenever target A1C level is not achieved), insulin or a sulfonylurea should be added as a second agent, depending on A1C level and patient-specific considerations. For patients with an A1C level greater than 8.5% or symptoms secondary to hyperglycemia, insulin is the preferred agent. The addition of insulin should be considered for all patients who are having difficulty achieving target A1C goals. Tier 2 therapies are considered “less well validated,” but they may be preferred in certain cases. For example, if avoidance of hypoglycemia is a major concern, pioglitazone or a glucagon-like peptide-1 (GLP-1) agonist may be selected. GLP-1 agonists are a good option if weight loss is an important consideration.³⁸

The Healthcare Effectiveness Data and Information Set (HEDIS) are criteria implemented by more than 90% of health insurance plans to assess performance on healthcare measures. HEDIS measures are carefully developed and involve identifying a clinical area to evaluate, conducting an extensive literature review, developing the measure with recognized experts in the field, reviewing it with various stakeholders, and field-testing it for feasibility, reliability, and validity. HEDIS measures for effectiveness in treating diabetes are depicted in Table 3; these sample results suggest that we are not doing well in managing this chronic condition.³⁹ Healthcare plans in which medical practices participate generally reward participating clinicians financially. Given financial incentive, strong vocational ambition to succeed, and well-designed practice guidelines, it is

Figure 2. ADA and EASD Consensus Algorithm for Initiation and Adjustment of Therapy in T2DM Management³⁸



Reinforce lifestyle interventions at every visit; check A1C every 3 months until A1C is <7% and then at least every 6 months. The interventions should be changed if A1C is ≥7%.

ADA indicates American Diabetes Association; CHF, congestive heart failure; EASD, European Association for the Study of Diabetes; T2DM, type 2 diabetes mellitus.

^aSulfonyleureas other than glybenclamide (glyburide) or chlorpropamide.

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^bInsufficient clinical use to be confident regarding safety

Table 3. HEDIS Diabetic Quality Measures³⁹

Hedis Diabetic Quality Measure	%
Control A1C <7%	35
Control A1C <8%	50
Control LDL cholesterol <100 mg/dL	42
Annual Retinal Exam	73
Annual Nephropathy Screen	84
Control Blood Pressure <130/80 mm Hg	15
Optimal Diabetes Care	10

A1C indicates glycosylated hemoglobin; HEDIS, Healthcare Effectiveness Data and Information Set; LDL, low-density lipoprotein.

disappointing that these data reflect performance with ample room for improvement.

Patient-Centered Challenges

The T2DM diagnosis places many social, economic, and behavioral restrictions on patients because, unlike other medical conditions, diabetes impacts personal habits such as eating, smoking, and exercising, and requires regular glycemic monitoring. Diabetes is also associated with serious comorbidities and

complications, such as the metabolic syndrome and CVD.

Cost: Economics are an issue in diabetes care because patients require medication, monitoring supplies and equipment, and regular office appointments. Over time, patients typically require additions to their therapeutic regimens as comorbidities increase, thereby increasing costs. Nationally, direct costs to treat comorbidities of diabetes such as obesity and CVD are \$90 and \$250 billion, respectively.⁴⁰

Glycemic Monitoring: The optimal frequency of glycemic monitoring in patients with T2DM is unclear. However, the frequency and timing of self-monitored glycemic checks should be individualized to capture peak and valley glycemic levels while minimizing intrusion on personal schedules. Glycemic monitoring is especially important in patients receiving insulin to avoid asymptomatic hypoglycemia or hyperglycemia.²⁹

Medical Literacy: Medical illiteracy among patients (ie, poor understanding of the disease process, medication effects, dosage regimens, and possible side effects) is a frequent cause of medication nonadherence. Patients' comprehension of such

■ **Table 4. Significant Survey Findings Concerning Adherence to Therapeutic Prescription Drug Regimens in the United States⁴⁴**

