

Diabetes Medication Guide

The purpose of this guide is to provide general care information regarding management of diabetes. The guidelines are not intended to preclude more extensive evaluation and management of the patient by specialists as needed. This guideline is based on the American Diabetes Association: *Standards of Medical Care in Diabetes – 2009, Diabetes Care, volume 32, Supplement 1, January 2009.*

Insulin Therapy

Insulin Preparation	Onset of Action	Peak Action	Duration of Action
Short acting (regular)	30 minutes	2-5 hours	5 - 8 hours
Rapid acting (Lispro (Humalog))	15 minutes	30-90 minutes	2 - 4 hours
Intermediate acting (NPH or lente)	1-3 hours	6-12 hours	16 - 24 hours
Long acting (ultralente)	1 hour	**	20 - 24 hours
Mixtures (70/30, 50/50)	15 – 30 minutes	30-minutes -12 hours	16 - 24 hours

This table summarizes the typical time course of action of various insulin preparations. These values are highly variable among individuals. Even in a given patient, these values vary depending on the site and depth of injection, skin temperature, and exercise. **No pronounced peak; small amounts of insulin are slowly released resulting in a relative constant concentration/time profile over 24 hours.

Biguanides

Name	Onset (hr)	Duration (hr)	Usual starting dose	Maximum dose per day	Formulary Status
Metformin (Glucophage)	1-3	12	500 mg qd or bid	2550 mg in 3 divided doses	F
Metformin (Glucophage XL)			500 mg daily with evening meal	2000mg daily or 1000 mg bid	

Increases insulin sensitivity of peripheral tissues. Decreases glucose production by the liver. Avoid using for patients with serum levels on upper limits of normal. In elderly, use lower dose, titrate carefully, and monitor renal function regularly.

Sulfonylureas

Name	Duration (hr)	Usual starting dose	Usual starting dose for elderly	Usual maximum clinical effective dose	Maximum dose per day	Formulary Status
Glimiperide (Amaryl)	24	1-2 mg/day	1-2 mg/day	4 mg/day	8 mg/day	F
Glipizide (Glucotrol)	10-24	5 mg/day	2.5mg/day	10 mg bid	40 mg/day	F
Glipizide (Glucotrol XL)	24	5 mg/day	5 mg/day	10 mg/day	20 mg/day	F
Glyburide (Macronase, DiaBeta)	18-24	2.5 – 5 mg/day	1.25 mg/day	5 mg/bid	20 mg/day	F
Glyburide (Glynase PresTab)	18-24	1.5-3 mg/day	0.75 mg/day	6 mg/day	12 mg/day	NF

Raises serum insulin level by stimulating the beta cells of the pancreas to insulin. Metabolized by cytochrome P450. The lower dosages should be used for initial treatment of elderly patients, those with uncertain meal schedules, and those with mild hyperglycemia.

Alpha – Glucosidase Inhibitors

Name	Usual starting dose	Maximum dose per day	Formulary Status
Acarbose (Precose)	25 mg qd	50 - 100 mg tid based on weight	F
Miglitol (Glyset)	25 mg qd	100 mg tid	PA

Acts in the small intestine. Inhibits alpha-glucosidase enzyme. Delays digestion and absorption of complex carbohydrates. Lowers post-prandial glucose. Titrate dose upward every 2-4 weeks depending on GI tolerance. Monitor AST every 3 months for first year. Must be taken at the beginning of meals to be effective.

Formulary Status: F- Formulary; NF – Non-Formulary; STEP – Covered with a trial of a first-line agent; PA – Prior Authorization

Updated/Reviewed by P&T Committee –2000, 2001, 2002, 2004, 2006, 2008, 2009

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Dipeptidyl Peptidase- (DPP-4) Inhibitor

Name	Usual starting dose	Maximum dose per day	Formulary Status
Sitagliptin	100 mg daily	100mg daily	

Slows the inactivation of incretins, hormones that are normally released in the gut throughout the day and increased after meals. Incretins increase insulin release from pancreatic beta cell, and lower glucagon secretion from pancreatic alpha cells. Can be taken with or without food.

Meglitinides

Name	Duration (hr)	Usual starting dose	Maximum dose per day	Formulary Status
Repaglinide (Prandin)	1-4	0.5 mg/meal A1c <8% or no previous treatment 1 or 2 mg/meal A1c >8% or on other oral agent	4mg/meal 16 mg/day	F (Step)
Nateglinide (Starlix)		60 – 120 mg tid before meals	360 mg/day	

Similar to sulfonylurea, stimulates insulin secretion, short duration of action, usually taken 15 minutes before meals, skip dose if meal is not taken. Can be used with renal function impairment, but increase cautiously. Metabolized by cytochrome P450 enzyme system and 3A4. Interaction with other drugs metabolized by the same system is possible. This includes troglitazone, rifampicin, barbiturates and carbamazepine. Ketoconazole and micronazole may inhibit metabolism.

Glucagon-like Peptide 1 (GLP-1) Agonist

Name	Duration (hr)	Usual starting dose	Maximum dose per day	Formulary Status
Exenatide Injection	6 – 10	5 mcg subcutaneous bid	10 mcg subcu bid after one month	

Intended for people with type 2 diabetes who are on oral medication but not achieving good blood sugar control. Stimulates glucose-dependent release of insulin and suppresses glucagons levels.

