ADOPT TREATMENT ALGORITHM

The organization develops and consistently uses a treatment algorithm for patients with Type 2 diabetes that is consistent with evidence-based guidelines. Care teams and patients determine mutually agreed-upon treatment plans and goals that are individualized to each patient's needs and circumstances. Adherence to the treatment algorithm is monitored.

As defined by the Institute of Medicine (a division of the National Academies of Sciences, Engineering, and Medicine), clinical guidelines are "systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances." Guidelines and algorithms contain recommendations that are based on evidence from rigorous systematic review and synthesis of the published medical literature. Such algorithms support decision making by:

- Describing a range of generally accepted approaches for the diagnosis, management, and/or prevention of Type 2 diabetes.
- Defining practices to help most patients achieve optimal outcomes.

It is critical that clinicians and patients develop individualized treatment plans together, tailored to the specific needs and circumstances of the patient and their mutually agreed-upon goals.

STEPS TO DEVELOP AND CONSISTENTLY USE A TREATMENT ALGORITHM FOR YOUR DIABETES POPULATION

- Create a Guidelines Committee to review your organization's existing diabetes treatment approach or to develop/adopt an algorithm if one does not exist. Most organizations start with nationally endorsed guidelines, such as those noted in Appendix E: Suggested Readings. The Committee should be multidisciplinary, adequately represent your organization, and include primary care, specialists, leadership, and support staff.
- Engage clinicians in algorithm development and review. Those who are involved in the process and feel ownership will be more likely to implement and endorse the tool.
- Create a practical summary that is brief, actionable, and written in plain language.
- Train physicians and other practitioners on the guideline and integrate clinical decision support (e.g., EHR alerts) into the workflow.
- Monitor utilization of the guideline and identify reasons for lack of adoption. Creating a feedback loop will help the organization understand the effectiveness of guideline training and need to revise the guidelines.
- Develop a systematic process for a periodic review of the guidelines as new evidence emerges.
- Leverage transparent data reports (refer to Publish Transparent Internal Reports plank) to promote the effectiveness of algorithm adherence.

TOOL: DIABETES MANAGEMENT ALGORITHM

INTERMOUNTAIN HEALTHCARE

HbA1c: INDIVIDUALIZED GOALS

Current ADA Standards stress individualizing management goals for specific circumstances, including duration of diabetes, life expectancy, comorbid conditions, CVD, hypoglycemia, and patient self-care capacity.[INZ,ADA]

- **For most nonpregnant adults, aim for HbA1c less than 7.0%.**
- **Consider more stringent goals** (e.g., 6.0% to 6.5%) for selected individual patients such as those with short duration of diabetes, long life expectancy, and no significant CVD. **For pregnant patients aim for less than 6.0%.**
- **Consider less stringent goals** (e.g., 7.5% to 8.0%) for patients with a history of severe hypoglycemia, long disease duration, limited life expectancy, advanced complications, or extensive comorbid conditions.

Results of the ACCORD,[ACCO] ADVANCE,[ADVA] and VADT[DUC] studies did not show increased cardiovascular benefits from tight control of diabetes. However, tight control has consistently been shown to reduce the risk of microvascular and neuropathic complications.

Approximate comparison of HbA1c and plasma glucose values[ADA]

HbA1c	Plasma Glucose
6%	126 mg/dL
7%	154 mg/dL
8%	183 mg/dL
9%	212 mg/dL
10%	240 mg/dL
11%	269 mg/dL
12%	298 mg/dL

MANAGEMENT OVERVIEW

Diabetes care is complex, requiring regular medical care and follow-up. Patients with well controlled diabetes should be seen at least every 6 months; those who are not meeting treatment goals should be seen even more frequently.

Good diabetes care focuses on comprehensive management of blood glucose, blood pressure, and lipids and includes regular screening for eye, nerve, and kidney complications. This section of the CPM focuses on some important elements of diabetes care and self-management, namely blood glucose monitoring, medical nutrition therapy (MNT), physical activity, and medication. **It emphasizes individualization of treatment to address the patient's needs, preferences, and values.**

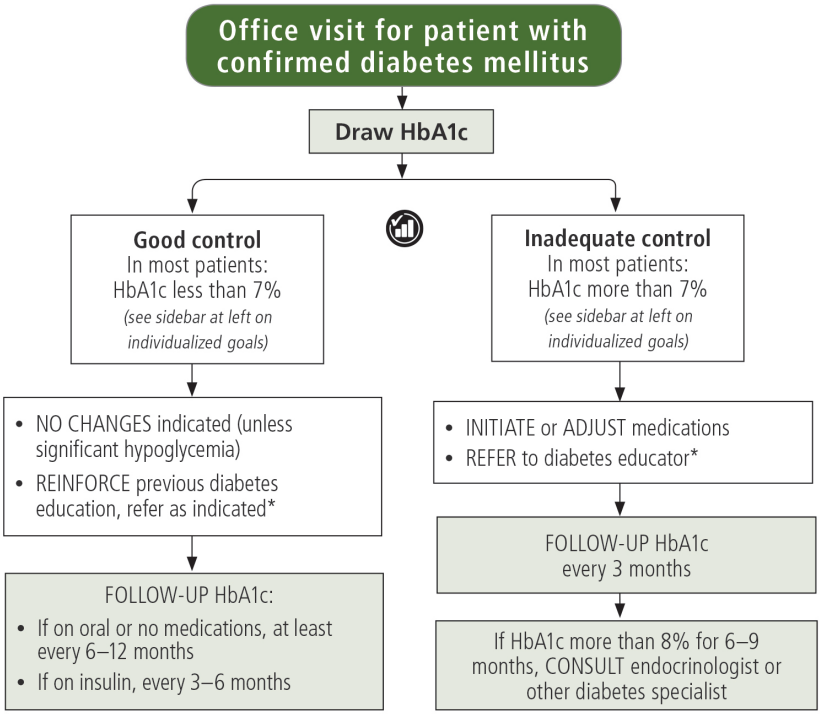
Monitoring blood glucose

The role of HbA1c

HbA1c testing is an indication of the overall trend of blood glucose levels for the previous 2 to 3 months and usually reflects overall diabetes control during that period.

HbA1c measurement can validate or call into question a patient's home record of glucose testing or glucose testing performed in the office. In situations where higher home glucose readings do not match in-office HbA1c, consider conditions causing rapid RBC turnover.

ALGORITHM: MONITORING HbA1c



*** At least annually, reinforce/update patients' diabetes knowledge and skills.** Consider using diabetes educators who are registered dietitians and can provide individualized medical nutrition therapy (MNT).

Indicates an Intermountain measure

The role of self-monitoring blood glucose systems (SMBG)

SMBG helps patients evaluate their individual response to therapy, avoid hypoglycemia, and make necessary adjustments to insulin therapy, medication, medical nutrition therapy (MNT), and physical activity. However, the accuracy of SMBG is dependent on the user and the instrument. Physicians or diabetes educators should teach patients how to do SMBG accurately, and routinely evaluate patients' technique and ability to use the data to adjust their therapy.[ADA]

Providers who manage insulin-treated patients — especially patients using multiple daily injection therapy or insulin pumps — must be able to appropriately analyze patients' SMBG data, including control over specific time intervals, control by time of day (modal day), testing frequency, and glucose variability. Software for this purpose is provided by device manufacturers at no cost. *See sidebar at right for testing guidelines.*

The role of continuous glucose monitoring systems (CGM)

Continuous glucose monitoring (CGM) devices provide continuous feedback to the patients about their glycemic control. When used consistently and in combination with an intensive insulin regimen, they can help lower HbA1c in adults age 25 and older. (Though there is less evidence supporting benefit in children, teens, and young adults, success correlates with consistent use.) In addition, CGM devices can be a valuable supplemental tools for patients with frequent hypoglycemic episodes and/or hypoglycemic unawareness — and significantly reduce the burden of diabetes by reducing fear of hypoglycemia and the pain of frequent testing.