- Of those polled, 49% reported forgetting to take prescribed medication
- Nearly a third (31%) reported not filling a prescription
- Approximately 3 of 10 (29%) stopped taking medication before their supply had run out
- Almost a fourth (24%) took less medication than the prescribed dosage

Adapted from Enhancing Prescription Medicine Adherence: A National Action Plan. August 1, 2007. National Council on Patient Information and Education.

issues is often overestimated by clinicians, who rarely verify patients' understanding and recall of dosage instructions.⁴¹ In a study of 408 English-speaking and Spanish-speaking inpatients, Schillinger et al found limited health literacy in more than 50% of both patient groups.⁴² The same researchers audiotaped patients' office visits to document physicians' introduction of a new concept, such as dosage adjustment, and the frequency with which the treating clinician assessed the patient's recall and comprehension. Among all office visits, at least 1 new concept was introduced in 82% of visits, but patient recall and comprehension was assessed in just 12% of visits where new concepts were introduced to patients.⁴³ Physicians can ensure that communications are successful by asking patients to review their understanding and explaining the rationale behind the request and the significance of adherence to therapy.

Weight and Physical Activity: Diet and exercise are patient-focused lifestyle issues that must be professionally addressed; however, the successful execution of lifestyle interventions falls primarily on the patient. Weight loss, when sustained over the long term, is the most effective lifestyle therapy to control T2DM. A weight loss of 4 kg is often sufficient to ameliorate hyperglycemia³⁸; therefore, unless there is a contraindication, weight loss and increased activity levels should be incorporated into patients' lifestyles. Excessive eating and a sedentary lifestyle are the major environmental factors contributing to diabetes. Weight loss and exercise contribute to improvement in CVD risk factors such as high blood pressure, atherogenic dyslipidemia, and other obesity-related abnormalities.³⁸ In the presence of these risk factors, diabetes costs have increased substantially.⁴⁰

Adherence to Therapy: Adherence to therapy is particularly problematic in diabetes because adherence to chronic medication is more difficult than adherence to an acute regimen, and diabetes regimens tend to become more complicated

■ **Table 5. Patient-Centered Reasons for Nonadherence to Therapy⁴⁵**

- Perceptions of nature and severity of disease
- Denial of disease and need of medication
- Assumption that medication can be discontinued upon "feeling better"
- Undervalued appreciation of adherence to therapy
- Unqualified beliefs concerning therapeutic efficacy
- Medication requirement for asymptomatic conditions (antihypertensives for high blood pressure)
- Social stigma associated with medication requirements
- Fears of side effects, drug addiction, and dependence
- Fears of needles (injections)
- Lack of confidence in ability to follow drug regimens
- Media influences imparting fear of some medications
- Lack of motivation to positively change behavior

Adapted from Peyrot M, et al. *Diabetes Care*. 2010;33(2):240-245.

over time. A recent survey commissioned by the National Community Pharmacists Association found that nearly 75% of Americans report not taking their medications as directed (Table 4).⁴⁴ Many factors that contribute to patients' non-adherence are related to their experiences, perceptions, and understanding of the disease (Table 5). Poor adherence is responsible for a constellation of comorbidities, including disease progression and complications, functional loss, reduced quality of life, and premature death.

Adherence to insulin regimens in T2DM is particularly important because it represents a therapeutic cornerstone as the most effective glucose-lowering agent.³⁸ In order to identify adherence barriers to insulin therapy, Peyrot et al recently conducted an Internet survey of 502 patients with type 1 DM or T2DM in the United States and assessed independent associations of demographic-, disease-, and injection-specific factors with nonadherence to insulin therapy. A synopsis of interview results is provided in Table 6. Fifty-seven percent of survey participants reported omitting insulin doses despite a thorough understanding of their therapeutic value, and 20% of respondents reported skipping injections sometimes or often.⁴⁵ Those significantly less likely to skip injections were older, disabled, of higher household income, or maintained a healthy diet. Students with the highest education level or those with T2DM, and those whose injection regimens required more frequent dosing, were significantly more likely to skip injections. Measures of injection burden and experience independently associated with higher injection omissions and accounting for an additional 10% variance were planning activities around injections, injections that interfered with activities of daily living, pain, and embarrassment. Results from this study imply that a substantial number of patients with T2DM report missing insulin doses with at least

