

## DIABETES MELLITUS MEDICATION USE GUIDELINES

Diagnosis Criteria:	
<p><b>Pre-Diabetes:</b> Impaired fasting glucose (IFG)*: Fasting plasma glucose (FPG) 100 to 125 mg/dL</p> <p>Impaired glucose tolerance (IGT): 2-h plasma glucose 140 to 199 mg/dL</p>	<p><b>Diabetes:</b> Symptoms of diabetes and a casual plasma glucose* <math>\geq</math> 200 mg/dL; or Fasting plasma glucose (FPG)* <math>\geq</math> 126 mg/dL; or 2-hr plasma glucose <math>\geq</math> 200 mg/dl (11.1 mmol/L) during an oral glucose tolerance test (OGTT)</p>

\*Casual is defined as any time of day without regard to time since last meal. Fasting is defined as no caloric intake for at least 8 hours. Symptoms of diabetes include polyuria, polydipsia and unexplained weight loss.

Lifestyle Modifications:
<ul style="list-style-type: none"> <li>▪ Reduce weight if overweight</li> <li>▪ Physical activity most days of the week</li> <li>▪ Reduce dietary fat (&lt;30%) and protein (10-20%)               <ul style="list-style-type: none"> <li>▪ Increase dietary fiber (20-35g/day)</li> <li>▪ Limit carbohydrate intake (50-60%)                   <ul style="list-style-type: none"> <li>▪ Quit smoking</li> </ul> </li> </ul> </li> <li>▪ Limit alcohol consumption (<math>\leq</math> 2 drinks/day ♂ and <math>\leq</math> 1 drink/day ♀)               <ul style="list-style-type: none"> <li>▪ Diligent foot care</li> </ul> </li> </ul>