A CGM device consists of a sensor electrode that is inserted into the subcutaneous tissue, a small radiofrequency transmitter, and a monitoring device that stores and displays the data. There are two types of CGM devices:

- **Personal CGM** devices belong to the patient and display subcutaneous glucose values to the patient in real time. An alarm feature alerts the patient when his or her subcutaneous glucose value crosses a prespecified threshold. In addition, these monitors have alarms that will warn the patient when glucose values are changing rapidly, potentially averting hypoglycemia. Several short-term studies have demonstrated their efficacy in lowering HbA1c levels and reducing frequency of hypoglycemia.[BEC,TAM] Most commercial insurance carriers cover CGM; however, the majority of Medicaid plans do not cover it.
- **Professional CGM** devices belong to the clinic or hospital and are used for short periods to give providers detailed information on a patient's glucose control. These devices can help identify patterns leading to hypoglycemia, hyperglycemia, and significant glucose variability. In addition, it can provide quick information on glucose patterns during pregnancy.

The role of continuous subcutaneous insulin infusion (CSII)

CSII (also called insulin pump therapy) is recommended for selected patients with type 1 diabetes and for some patients with insulin-treated type 2 diabetes. These should only be prescribed by experienced clinicians who have the knowledge, skills, and resources to monitor for failure. Adequate pump programs should involve a multidisciplinary team of providers — not just the services of industry-employed trainers and salespersons. Most insurance carriers, including SelectHealth, have liberal criteria for approval of CSII and rely on physician discretion to identify patients who are likely to benefit. Identifying patients appropriate for this technology is complex and beyond the scope of this discussion.

SMBG GUIDELINES

Although we recommend tailoring the frequency and timing of SMBG to individual patients and circumstances, some general guidelines appear below.

Test once a day, or less often:

- Patients who are controlling their diabetes with oral agents or with diet and exercise alone

Test 3 or fewer times a day:

- Patients using less-frequent insulin injections

Test 3 to 4 times a day:

- Patients using multiple insulin doses

Test 4 or more times a day:

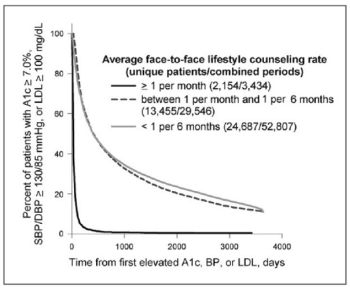
- Pregnant women or patients with hypoglycemic unawareness (4 to 8 times per day)
- Patients having sick days
- Patients modifying therapy
- Patients having hypoglycemia
- Any patient motivated to test this often to achieve best control possible

Coverage for SMBG test strips

- **For all patients:** Sometimes a durable medical equipment benefit is a better alternative than a pharmacy benefit to obtain test strips. Patients should compare both options.
- **For Medicare patients:** Medicare allows 3 test strips daily for patients with type 1 or type 2 diabetes on any form of insulin therapy. To obtain approval for 4 or more tests per day, Medicare requires proof of higher testing frequency (download from glucose monitor), a statement attesting to the need for added tests, and often a record from office notes demonstrating the provider's recommendation for high-frequency testing.
- **For patients without insurance coverage:** Simple meters (usually with no memory or download capability) with names like ReliOn and Truetrack can be significantly less expensive for patients lacking insurance coverage for superior products.

FREQUENT LIFESTYLE COUNSELING HELPS PATIENTS ACHIEVE TARGETS FASTER

Lifestyle counseling in the primary care setting is strongly associated with faster achievement of HbA1c, blood pressure, and LDL cholesterol control. A large retrospective study found that with a face-to-face counseling rate of **at least one time per month,** patients reached goals much faster than with less-frequent rates.[MOR]



NEW SUPPORT FOR LIFESTYLE MANAGEMENT

The 2013 care process model *Lifestyle and Weight Management* provides detailed strategies and tools to help you build a team process around evidence-based guidelines for behavior change, physical activity, nutrition, weight management and other lifestyle factors.

Click the image to open the document, or see page 31 for ordering information.

Lifestyle management

All patients with diabetes and prediabetes should be counseled on lifestyle measures. Lifestyle counseling is associated with better control of HbA1c, blood pressure, LDL cholesterol, and weight, as well as improved overall well-being.[MOR]

The two principal goals of lifestyle intervention are to **achieve a mean loss of ≥7% of initial body weight in overweight patients** and to **increase patient physical activity to ≥175 minutes of moderate intensity a week.** Key components of lifestyle management are medical nutrition therapy, physical activity, behavior modification and accountability, and intensive lifestyle interventions.

Medical nutrition therapy (MNT)

Medical nutrition therapy is an integral component of diabetes management and is covered by most commercial insurance providers and by Medicare.

All patients with prediabetes or diabetes should be referred to a registered dietitian — preferably one specializing in diabetes education — for individualized MNT. MNT includes an individualized meal plan that accommodates the patient's medications and metabolic needs, as well as their eating habits, lifestyle, and readiness to change. Meal plans are adjusted as needed to help patients comply with needed changes and meet goals.

A meal plan includes the following, at a minimum:

- **Amount and type of carbohydrates consumed.** Both quality and quantity of carbohydrate in foods influence blood glucose levels and glycemic response. However, there is no standard regarding the ideal amount of carbohydrate intake for people with diabetes.[ADA] Individualized recommendations should address the total amount of carbohydrate that should be distributed through the day. Consistency in method of carbohydrate monitoring should be encouraged. For good health, dietary patterns should include carbs from fruits, vegetables, whole grains, legumes, and low-fat milk. Promote fiber intake of 25 g to 35 g per day.[BAN] The patient fact sheet *High-Fiber Eating Plan* provides ideas.
- **Timing of meals and snacks.** Monitoring and maintaining a consistent pattern of carbohydrate use is key to achieving glycemic control. Meals should include a mix of macronutrients (carbohydrate, protein, and fat) individualized to meet the patient's metabolic goals and personal preferences.
- **Caloric restriction combined with physical activity to support any needed weight loss.** Weight loss should be gradual and slow. Aim for a rate of 1 to 2 pounds per week. Mediterranean, low-fat, calorie-restricted, or low-carbohydrate diets may all be effective for weight loss.[ADA]

Until a dietitian can provide an individualized meal plan, counsel overweight patients to reduce calories.

- As a temporary guideline, an initial goal is 1200 to 1500 total calories per day for patients <250 pounds, and 1500 to 1800 calories per day for patients >250 pounds.
- Additional recommendations could include limiting fat to <30% of calories (with <7% from saturated fat), and limiting carbohydrates per meal (or split between meal and snack) to 45 to 60 grams for women, and 60 to 75 grams for men.
- Resources such as CalorieCount.com can provide nutrition content of foods. Assistance with healthy food choices is available at ChooseMyPlate.gov. Smart phone apps such as MyFitnessPal can also help patients track nutrients.

Physical activity

Regular physical activity improves blood glucose control and can prevent or delay type 2 diabetes.[COLB] Regular activity also positively affects cholesterol, blood pressure, cardiovascular risk, mortality rates, and quality of life.

Preexercise evaluation. Sedentary patients should be evaluated by a physician before beginning a moderate- to vigorous-intensity exercise program. *See the Exercise is Medicine Physical Activity Questionnaire* for a sample screening tool. Refer to appropriate specialists or provide suggestions for adapting exercise based on individual needs. ***Note:* even patients with known coronary artery disease and stable angina benefit from regular physical activity.**[BOD]

Recommendations. Counsel patients to:

- **Increase activity to ≥175 minutes per week** of moderate- to vigorous-intensity aerobic activity — heart beating faster than normal and breathing harder than normal, such as a brisk walk. Spread activity over at least 3 days per week, with no more than 2 consecutive days between bouts of aerobic activity. While the ADA guidelines recommend ≥150 minutes per week, Intermountain endorses the target of ≥175 minutes used in the Look AHEAD trial based on findings that higher levels of physical activity significantly improve weight loss maintenance and other health outcomes.[DEL] Record patient activity in the *Physical Activity Vital Sign* in the electronic medical record. Casual walking that does not meet at least moderate intensity does not count toward the weekly goal.
- **Increase activity gradually.** Patients who are currently sedentary should start with 10 minutes of walking at moderate intensity 3 days per week, gradually increasing to 5 days per week. Once they are walking on most days, patients should add minutes to achieve 20 minutes on most days, and build toward the goal of 30 to 60 minutes on most days of the week.
- Unless contraindicated, **undertake resistance training 2 days per week**, focusing on major muscle groups and core body conditioning.
- **Decrease time sitting and increase daily movement.** All individuals should be encouraged to break up extended amounts of time sitting (>90 minutes).[ADA] Taking a two- to three-minute walk every 20 minutes has been demonstrated to reduce postprandial glucose and insulin levels in overweight and obese adults.[DUN] Individuals can increase daily movement through activities such as taking the stairs, walking rather than riding in a car, etc.
- **At first, monitor blood glucose before, during, and after physical activity.** Once patients have a sense of how exercise works with their medication, food choices, and other factors that affect blood glucose, they won't need to check levels as often.