Table 6. Injection Patterns Associated with Intentional Insulin Injection Omissions⁴⁵

	T1DM (n = 114)	T2DM (n = 388)
Insulin injection device (pen/syringe)	33/67	29/71
Daily injection frequency	3.5 (1.3)	2.5 (1.3)
Plan daily activities around insulin injections ^a	32	19
Interference with eating and exercise ^a	1.9 (0.8)	1.6 (0.8)
Interference with activity of daily living	0.7 (1.3)	0.5 (1.0)
Dissatisfaction with time needed for injection ^b	1.9 (0.9)	2.1 (0.9)
Dissatisfaction with injection ease of use ^b	1.9 (0.9)	2.0 (0.9)
Dissatisfaction with injection pain ^b	2.2 (0.9)	2.3 (0.9)
Dissatisfaction with injection inflammation/bruising ^b	2.4 (0.9)	2.5 (1.0)
Dissatisfaction with injection embarrassment ^b	2.1 (0.9)	2.0 (0.9)
Negative affect toward injections ^c	1.6 (0.7)	1.9 (0.9)
Worry about hypoglycemia ^a	2.8 (1.0)	2.7 (0.9)
Skip insulin injections ^d	1.7 (0.7)	1.8 (0.8)

T1DM indicates type 1 diabetes mellitus; T2DM, type 2 diabetes mellitus.

Data are % or means (SD), unless otherwise stated. ^a1=not at all, 2=a little, 3=a moderate amount, 4=a great deal; ^b1=very satisfied, 2=satisfied, 3=somewhat satisfied, 4=not at all satisfied; ^c1=strongly disagree, 2=somewhat disagree, 3=somewhat agree, 4=strongly agree; ^d1=never, 2=rarely, 3=sometimes, 4=often.

Reprinted with permission from Peyrot M, et al. *Diabetes Care*. 2010;33(2):240-245.

some degree of regularity. Obviously, it is important to identify these patients and provide counsel concerning potential risks. Much attention has been focused on missed injections in adolescent patients with type 1 DM; however, results of this study suggest that adult patients with T2DM are at higher risk. Other factors contributing to potential risk of omitting injections are lack of personal resources, such as finances, and nonadherence to other components of a T2DM management program, such as diet.

Keys to improving adherence include addressing patient behaviors, such as insulin injection omissions, simplifying therapeutic regimens, and reducing costs. Unfortunately, adherence studies are less than encouraging. Cramer et al studied incident rates of oral antihyperglycemic drug (OAH) and insulin dose omissions and correlations between adherence and glycemic control in 15 retrospective and 5 prospective OAH studies and 3 retrospective insulin studies. In patients on therapy for 6 to 24 months, adherence ranged from 36% to 93%. Electronic monitoring studies demonstrated that patients took 67% to 85% of OAH doses as prescribed. Young patients with diabetes filled prescriptions for only 33% of prescribed insulin doses, and insulin adherence among patients with T2DM was 62% to 64%.⁴⁶

Increased drug regimen complexity is associated with diminished adherence to therapy. Several retrospective studies

have demonstrated that adherence to multiple drug regimens decreases by 10% to 20% compared with monotherapy.⁴¹ Using electronic monitoring to compare dosing adherence, Paes et al observed a 79% adherence rate for once-daily dosing while twice and three times dosing adherence dropped to 66% and 38%, respectively. Doses were taken at prescribed times in 77% of once-daily regimens versus 41% and 5% in twice-daily and three times-daily dosing scenarios, respectively, suggesting that less frequent dosing increases adherence.⁴⁷