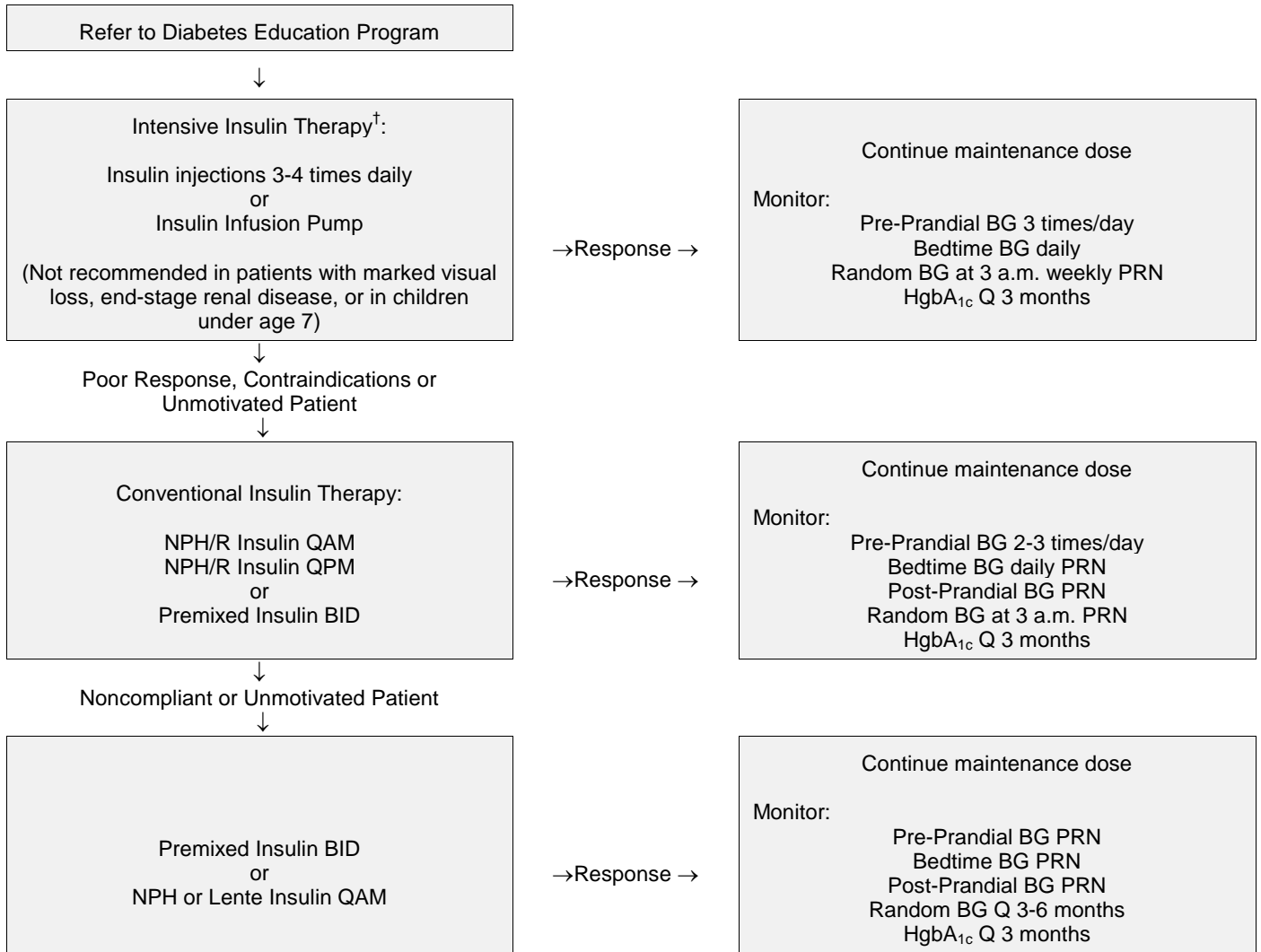
Test for:	Tests/Goals:	Frequency (or more often if needed to achieve goals):
Glycemic control (short-term)	Preprandial PG*: 90–130 mg/dL Peak postprandial PG*: <180 mg/dL	3 or more times daily for patients using multiple insulin injections, others on an individual basis. Postprandial is defined as 1–2 h after the beginning of a meal.
Glycemic control (long-term)	Glycosylated hemoglobin A1C: <7.0%	Every 3 months if not meeting glycemic goals otherwise every 6 months.
Gum disease	Dental exam	Every 6 months
Hypertension	Blood pressure: <130/80 mmHg	Every 3-6 months and at every routine visit
Albuminuria/Nephropathy	Urinalysis for protein, albumin	Every 12 months
Hyperlipidemia	LDL: <100 mg/dL Triglycerides: <150 mg/dL HDL: >40 mg/dL (♂), >50 mg/dL (♀)	Every 12 months
Peripheral neuropathy	Neurological exam	Every 12 months
Foot disorders	Thorough foot exam	Every 12 months
Retinopathy	Dilated retinal eye exam	Every 12 months

\* PG – plasma glucose: Equivalent *venous whole blood* concentrations are approximately 12% to 15% lower. *Arterial* samples are higher than venous samples postprandially because glucose has not yet been removed from peripheral tissues. *Capillary whole blood* samples contain a mixture of arterial and venous blood. Fasting levels will be equivalent to whole blood venous samples. One hour after a 100-g glucose load, capillary samples may be 30 to 40 mg/dL higher than venous samples.

### References:

1. The Diabetes Control and Complications Trial Research Group. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. *N Engl J Med.* 1993;329(14):977-86.
2. Goldstein DE, Little RR, Lorenz RA, Malone JI, Nathan D, Peterson CM, Sacks DB. Tests of glycemia in diabetes. *Diabetes Care.* 2004 Jul;27(7):1761-73.
3. Carlisle BA, Kroon LA, Koda-Kimble MA. Diabetes Mellitus. In: Young LY, Koda-Kimble MA, Eds. *Applied Therapeutics: The Clinical Use of Drugs.* 8th ed. Vancouver, WA: Applied Therapeutics, Inc. 2005:50:1-86.
4. American Diabetes Association. Clinical Practice Recommendations. *Diabetes Care.* Vol. 28:Suppl 1, 2005.
5. Diabetes Guidelines Task Force. Medical guidelines for the management of diabetes mellitus: the AACE system of intensive diabetes self-management – 2002 update. *Endocrine Practice.* 2002;8(1):40-82.
6. Welschen LMC, et al. Self-Monitoring of blood glucose in patients with type 2 diabetes who are not using insulin: a systematic review. *Diabetes Care.* 2005;28:1510-7.
7. Nathan DM, Buse JB, Davidson MB, Ferrannini E, Holman RR, Sherwin R, Zinman B. Medical management of hyperglycemia in type 2 diabetes: a consensus algorithm for the initiation and adjustment of therapy: a consensus statement from the American Diabetes Association and the European Association for the Study of Diabetes. *Diabetes Care.* 2008 Dec;31(12):1-11.
8. *Diabetes Care, Volume 30, Supplement 1, January 2007. Standards of Medical Care in Diabetes—2007.*