Behavior modification and accountability

Diabetes self-care requires modification to daily behaviors that most patients find challenging. For detailed, evidence-based support in this process, *see the Behavior Change Techniques and Tools section of the Lifestyle and Weight Management CPM.*

Patients experiencing difficulty adhering to diet and exercise recommendations, or who lose <1% of weight per month, may require additional assistance. Referral to an intensive lifestyle intervention program (such as *The Weigh to Health*®) or additional contact with a clinician may help. *See sidebar on page 10 for more information.*

DIABETES IN REMISSION

In patients who have had gastric bypass surgery or banding or who have implemented lifestyle and weight management changes, glycemia measures may fall below diagnostic thresholds. Because chronic conditions such as diabetes are never considered to be completely cured, these patients are considered to be in remission. An ADA consensus statement defines remission as the following[BUS]:

- **Partial remission**
  - Hyperglycemia below diagnostic thresholds for at least 1 year, with no active pharmacologic intervention
- **Complete remission**
  - Normal glycemia measures for at least 1 year, with no active pharmacologic therapy
- **Prolonged remission**
  - Complete remission for at least 5 years

Follow-up for patients in remission

The science is limited regarding risk for macro and microvascular complications for patients in remission. The ADA currently recommends the following care:

- Until the patient is in prolonged remission, continue the same follow-up practices as a patient with diabetes.
- Once the patient is in prolonged remission, make a shared decision with the patient on how to monitor based on personal risk factors. At a minimum, this should include HbA1c monitoring every 3 years, which matches the preventive care guidelines.

This shared decision-making tool will help you and your patients to decide on a follow-up plan together.

Diabetes in Remission Fact Sheet. For ordering information see page 31.

THE LOOK AHEAD TRIAL

The Look AHEAD[DEL] trial was a large clinical trial designed to examine the long-term effects of an intensive lifestyle intervention (ILI) in overweight volunteers with type 2 diabetes. Although the trial showed no difference in CVD endpoints compared to the control group, study participants who received ILI experienced:

- Average weight loss of 8.6%
- Significant reduction of HbA1c
- Reduction in several CVD risk factors

The Look AHEAD findings suggest that ILI is associated with partial diabetes remission in patients with type 2 diabetes, particularly in those whose diabetes is of short duration, who have lower HbA1c levels, and who do not yet require insulin therapy.

Consider referring patients to Intermountain's *The Weigh to Health*® program

Intermountain Healthcare's revised *The Weigh to Health*® program is an example of an intensive lifestyle intervention. The program consists of:

- 2 individual sessions with a registered dietitian
- Regular group sessions (an orientation and at least 9 more over 6 months) covering nutrition, exercise, behavior change, and other topics
- At many facilities, a collaborative exercise program (for a small fee)

There is no cost for SelectHealth members who have a BMI over 30 OR have a comorbidity for a diet-related chronic condition (such as diabetes), and who complete the program. Patients who *do not* complete the program pay for the sessions they attended.

Click the image to open the brochure, or refer to page 31 for ordering information.

Intensive lifestyle intervention (ILI)

An intensive lifestyle intervention (also referred to as behavioral intervention) **can provide the support and follow-up necessary for behavior modification.** With passage of the Affordable Care Act (ACA), commercial payers are required to cover an intensive lifestyle intervention *at no cost* to patients with BMI ≥30 or with BMI ≥25 and one or more cardiovascular disease risk factors. Intermountain's *The Weigh to Health*® program *(see sidebar)* is an example of an intensive lifestyle intervention that may be covered by a plan. Medicare and Medicare Advantage do not cover The *Weigh to Health*®, but may have coverage for medical nutrition therapy for select patients.

Bariatric surgery for people with type 2 diabetes

Studies show that bariatric surgery can produce a remission in type 2 diabetes (normal or near-normal glycemia in approximately 55% to 95% of patients with type 2, depending on the surgery).[ADA1] Rates of remission tend to be greater with malabsorptive (bypass) procedures versus restrictive procedures. Additionally, patients with type 2 diabetes of less than two years duration tend to have the best response to bariatric surgery, while those who have had type 2 diabetes for more than 10 years or require insulin therapy may be less response.[VET] For further discussion of diabetes in remission, *see the sidebar on page 9.*

Clinical efficacy. A 2012 study by LDS Hospital researchers published in JAMA[ADAM] showed:

- **Diabetes benefits are enduring.** Among diabetes patients who had diabetes before surgery, 62% were in remission after six years. That compares to 8% and 6% for the nonsurgical groups. Gastric bypass patients who did not have diabetes before the surgery were 5 to 9 times less likely to develop the disease than nonsurgical participants.
- **Weight loss benefits are enduring.** Surgical patients lost an average of 34.9% of their initial weight after surgery, and kept off 27.7% 6 years after surgery. Nearly all the surgical patients, 96%, had maintained more than 10% weight loss from baseline, and 76% had maintained more than a 20% weight loss. By contrast, patients who did not have bariatric surgery either lost no weight or gained weight over the next 6 years.

For primary care providers, we recommend the following:

- **Consider bariatric surgery for patients with type 2 diabetes who have BMI ≥35,** particularly when diabetes or its comorbidities haven't been controlled with medication or lifestyle modifications. This recommendation follows national guidelines.[ADA]
- **Refer patient candidates to a bariatric surgery center** with **(a)** a Board-certified physician with a practice devoted to bariatric medicine; **(b)** the ability to provide presurgical consultation with dietitians, social workers, and other staff who can help patients with nutritional, psychological, and logistical (insurance) issues; and **(c)** follow-up processes and consults to manage postoperative complications and dietary regimens. For more information visit the ASMBS website or the LDS Hospital Bariatric Surgery website.
- **Postsurgery, ongoing lifestyle support is critical.**

Medication

Medication therapy includes oral and injectable antidiabetic agents as well as several classes of insulin.

- **For type 2 diabetes,** oral medication is required for glycemic control if lifestyle modifications don't achieve glycemic control within 2 to 3 months *(see page 11).* Prescribing considerations include the patient's age, weight, any renal or hepatic impairment, and cardiopulmonary comorbidities. Insulin may be used initially (often temporarily) for significant hyperglycemia and is a long-term option for patients on oral agents who still have HbA1c values more than 1% above goal.
- **For type 1 diabetes,** insulin therapy is essential. A regimen that combines long-acting, peakless insulin (basal) and rapid-acting insulin (bolus) most closely mimics normal physiologic insulin production *(see page 15).*
- **For LADA**, insulin therapy will be required eventually, if not immediately. Frequent follow-up is required to assess the patient's blood glucose control and the timing of insulin initiation.

TOOL: DIABETES MANAGEMENT ALGORITHM (CONTINUED)

INTERMOUNTAIN HEALTHCARE

ALGORITHM: TREATMENT OF TYPE 2 DIABETES—A PATIENT-CENTERED APPROACH[INZ]

CONFIRMED TYPE 2 DIABETES

- **EDUCATE** on lifestyle modifications *(see page 8)* and diabetes self-management skills and **CONSIDER REFERRAL** to a qualified **diabetes educator** and a **registered dietitian.**
- **SCREEN** for and treat diabetes related conditions (such as dyslipidemia). *See pages 18 to 28.*
- **ADDRESS** psychological and social issues.