Medication cost affects adherence. In a US survey of adult patients with T2DM, 11% reported limiting medications within the past year due to cost. Those without prescription coverage predictably reported greater affordability problems than those with coverage. Of those reporting self-reductions in treatment, only 32% reported informing their providers of reductions in therapy and only 37% reported failure to communicate cost concerns with their physicians. Half of the respondents did not think their providers could assist with cost reductions, and 39% did not believe cost was significant enough to discuss with their physicians. Sources for less costly medication and assistance programs are available and should be reviewed with patients whenever possible to afford pharmacoeconomic therapeutic adjustments.^{41,48} Results from a recent study indicate that pharmacist diabetes management recommendations can provide savings to both patients and health plans.⁴⁹

Physician-Centered Challenges

Though ultimately in the hands of patients, physician-centered interaction and communication with patients is critical to optimal adherence and contributes toward improved outcomes. From the previously discussed study concerning medical literacy, patients whose physicians assessed their recall and comprehension had lower A1C levels than patients of physicians who failed to make these assessments.⁴² The study also demonstrated that patients who evaluated their clinicians as good communicators were significantly more adherent to glucose-lowering regimens and recommendations for self-monitoring glycemic levels than patients who rated their clinicians as poor communicators.^{41,50}

Along with physicians' responsibility for communicating medication instructions to patients, they must address perceptions of treatment benefits and side effects (of which patients are often misinformed). Many patients are unaware of the potential interrelationships between T2DM, hypertension, dyslipidemia, and CVD, and because such comorbidities are often asymptomatic, patients may underestimate their significance and the effects of treatment (eg, statins, antihypertensive medications) on these conditions. There are several misperceptions about insulin. For example, in 1 survey, 23% of patients with T2DM who were not taking their insulin reported believing that insulin therapy would not help them, and 48% believed they were prescribed insulin because they had not properly followed their therapeutic regimen.⁴¹

Diabetes is a progressive disease, and therapy for it is counter to physicians' traditional approach to therapy, which is to "start low and go slow." Instinctively cautious, clinicians prefer minimal initial treatment, careful observation, and slow progression of therapy. However, as time progresses, the diabetes disease course characteristically manifests in comorbidities, increasing insulin resistance, declining β -cell function, and increasing A1C concentrations. Disparities in clinical findings have contributed to recent confusion. As reviewed earlier, intensive early lifestyle and pharmacologic intervention was shown to slow disease progression and appeared an optimal T2DM management approach barring contraindications.³³ However, results from later trials indicated that lowering A1C concentrations to near-normal levels was not associated with a reduction in cardiovascular events.³⁴⁻³⁶

Clinicians also face the challenges of ever-evolving diabetes management guidelines, patients' insurance plans, and drug formularies. Many insurance plans have a stepped care "go slow" approach built into them so that prescribing one therapy prior to another, or prior to the expiration of a mandated period of time, may disallow coverage. Payers may also discourage physicians from prescribing certain medications, such as

newer, more expensive injectable medications, through tiered copay schedules or coverage exclusion.

Payer-Centered Challenges

The stepped care approach traditionally embraced by many diabetes formularies was price-based as opposed to outcome-based. In other words, the least expensive medications represented the first step or tier, and as price went up by step, each ascending therapy became more difficult to acquire, either through required prior authorization or through some other means. As such, payers in diabetes care have faced an ever-growing number of newly introduced pharmaceuticals, and become challenged to ensure that stepped-care-based formularies function in parallel with outcomes.

Payer cost controls can contribute to lack of adherence and underutilization in other ways. Copayments may be considerably higher for nongeneric branded drugs, which by definition are the latest treatments approved for use by the US Food and Drug Administration. Patients prescribed combination therapy may fill only the least expensive prescriptions, consequently losing the complementary mechanistic effects of 2 or more medications. Cost-sharing strategies such as tiering, copayments, pharmacy benefit caps, and formulary restrictions can also lead to lower adherence and more frequent therapy discontinuations.