**TYPE 1 DIABETES MEDICATION USE GUIDELINES**

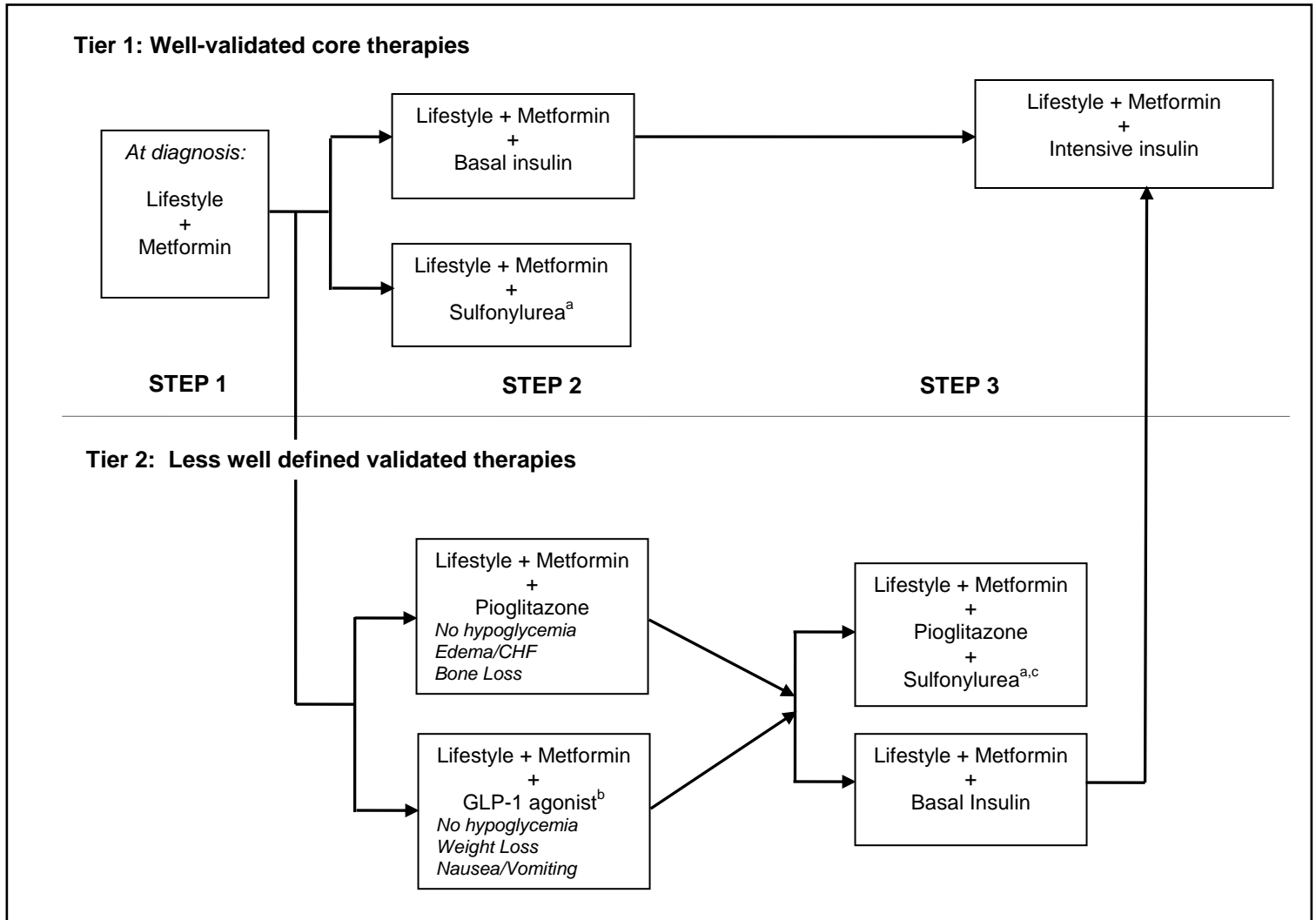


**Figure 1. Medical management of type 1 diabetes.**

†Intensive insulin therapy criteria:

- Age > 7 years
- Otherwise healthy
- Ability/willingness to test blood glucose (BG) 3-4 times daily
- Ability to inject 3-4 doses of insulin daily
- Ability to interpret BG readings and adjust insulin dose accordingly
- Access to trained clinicians providing education and supervision

**MANAGEMENT OF HYPERGLYCEMIA IN TYPE 2 DIABETES**



**Figure 2. Algorithm for the metabolic management of type 2 diabetes.**

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

<sup>a</sup> Sulfonylureas other than glybenclamide (glyburide) or chlorpropamide.

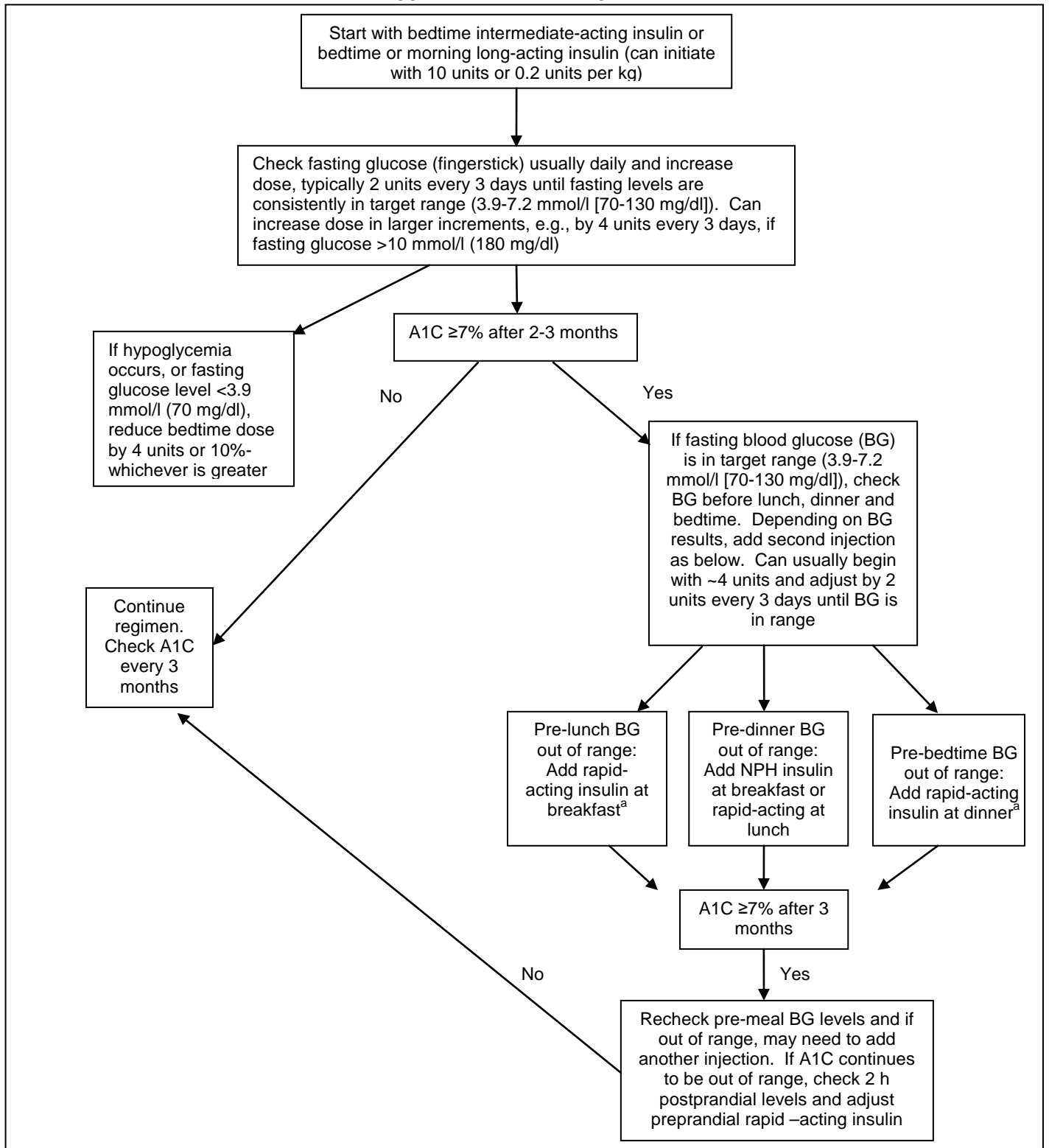
<sup>b</sup> Insufficient clinical use to be confident regarding safety.