Healthy eating, weight control, increased physical activity, and diabetes education

(a) Monotherapy

	Metformin
Efficacy*	high
Hypo risk	low risk
Weight	neutral / loss
Side effects	GI / lactic acidosis
Costs*	low

If HbA1c target not achieved after ~3 months of monotherapy, proceed to 2-drug combination (order not meant to denote any specific preference — choice dependent on a variety of patient- and disease-specific factors):

(b) Dual therapy†

	Metformin + Sulfonylurea	Metformin + Thiazolidinedione	Metformin + DPP-4 Inhibitor	Metformin + SGLT2 Inhibitor	Metformin + GLP-1 receptor agonist	Metformin + Insulin (basal)
(c) Efficacy*	high	high	intermediate	intermediate	high	highest
Hypo risk	moderate risk	low risk	low risk	low risk	low risk	high risk
(d) Weight	gain	gain	neutral	loss	loss	gain
Side effect(s)	hypoglycemia	edema, HF, fxs	rare	GU, dehydration	GI	hypoglycemia
Costs*	low	low	high	high	high	variable

If HbA1c target not achieved after ~3 months of dual therapy, proceed to 3-drug combination (order not meant to denote any specific preference — choice dependent on a variety of patient- and disease-specific factors):

(e) Triple therapy

Metformin +	Metformin +	Metformin +	Metformin +	Metformin +	Metformin +
Sulfonylurea +	Thiazolidinedione +	DPP-4 Inhibitor +	SGLT2 Inhibitor +	GLP-1 receptor agonist +	Insulin (basal) +
TZD	SU	SU	SU	SU	TZD
or DPP-4-I	or DPP-4-I	or TZD	or TZD	or TZD	or DPP-4-I
or SLGT2-I	or SLGT2-I	or SLGT2-I	or DPP-4-I	or Insulin	or SLGT2-I
or GLP-1-RA	or GLP-1-RA	or Insulin	or Insulin		or GLP-1-RA
or Insulin	or Insulin				

If HbA1c target not achieved after ~3 months of triple therapy and patient (1) on oral combination, move to injections, (2) on GLP-1-RA, add basal insulin; or (3) on optimally titrated basal Insulin, add GLP-1-RA or mealtime insulin. In refractory patients consider adding TZD or SGLTS-1:

(f) Combination injectable therapy†

Metformin +

Basal insulin + **Mealtime Insulin** or **GLP-1-RA**

(a) Initial drug monotherapy

- Begin metformin monotherapy at or soon after diagnosis (unless explicitly contraindicated).
- In patients intolerant of or with contraindications for metformin, select initial drug from other classes depicted and proceed accordingly.
- Metformin use has been associated with a 3-fold increase in vitamin B12 deficiency, which is associated with peripheral neuropathy. Periodic B12 testing is prudent to consider. Clinicians should be aware, however, that the B12 assay has highly variable results. We recommend repeat testing and methylmalonic acid or homocysteine levels to confirm diagnosis, especially in patients with low normal B12 levels. Treatment options include cyanocobalamin 1000 mcg pill taken daily, or 1000 mcg solution injected weekly for a month, then monthly indefinitely.[STA]

(b) Two-drug combinations

- If HbA1c target is not achieved after ~3 months, consider one of the six treatment options combined with metformin.
- Drug choice is based on patient and drug characteristics, with the overriding goal of improving glycemic control while minimizing side effects. Shared decision-making with the patient may help in the selection of therapeutic options.
- Consider beginning therapy with a two-drug combination in patients with HbA1c ≥9%.

(c) Medication Alternatives

- Other drugs not shown (α–glucosidase inhibitors, colesevelam, dopamine agonists, pramlintide) may be used where available in selected patients but have modest efficacy and/or limiting side effects.

(d) Insulin

- Usually basal insulin (NPH, glargine, detemir) in combination with noninsulin agents.
- **Insulin is likely to be more effective than most other agents as a third-line therapy, especially when HbA1c is very high** (e.g., ≥9%.) The therapeutic regimen should include some basal insulin before moving to more complex insulin strategies.

(e) An effective triple therapy

An especially effective option is the combination of metformin + GLP1 receptor agonist + basal insulin. This therapy is associated with less weight gain and greater reduction in HbA1c.

(f) Progression to multiple daily doses of insulin

Consider a more rapid progression from a two-drug combination directly to multiple daily insulin doses — or consider beginning at this stage — in patients with severe hyperglycemia (e.g., HbA1c ≥10% to 12%).

MEDICATION DETAILS

This section gives detailed information on medication — oral agents, non-insulin injectables, and insulin — for the treatment of adult diabetes. **If the patient has chronic kidney disease beyond Stage G2, refer to the Chronic Kidney Disease CPM for necessary dose adjustments.**

TABLE 2. Oral Agents and Non-insulin Injectable Medications

Class	Generic name (SelectHealth commercial formulary status)	Brand name	Usual dosing	2015 AWP cost for 30-day supply* (MAC Cost for generics)	Pros	Cons
biguanides	**metformin** (Tier 1)	Glucophage (Tier 3)	500 mg twice a day (once a day to start) to 1000 mg twice a day (max) Most benefit obtained between 1500–1700 mg/day	**Generic**: 500 mg twice a day: $3 850 mg twice a day: $4 1000 mg twice a day: $4 **Brand name:** 500 mg twice a day: $68 850 mg twice a day: $115 1000 mg twice a day: $139	• Extensive experience • No hypoglycemia • ↓ Weight (preferred for obese patients — most type 2 diabetics) • Favorable lipid effects • Maximum PG effect at 3–4 weeks. • ↓ insulin resistance • Consensus first-line agent	• GI distress (nausea/diarrhea) • B12 deficiency — suggest periodic testing • CHF patients should be stable • Risk of acidosis; STOP with acute illness, dehydration, or IV contrast dyes • Multiple contraindications. Do not use for patients with chronic liver disease, alcoholism, or chronic kidney disease (eGFR <30)
	metformin ER (Tier 1)	Glucophage XR (Tier 3)	500 mg to 1500 mg once a day at dinner	**Generic**: 500 mg once a day: $2 750 mg once a day: $4 1000 mg (2 × 500 mg): $4 1500 mg (2 × 750 mg): $8 **Brand name**: 500 mg once a day: $35 750 mg once a day: $52		
sulfonylureas	**glipizide XL** (Tier 1)	Glucotrol XL (Tier 3)	5 mg to 20 mg once a day (max) [may give dose twice a day]	**Generic**: 5 mg once a day: $5 10 mg once a day: $8	• Extensive experience • Well tolerated • Maximum PG effect at 5 to 7 days	• ↑ Hypoglycemia, especially with reduced GFR • ↑ Weight • Do not use with Prandin, Starlix, or other sulfonylureas • Limited duration of effect
	glimepiride (Tier 1)	Amaryl (Tier 3)	1 mg to 8 mg (max) once a day [may give dose twice a day]	**Generic**: 1 mg once a day: $2 4 mg once a day: $3		
thiazolidinediones	**pioglitazone**	Actos (Tier 3)	15 mg to 45 mg once a day (dosing at bedtime may decrease edema)	**Generic**: 15 mg once a day: $11 30 mg once a day: $13 45 mg once a day: $14	• Option for patients intolerant of metformin • No hypoglycemia • ↓ Serum insulin • Durability • ↓ Triglycerides • Possible ↓ CVD events	• Edema, especially if given with insulin; Adding spironolactone can help • Fluid retention may lead to or exacerbate heart failure or macular edema (If so, discontinue) • Bone fractures • May change metabolism of birth control pills • Slow onset: max effect in 6–12 weeks
DPP-4 inhibitors	**sitagliptin phosphate**	Januvia (Tier 3, step edit)	100 mg once a day [as monotherapy or as combination therapy with metformin or glitazones]	25 mg, 50 mg, or 100 mg once a day: $397	• Can be taken with or without food • No hypoglycemia • No weight gain • Most PG effect within 1–2 weeks of initiation	• Increased cost • Can be used only for type 2 diabetes • Reduce dose with decreasing creatinine clearance <50 — except linagliptin • Possible acute pancreatitis • Possible ↑ Heart failure hospitalizations
	saxagliptin	Onglyza (Tier 3, step edit)	2.5 mg or 5 mg once a day	2.5 mg or 5 mg once a day: $390		
	linagliptin	Tradjenta (Tier 2)	5 mg once a day	5 mg once a day: $397		
	alogliptin	Nesina (Tier 2)	6.25 mg to 25 mg orally once a day	All strengths: $374		

*AWP = Average Wholesale Pricing; MAC = Maximum Allowable Cost. Many patients may benefit from manufacturers' discounts or patient assistance programs.