Synthetic Analog of Human Amylin

Name	Duration (hr)	Usual starting dose	Maximum dose per day	Formulary Status
Pramlintide Acetate Injectable	3 0 4	Type 2: 60 mcg subcutaneous/meal	Type 2: 120 mcg subcutaneous	

Indicated as an adjunct treatment in patients with type 1 or type 2 diabetes who use mealtime insulin therapy and who have failed to achieve desired glucose control despite optimal insulin therapy, and it is used with or without a sulfonylurea and/or metformin. May decrease A1c by an average of 0.4% and may observe weight loss of less than 1kg at six months.

Thiazolidinediones

Name	Usual starting dose	Maximum dose per day	Formulary Status
Rosiglitazone (Avandia)	2 mg daily or twice daily	8 mg/day	PA
Pioglitazone (Actos)	15-30 mg/day	45 mg/day	PA

Acts via PPAR-gamma receptors on membranes of the cell nucleus. Improves response of peripheral cells. Reduces glucose production by the liver. Favorable effects on lipids. Initiation of therapy is not recommended in anyone with an ALT >2.5 upper limits of normal. LFT monitoring is recommended prior to initiation of therapy and every two months for the first 8 months and periodically thereafter.

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Combination Products

Name	Fixed Dose (mg)	Usual starting dose (mg)	Maximum dose per day	Formulary Status
TZD + metformin (Avandamet)	Rosiglitazone/metformin 1/500, 2/500, 4/500 2/1000, 4/1000	Not recommended as initial treatment	8 mg/2000 mg	PA Step
TZD + metformin	Pioglitazone/metformin 15/500, 15/850	Not recommended as initial treatment; one tab PO daily or bid if on metformin monotherapy; 15 mg/500 mg bid or 15 mg/850 mg daily if on pioglitazone monotherapy	45 mg/2,550 mg/day	
TZD + sulfonylureas	Pioglitazone/glimerpiride 30/2, 30/4	Not recommended as initial treatment; 30/2 or 30/4 daily	45 mg/8 mg/day	
TZD + sulfonylureas	Rosiglitazone/glimerpiride 4/1, 4/2, 4/4	Not recommended as initial treatment; 4/1 or 4/2 daily	8 mg/4mg/ day	
Sulfonylurea + metformin (Glucovance)	Glyburide/metformin 1.25/250, 2.25/500, 5/500	As initial treatment: 1.25/250 qd or bid As second-line treatment: 2.5/500 or 5/500 bid	20 mg/2000 mg	PA Step
Sulfonylurea + metformin (Metaglip)	Glipizide/metformin 2.25/500, 2.5/500, 5/500,	As initial treatment: 2.5/250 qd or bid As second-line treatment: 2.5/500 or 5/500 bid	As initial treatment: 10mg/2000mg As second line: 20mg/2000mg	PA Step
DDP-IV inhibitor + metformin	Sitaglipton/metformin 50/500, 50/100	As adjunct for patients in adequately controlled on metformin monotherapy: 50 mg sitaglipton plus current dose of metformin bid	100 mg/2,000 mg/day	

Glycemic Control Levels

Glycemic control for diabetics			
Biochemical index	Normal	Goal	Additional action suggested
Average preprandial glucose (mg/dl)†	<110	80 – 120	<80 or >140
Average bedtime glucose (mg/dl)†	<120	100 – 140	<100 or < 160
Hba1c (%)	<6	<7	>8

The values shown in this table are by necessity generalized to the entire population of individuals with diabetes. Patients with comorbid diseases, the very young and older adults, and others with unusual conditions or circumstances may warrant different treatment goals. These values are for non-pregnant adults. “Additional action suggested” depends on individual patient circumstances. Such actions may include enhanced diabetes self-management education, comanagement with a diabetes team, referral to an endocrinologist, change in pharmacological therapy, initiation of or increase in self-monitoring of blood glucose, or more frequent contact with the patient. HbA1c is referenced to a nondiabetic range of 4.0 – 6.0% (mean 5.0%, SD 0.5%).

†Measurement of capillary blood glucose.

Lipoprotein Risk Levels

Category of risk based on lipoprotein levels in adults with diabetes			
Risk	LDL Cholesterol	HDL Cholesterol*	Triglycerides
High	≥130	<35	≥400
Borderline	100 – 129	35 – 45	300 – 399
Low	<100	>45	<200

Data are given in milligrams per deciliter. *For women, HDL cholesterol values should be increased by 10 mg/dl.

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Abnormalities in Albumin Excretion

Definition of abnormalities in albumin excretion			
Category	24-h collection (mg/24h)	Timed collection ($\mu\text{g}/\text{min}$)	Spot collection ($\mu\text{g}/\text{mg}$ creatinine)
Normal	<30	<20	<30
Microalbuminuria	30 – 300	30 – 200	30 – 300
Clinical albuminuria	>300	>200	>300

Because of variability in urinary albumin excretion, two of three specimens collected within a 3- to 6-month period should be abnormal before considering a patient to have crossed one of these diagnostic thresholds. Exercise within 24 hours, infection, fever, congestive heart failure, marked hyperglycemia, and marked hypertension may elevate urinary albumin excretion over baseline values.