Associations among prescription drug benefits cost-sharing features and prescription drug use were recently reviewed, and it was revealed that increased cost sharing is associated with lower drug treatment rates, lower adherence rates, and more frequent discontinuation of therapy. Prescription drug spending decreased by 2% to 6% (depending on drug class and patient condition) for each 10% increase in cost sharing.⁵¹ Reduced utilization, consistent with cost sharing, was also associated with benefit caps. The degree of formulary restriction was also positively correlated with higher medication costs, more office visits, and higher likelihood of hospitalization in patients with certain conditions. For patients with diabetes, higher copays, cost sharing, and benefit caps were unambiguously associated with greater inpatient and emergency medical services.⁵¹ Another study focused on how changes in cost sharing affect drug use (by therapeutic class) among those who are privately insured and chronically ill. Copayment doubling was associated with decreased utilization in 8 therapeutic classes, including antidiabetic medications, which significantly decreased by 25%. Patients diagnosed with diabetes reduced their use of antidiabetic drugs by 23%.⁵²

ADA Position Statement on Third Party Reimbursement for Diabetes Care

The ADA has taken a stand on diabetes care and health

insurance, and regularly issues a position statement based on diabetes self-management education programs.⁵³⁻⁵⁵ As asserted in the ADA position statement, without systematic self-management education, medical treatment of diabetes is inadequate, and as such, insurers must reimburse for qualified self-management diabetes education programs such as those that meet the ADA's national standards. Third-party payers must also reimburse for diabetes medications and supplies related to daily diabetes care. The ADA applies these same standards to managed care and all organizations' healthcare benefits for members, employees, and participants. Any "controls" imposed through third-party plans must ensure that all classes of antidiabetes therapies with distinctly different mechanisms of action, as well as supplies and equipment, are made available to patients to achieve glycemic goals and minimize complication risks associated with diabetes. Recognizing adherence as a major barrier to achieving glycemic goals, the ADA further asserts that any "controls" should not compromise patients' efforts to comply with therapy, and that without safeguards, "controls" could constitute an "obstruction of effective care."⁵³

Pitney Bowes Diabetes Healthcare Experience

Cost-effective health insurance and diabetes care came to Pitney Bowes' attention in 2000 when per-employee claims versus the benchmark 3% increase spiked by 13%.⁵⁶ Management commissioned an analysis to find population-based factors associated with participants' migration from "normal cost" to "high cost" status and quickly found relationships between

chronic conditions, lack of adherence to pharmaceutical treatment regimens, and future high healthcare costs. Further investigation determined that patients with diabetes who refilled their medications two-thirds of the time or less were most likely to become the costliest. This nonadherence factor led to the questioning of long-held assumptions about cost sharing, price elasticity, and drug accessibility. Similar revelations were demonstrated for asthma and hypertension.

The company dramatically altered plans for patients with diabetes by moving tier 2 and 3 antidiabetes drugs to tier 1, enabling participants to buy brand name medications at the 10% coinsurance (tier 1) rate. The previous cost-share rate was 25% to 50%. Tier 2 and 3 test strips were also moved to tier 1. While not directly tied to pharmacy benefits, the company also improved diabetes wellness and disease management through incentives such as supplying free glucometers. The overall rationale was reduction in healthcare costs through increased adherence enabled by reduced out-of-pocket costs. In turn, optimized preventive care would theoretically reduce costly diabetes complications.

Medication possession rates significantly increased, fixed-dose combination diabetes drug use increased, average total pharmacy costs and emergency department visits decreased 7% and 26%, respectively, and overall direct healthcare costs per diabetes plan participant decreased by 6%. The escalation rate of plan participant healthcare costs has also markedly diminished, with net 2003 per-plan-participant costs approximately \$2500 per year lower than the industry benchmark.⁵⁷