TABLE 2. Oral Agents and Non-insulin Injectable Medications (continued)

Class	Generic name (SelectHealth commercial formulary status)	Brand name	Usual dosing	2015 AWP cost for 30-day supply* (MAC Cost for generics)	Pros	Cons
SGLT2 inhibitors	**canagliflozin**	Invokana (Tier 2, step edit)	100 mg or 300 mg once a day	All strengths: $411	• Non-insulin dependent — novel MOA • Low incidence of hypoglycemia • ↓ Weight	• ↑ Female genital mycotic infections, UTIs, and increased urination • Volume depletion; Use cautiously in elderly and patients already on diuretic • Possible ↑ risk of bladder cancer (dapagliflozin) • Requires normal renal function (>45 ml/min for empagliflozin and canagliflozin and >60 ml/min for dapagliflozin)
	dapagliflozin	Farxiga (Tier 3, step edit)	5 mg or 10 mg once a day	All strengths: $412		
	empagliflozin	Jardiance (Tier 2, step edit)	10 mg or 25 mg once a day	All strengths: $411		
GLP-1 receptor agonists	**exenatide**	Byetta (Tier 3, step edit)	5 mcg twice a day [within 60 minutes before breakfast and dinner; may be increased to 10 mcg twice a day after 1 month]	5 mcg twice a day: $574	• No hypoglycemia • ↓ Weight • ↓ Postprandial glycemia • Exhibits many of the same glucoregulatory actions of naturally occurring hormones	• Exenatide: Use caution when initiating or when increasing dose from 5 mcg to 10 mcg in CKD Stage G3 • All in this class: – Gastrointestinal side effects (nausea, vomiting, diarrhea) – Training requirements – ↑ Heart rate – Possible acute pancreatitis
	exenatide ER	Bydureon (Tier 3, step edit)	2 mg once every 7 days	2 mg once a week: $570		
	liraglutide	Victoza (Tier 2, step edit)	1.2 mg or 1.8 mg once a day	1.2 mg once a day: (18 mg/3mL pen): $513 1.8 mg once a day: (18 mg/3mL pen): $769		
	albiglutide	Tanzeum (Tier 3, step edit)	30 mg or 50 mg once every 7 days	30 mg or 50 mg once every 7 days: $391		
	dulaglutide	Trulicity (Tier 2, step edit)	0.75 mg or 1.5 mg once every 7 days	0.75 mg or 1.5 mg once every 7 days: $586		
amylin mimetic	**pramlintide acetate**	Symlin (Tier 2, step edit)	**See below	60 injection pen (1.5 mL): $708	Very positive effect on weight loss	Symlin should only be used by providers with significant knowledge of its properties. 3 injections per day brings significant risk of severe nausea and hypoglycemia
	**Dosing instructions for Symlin: • Type 1: 15 mcg immediately prior to major meals; increase at 15 mcg increments to a maintenance dose of 60 mcg or as tolerated. • Type 2: 60 mcg immediately prior to major meals; increase to 120 mcg as tolerated. • When initiating Symlin, reduce insulin dosages, including premixed insulins (70/30).					
combinations (examples only)	**sitagliptin + metformin XR**	Janumet XR (Tier 3, step edit)	Once a day: 100 mg/1000 mg 50 mg/500 mg two 50 mg/1000 mg	All strengths: $397	See notes for individual components *(page 12)*	
	saxagliptin + metformin XR	Kombiglyze XR (Tier 3, step edit)	Once a day: 5 mg/500 mg 5 mg/1000 mg 2.5 mg/1000 mg	All strengths: $390		
	linagliptin + metformin	Jentadueto (Tier 3)	Twice a day: 2.5 mg/500 mg 2.5 mg/1000 mg	All strengths: $397		

*AWP = Average Wholesale Pricing; MAC = Maximum Allowable Cost. Many patients may benefit from manufacturers' discounts or patient assistance programs.

METFORMIN WITH INSULIN FOR PEOPLE WITH TYPE 2 DIABETES[KOO]

A metformin and insulin combination may:

- Prevent weight gain
- Improve glycemic control
- Reduce insulin requirements

Insulin therapy

Patients with type 1 diabetes will require an insulin regimen that combines different insulins to meet basal and meal-time bolus needs. Most patients with type 1 diabetes will be on physiologic regimens. *See the notes and algorithm on the following pages for more information on a physiologic insulin regimen.* To treat patients with type 2 diabetes, keep these general principles in mind when using oral agents with insulin:

- **A basal insulin regimen (bedtime dose of peakless insulin) is our recommended first choice when adding insulin to treatment with oral agents.**
- **Consider the timing of the patient's hyperglycemia when adding or adjusting insulin.**
  - Use glargine or detemir at bedtime to control morning FPG.
  - When morning FPG is controlled with peakless insulin, daytime PPG readings frequently come under control with an oral agent and dietary modification. To control daytime PPG, sulfonylureas, DPP-4 inhibitors, and GLP-1 agonists are most effective.
  - If 2-hour postprandial PG is still above goal with FBG >100 mg/dL, consider physiologic insulin regimen with or without metformin.

TABLE 3. Insulin Profiles

Insulin type	Generic (Brand) name	Description	Onset	Peak	Usual effective duration	2015 30-Day AWP	SelectHealth commercial formulary status
Rapid-acting	aspart (NovoLog)	Clear	10 to 20 minutes	1 to 2 hours	3 to 5 hours	10 mL: $244 FlexPen 15 mL: $471	Tier 2
	glulisine (Apidra)	Clear	10 to 20 minutes	1 to 2 hours	3 to 5 hours	10 mL: $243 SoloSTAR pen 15 mL: $471	Tier 3
	lispro (Humalog)	Clear	10 to 20 minutes	1 to 2 hours	3 to 5 hours	10 mL: $243 KwikPen 15 mL: $470	Not covered
	human (Afrezza)*	Inhalation powder	10 to 15 minutes	1 hour	2 to 3 hours	equivalent to 1000 units: $630	Not covered
Regular (short-acting)	Novolin R Humulin R ReliOn R	Clear	30 to 60 minutes	2 to 4 hours	4 to 8 hours	10 mL: $132 ReliOn R 10 mL: $28	Novolin R: Tier 2 Humulin R: not covered ReliOn R: Not covered†
Intermediate-acting	NPH (Novolin N) NPH (Humulin N) ReliOn N	Cloudy	1 to 3 hours	4 to 10 hours	10 to 18 hours	10 mL: $132 ReliOn N 10 mL: $28	Novolin N: Tier 2 Humulin N: not covered ReliOn N: Not covered†
Peakless	detemir (Levemir)‡	Clear	1 hour	peakless	18 to 24 hours	10 mL: $298 FlexPen 15 mL: $447	Tier 2
	glargine (Lantus)‡	Clear	2 to 3 hours	peakless	24 + hours	10 mL: $298 SoloSTAR pen 15 mL: $447	Tier 2
	glargine U-300 (Toujeo)	Clear	develops over 6 hours	peakless	24 + hours	SoloSTAR pen 14.5 mL: $403	Not covered
Mixes	70/30 (NovoLog Mix) 75/25 (Humalog Mix) 50/50 (Humalog Mix) 70/30 (ReliOn Mix)					10 mL: $253; pen: $471 10 mL: $252; pen: $470 10 mL: $252; pen: $470 10 mL: $28	70/30 NovoLog Mix: Tier 2 Humalog Mixes: not covered ReliOn Mix: not covered†

* **Afrezza contraindications:** asthma, COPD, smokers. Requires PFT monitoring at baseline, 6 months, then yearly. Supplied in 4-unit and 8-unit single-dose cartridges. Dose adjustments are made in 4-unit increments.

† **ReliOn** is available at Walmart and is a possible option for cash-paying patients. Cash price is about $25–$30 per vial.

‡ **Peakless insulin (detemir and glargine):**

- Administer detemir insulin twice a day for type 1 diabetes and at bedtime for type 2 diabetes. Administer glargine insulin once a day for type 1 and type 2 diabetics who require long-acting insulin for control of hyperglycemia.
- Peakless insulin cannot be diluted or mixed with other types of insulin or solutions.
- Administer peakless insulin subcutaneously only — DO NOT give it intravenously.

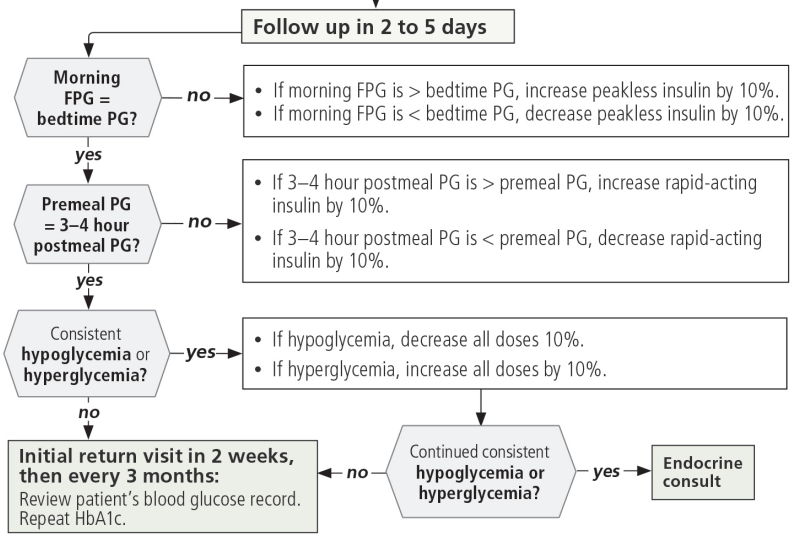
Physiologic insulin regimen: peakless + rapid-acting insulins

Using multiple daily injections (MDI), a physiologic insulin regimen most closely mimics normal insulin physiology. This intensive regimen uses peakless insulin as the basal dose and rapid-acting insulin for control with meals. Almost all type 1 patients require this physiologic (basal/bolus) regimen. Most type 2 patients who require insulin will attain good control with this regimen. For this regimen, we recommend the following:

- **Use peakless insulin to control blood glucose when not eating.** The period between bedtime and breakfast is the best reflection of how this method is working — prebreakfast blood glucose should approximate bedtime blood glucose. A bedtime snack is not required; if desirable, match its carb content with a rapid-acting insulin dose.
- **Add rapid-acting insulin prior to each meal and planned snack.**
  - Adjust this insulin to prevent post-meal hyperglycemia or hypoglycemia. Blood glucose levels 4 hours after a meal should approximate premeal levels.
  - Determine premeal rapid-insulin doses by counting carbohydrates and using an insulin-carbohydrate ratio. Alternatively, base premeal insulin dose on a fixed meal plan (budgeted carbohydrates).
  - Train patients in MNT and insulin use; support with referral to diabetes educator/registered dietitian.
  - Train patients in use of correction dose to treat hyperglycemia. (At bedtime, the correction dose may be reduced to as much as 50% of the usual correction dose.)
- **Teach patients how to modify insulin doses** when exercising, on sick days, to combat significant premeal hypoglycemia, or to prevent delayed postmeal hyperglycemia due to higher fat meals *(see sidebar on page 17)*. Support with referral to diabetes educator/registered dietitian.

ALGORITHM: INITIAL PHYSIOLOGIC INSULIN REGIMEN

- **Use recommended starting doses:** for patients with type 1, the total daily dose (TDD) of insulin is approximately 0.5 U/kg; for those with type 2, TDD is approximately 0.5 to 0.7 U/kg.
- **Teach injection technique.**
- **Divide dose as follows:** One-half of total daily dose as peakless basal insulin dose (glargine once a day or detemir twice a day regimen). Use carbohydrate ratio and correction factor to calculate premeal and bedtime rapid-acting insulin doses.
- **Instruct patient to carefully record SMBG** (before meals, at bedtime).



Insulin requirements vary considerably from patient to patient depending on the degree of insulin deficiency and resistance. These formulas are guidelines for estimating insulin doses. You will likely need to make adjustments to these estimates.

USING THE 1700 RULE

The 1700 Rule can be used to calculate:

- A correction dose of rapid-acting insulin for a high PG reading.
- An insulin-to-carb ratio to approximate the rapid-acting insulin needed to cover the carbohydrate content of a meal.

To calculate either of these doses:

- **Determine the current total daily dose (TDD):** Add up ALL the insulin (rapid and long-acting) the patient takes in a 24-hour period.
- **Divide 1700 by the TDD.** This is the predicted amount (mg/dL) the PG will decrease for each unit of rapid-acting insulin added (correction factor).

To calculate a correction dose:

- **Increase rapid-acting insulin** by the number of units needed to reduce the PG to the desired goal. Encourage patient to keep careful records of resulting PG readings, especially morning FPG, premeal 2-hour PPG, and bedtime PG.

Correction dose example:

- Patient takes 50 units of insulin per day: TDD = 50
- 1700 ÷ 50 = 34 (round to 35, which means that 1 unit of insulin will lower PG by 35 points — correction factor 35)
- If goal is 130 and PG is 165, use 1 extra unit of insulin to drop PG to about 130. If PG is 200, use 2 extra units, and so on.

To calculate an insulin-to-carb ratio:

- **Multiply predicted PG lowering (mg/dL) by 0.33.** This is the number of grams of carbohydrate covered by 1 unit of insulin. For most people, a starting dose would be 1 unit of rapid-acting insulin for every 10 to 15 grams of carbohydrate to be eaten.

Insulin-to-carb ratio example:

- Patient takes 50 units of insulin per day: TDD = 50
- 1700 ÷ 50 = 34 (round to 35, which means that 1 unit of insulin will lower PG by 35 points)
- 35 × 0.33 = 12, which means that you'll need 1 unit of insulin for every 12 grams of carbohydrate anticipated in a meal.

EXAMPLE OF WEEKLY TITRATION SCHEDULE

(Treat-to-Target Trial)[RID]

A large, randomized controlled trial showed that systematically titrating **bedtime basal insulin added to oral therapy** can safely achieve 7% HbA1c in overweight patients with type 2 diabetes as compared to 7.5% to 10% HbA1c in those patients on oral agents alone.

- **Start with 10 IU at bedtime.**
- **Titrate weekly based on FBG values over 3 days**, as shown in the table below.

Forced weekly insulin titration schedule
(for treat-to-target FBG of <120 mg/dL)

Mean of FBG values over 3 days	Increase of insulin dosage (IU/day)
>180 mg/dL	+8
160–180 mg/dL	+6
140–159 mg/dL	+4
120–139 mg/dL	+2

Use glargine or detemir with this titration schedule to significantly reduce nocturnal hypoglycemia. Using insulin can help achieve recommended standards of diabetes care more quickly.

HIGHER DIETARY FAT AND POSTMEAL HYPERGLYCEMIA

Higher dietary fat intake can cause late postprandial hyperglycemia. This can be addressed either by reducing fat intake (especially for type 2 patients on nonphysiologic regimens) and/or by adjusting premeal insulin doses (for type 1 patients on rapid-acting insulin). Practical ways to compensate for a high-fat meal include splitting premeal insulin into 2 injections from 1 to 3 hours apart, or using an extended bolus. The total amount of insulin provided may need to be increased from the usual dose as well. The response to dietary fat will vary according to the individual and the specific foods, so defining insulin adjustments may require multiple attempts.

Basic (nonphysiologic) regimen: NPH + rapid-acting insulin

Basic insulin therapy is not designed to mimic normal insulin physiology. Although a basic regimen is not recommended for type 1 patients, it may provide adequate control for type 2 patients who have not been successful with oral medication combinations or with patients who are not able to manage a multiple daily dose regimen as required in physiologic insulin therapy.

For a basic insulin therapy regimen to be successful, a patient must be consistent with meals and adhere to a medical nutrition therapy plan.

Sample basic insulin regimens

Following are some sample basic insulin regimens.

- **Premixed insulins:** These insulins are all given twice a day (before breakfast and before the evening meal)
  - 70% aspart protamine suspension / 30% aspart injection (NovoLog Mix 70/30)
  - 70% NPH / 30% regular (Novolin 70/30)
- **Split-mixed insulins:** NPH is given twice a day (either morning and before the evening meal, or morning and bedtime) with:
  - Regular insulin before breakfast and before the evening meal

    OR
  - Rapid-acting insulin before breakfast and before the evening meal

Glucose management in special circumstances

Some circumstances — such as when a patient is preparing for a test or procedure, has had a cortisone injection, etc. — may require temporary adjustment to diabetes treatment. We advise the following:

- **Before surgery:** Optimize glycemic control and temporarily stop metformin if appropriate.
- **When patient receives a steroid (injection or oral):** Advise more frequent SMBG and adjust medications as needed. Patients often experience a worsening of glycemic control after an injection.
- **When patient is fasting prior to a test or procedure:** Adjust glucose-lowering medications as needed.
- **Illness:** Consider increasing frequency of blood glucose monitoring. Metformin may need to be held if the patient is at risk for dehydration.

SGAs and metabolic abnormalities

Although the second-generation antipsychotic medications (SGAs) have many notable benefits compared with their earlier counterparts, their use has been associated with reports of significant weight gain, diabetes (even DKA), and a worsened lipid profile (increased LDL and triglyceride levels and decreased HDL cholesterol).[ADAP,NEW] This has led to growing concern about a possible link between these metabolic effects and therapy with SGAs. There are also data that suggest these agents elevate the risk for sudden cardiac death.

The table below shows the metabolic abnormalities associated with various SGAs. Given these findings and the increased use of SGAs, we recommend the following:

TABLE 4. SGAs and Metabolic Abnormalities[NEW]

Generic (brand) name	Weight gain	Risk for diabetes	Worsening lipid profile
clozapine (Clozaril)	+++	+	+
olanzapine (Zyprexa)	+++	+	+
risperidone (Risperdal)	++	+	+
quetiapine (Seroquel)	++	+	+
aripiprazole (Abilify)*	+/–	–	–
ziprasidone (Geodon)*	+/–	–	–

+ = increased effect – = no effect

* newer drugs with limited long-term data

- **Monitor patients regularly (perhaps monthly) after SGA therapy is initiated.** Measure weight, glucose, blood pressure, and lipids.
- **Consider switching the SGA if a patient gains ≥5% of his or her initial weight at any time during therapy.** Note that abruptly discontinuing clozapine has the potential for serious psychiatric sequelae.

IMMUNIZATIONS

Influenza and pneumonia are common and preventable infectious diseases. These diseases are associated with high mortality and morbidity in people with chronic diseases such as diabetes. This CPM recommends the following vaccinations for patients with diabetes:

- **Annual influenza vaccination for all patients over 6 months of age.** Patients with diabetes show an increased rate of hospitalization for influenza. The influenza vaccine can reduce hospital admissions for these patients by as much at 79% during flu epidemics.[COLQ]
- **Pneumococcal vaccine for all adult patients with diabetes.** Patients with diabetes may be at increased risk of bacterial pneumonia and have a high reported risk of nosocomial bacteremia, which has a mortality rate as high as 50%.[SMI] Patients with diabetes need the following pneumococcal vaccines:
  - Age 19 to 64: one dose PPSV23.
  - Age 65 or older: one dose PPSV23. If patient has not previously received PCV13 as an adult, give also one dose PCV13 (preferably before PPSV23). Doses need to be separated by one year.

    Note: CMS-Medicare Part B now covers both PCV13 and PPSV23, given at least one year apart.
- **Hepatitis B vaccination for unvaccinated adults with diabetes under age 60.** In 2013, the Advisory Committee on Immunization Practices of the CDC recommended that all previously unvaccinated adults with diabetes aged 19 through 59 years be vaccinated with 3 doses of hepatitis B vaccine, and that vaccination be considered for those aged ≥60 years, after assessing risk and likelihood of an adequate immune response.[ADA] This acknowledges increased risk of Hepatitis B in institutionalized (e.g., nursing home, prison) patients.

TOOL: DIABETES DECISION GUIDE

SUTTER HEALTH

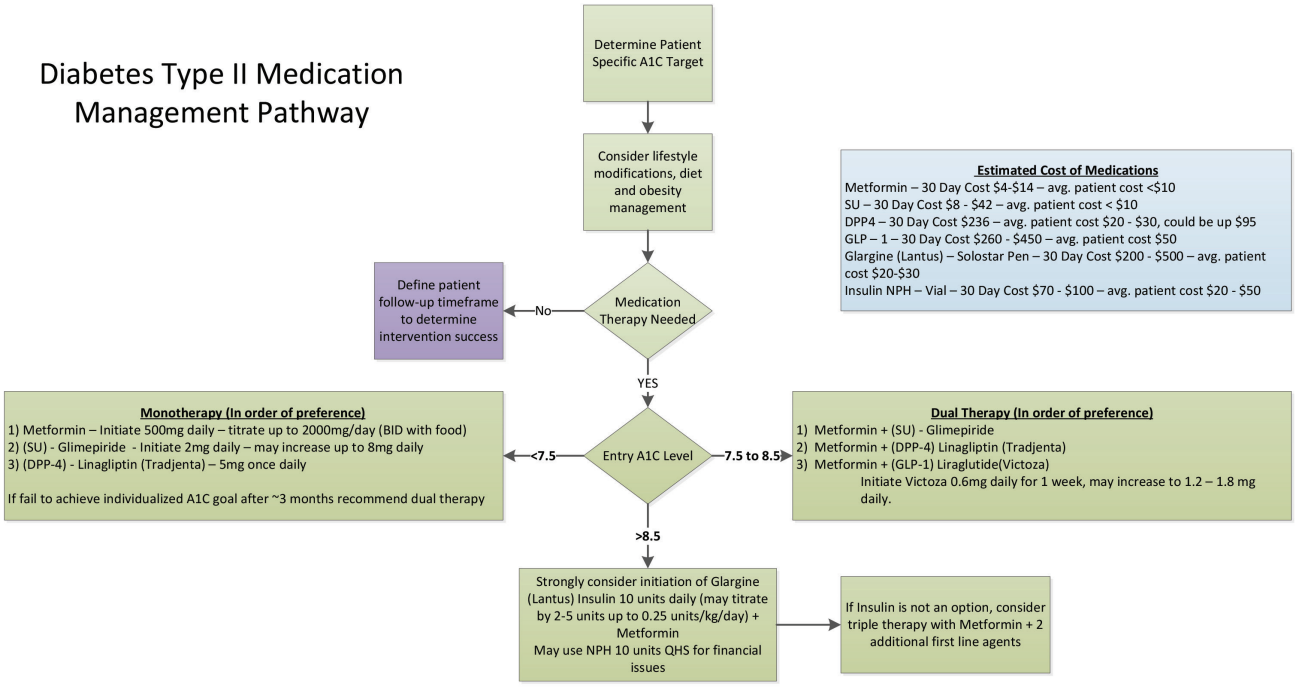
Sutter Health Diabetes Decision Guide - 2015

	Treatment Type	Common Name of Medication	How Works	How Taken	Risks/ Side Effects	A1C Lowering (average)	Risk of Low Sugars	Potential Weight Change (average)	Cost
Lifestyle	Diet, Exercise, Weight Loss, Stress Mgmt.		Liver, Pancreas, Stomach, Brain	Lifestyle change		Variable	Variable	Variable	Variable
Pills	Biguanide	Glucophage Metformin	Liver	Pill Once daily	• Stomach upset • Not if kidney issues	1.0-2.0	No	None	Generic $
	Sulfonylurea	Glipizide, Glimepiride Glyburide	Pancreas	Pill Twice daily	• Low blood sugar	1.0-2.0	Yes	2 lbs gain	Generic $
	Glinide	Starlix Prandin	Pancreas	Pill With meals	• Low blood sugar	0.5-1.0	Yes	2 lbs gain	Generic $
	TZD	Pioglitazone (Actos)	Cells	Pill Once daily	• Swelling • Bladder cancer • Broken bones • Heart problems • Eye problems	0.5-1.5	No	4-6 lbs gain	Generic $
	DPP-4 Inhibitor	Januvia Onglyza Tradjenta, Nesina	Liver, Pancreas, Stomach, Brain	Pill Once daily	• Possible pancreas effects • Unknown long term effects	0.5	No	None	Brand $$$$
	SGLT-2 Inhibitor	Invokana Farxiga Jardiance	Kidney	Pill Once daily	• Dehydration/dizziness • Yeast and urinary tract infections • Kidney issues/high potassium • Unknown long term effects • Possible diabetic ketoacidosis	0.5-1.0	No	4-6 lbs loss	Brand $$$$
Injections	GLP-1 Therapy	Byetta (2x/day) Victoza (1x/day) Bydureon (1x/wk) Trulicity (1x/wk) Tanzeum (1x/wk)	Liver, Pancreas, Stomach, Brain	Injection Once daily or Once weekly	• Stomach upset • Not if thyroid cancer • Possible /pancreas effects • Affected by kidney issues • Unknown long term effects	1.0-2.0	No	4-6 lbs loss	Brand $$$$
	Basal Insulin	Lantus, Levemir Toujeo (U-300) NPH	Slow release	Injection Once daily		Unlimited	Yes	2-4 lbs gain	Brand $$$$
	Mealtime Insulin	Humalog, Novolog Apidra, Regular Afrezza (inhaled)	Rapid release	Injection With meals					
	Premix Insulin	70/30 Novolog 75/25 Humalog	Mixed slow and rapid	Injection Twice daily					

TOOL: DIABETES PATHWAYS

CORNERSTONE HEALTH CARE, P.A.

Diabetes Type II Medication Management Pathway



Condition Specific / Contraindication Recommendations				
**	USE	OK to USE	Less Preferable	Contraindicated
Weight Loss Desired	Metformin,GLP-1	Tradjenta	SU, Insulin	
Renal Failure	DPP-4, GLP-1	Other DPP-4(dose adjusted), TZD	Insulin	Metformin, SU
CHF / CVD	Metformin, Insulin	DPP-4, GLP-1	SU	SU, TZD
Hypoglycemia Concern	Metformin	DPP4, GLP1, TZD	SU, Insulin	

**1) Adopted from AACE Comprehensvie Diabetes management Algorithim, Endo Prac, 2013: 19. Pg 328-336

**2) ADA Position Statement: Standards of Medical Care in Diabetes-2012. Diabetes Care, Volume 35, Supplement 1, P S11-S63: Jan 2012

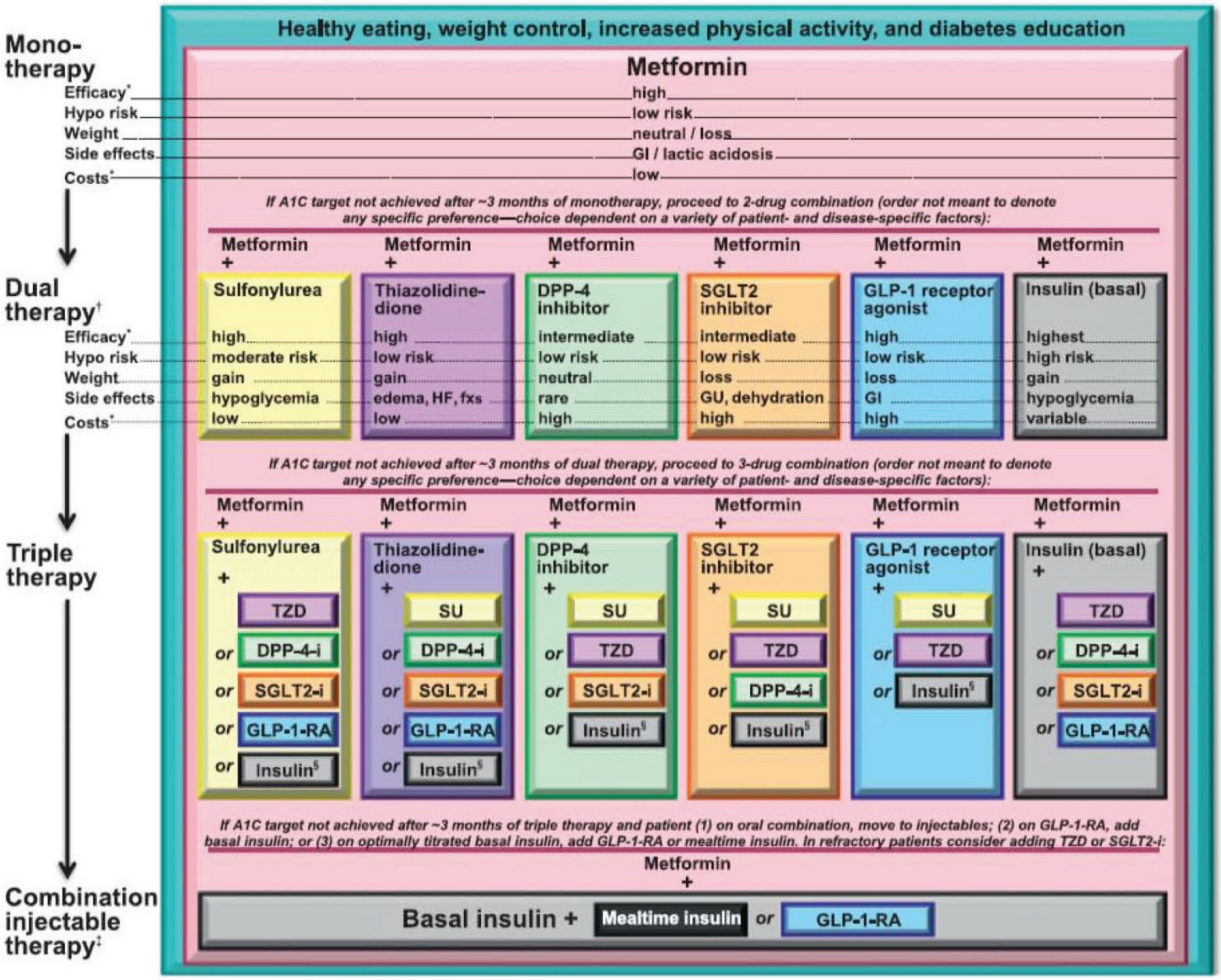
TOOL: TREATMENT ALGORITHM

MERITER-UNITYPOINT HEALTH

MERITER Medical Group

Diabetes Update – 2015

Citation:
Diabetes Care, Standards of Medical Care in Diabetes
January 2015, Volume 38, Supplement 1, Page S43



Antihyperglycemic therapy in type 2 diabetes: general recommendations. The order in the chart was determined by historical availability and the route of administration, with injectables to the right; it is not meant to denote any specific preference. Potential sequences of antihyperglycemic therapy for patients with type 2 diabetes are displayed, with the usual transition moving vertically from top to bottom (although horizontal movement within therapy stages is also possible, depending on the circumstances). DPP-4-i, DPP-4 inhibitor; fxs, fractures; GI, gastrointestinal; GLP-1-RA, GLP-1 receptor agonist; GU, genitourinary; HF, heart failure; Hypo, hypoglycemia; SGLT2-i, SGLT2 inhibitor; SU, sulfonylurea; TZD, thiazolidinedione.

†Consider starting at this stage when A1C is $9%.

‡Consider starting at this stage when blood glucose is $300–350 mg/dL (16.7–19.4 mmol/L) and/or A1C is $10–12%, especially if symptomatic or catabolic features are present, in which case basal insulin 1 mealtime insulin is the preferred initial regimen. §Usually a basal insulin (NPH, glargine, detemir, degludec). Adapted with permission from Inzucchi et al.