<sup>c</sup> Although addition of a third oral agent can be considered, especially if the A1C level is close to target (A1C<8.0%), this approach is usually not preferred, as it is no more effective in lowering glycemia, and is more costly, than initiating or intensifying insulin. #See Fig. 3 for initiation and adjustment of insulin.

**Reference:**

Nathan DM, Buse JB, Davidson MB, Ferrannini E, Holman RR, Sherwin R, Zinman B. Medical management of hyperglycemia in type 2 diabetes: a consensus algorithm for the initiation and adjustment of therapy: a consensus statement from the American Diabetes Association and the European Association for the Study of Diabetes. *Diabetes Care*. 2008 Dec;31(12):1-11.

**INSULIN THERAPY MANAGEMENT**



**Figure 3. Initiation and adjustment of insulin regimens.**

<sup>a</sup>Premixed insulins are not recommended during adjustment of doses; however, they can be used conveniently, usually before breakfast and/or dinner if proportion of rapid- and intermediate-acting insulins is similar to the fixed proportions available.

Nathan DM, Buse JB, Davidson MB, Ferrannini E, Holman RR, Sherwin R, Zinman B. Medical management of hyperglycemia in type 2 diabetes: a consensus algorithm for the initiation and adjustment of therapy: a consensus statement from the American Diabetes Association and the European Association for the Study of Diabetes. *Diabetes Care*. 2008 Dec;31(12):1-11.

Generic Name	Brand Name	FORMULARY STATUS*	USUAL DOSE	ONSET OF ACTION/ DURATION OF ACTION	COST/ MONTH (\$)†
<b>SULFONYLUREAS</b>					
<b>1st Generation</b>					
chlorpropamide	Diabinese	PA Required	100-500mg QD	1 hr/24-60 hrs	\$25
tolazamide	Tolinase	Formulary	100-1,000mg QD	4-6 hrs/12-24 hrs	\$30
tolbutamide	Orinase	Formulary	1,000-3,000mg/day given BID-TID	1 hr/6-12 hrs	\$15
<b>2nd Generation</b>					
glimepiride	Amaryl	Limit: #2/day for 4 mg, #1/day others	1-8mg QD	2-3 hrs/24 hrs	\$10
glipizide	Glucotrol	Limit: #4/day	2.5-40mg/day given BID	1-3 hrs/10-24 hrs	\$10
glipizide SR	Glucotrol XL	Limit: #1/day 5mg XL Limit: #2/day for 10mg XL	2.5-20mg/day given QD	1-1.5 hrs/24 hrs	\$30
glyburide	Micronase, DiaBeta	Limit: #2/day Limit: #4/day for 5mg	1.25-20mg/day given QD to BID	2-4 hrs/16-24 hrs	\$15
<b>BIGUANIDES</b>					
metformin	Glucophage	Limit: #5/day for 500mg, #3/day for 850mg, #2/ day for 1,000mg Max daily dose=2,550mg	1000-2550mg/day given BID to TID	1 hr/10-12 hrs	\$15
metformin XR	Glucophage XR	Limit: #4/ day for 500mg Limit: #3/day for 750mg (Fortamet: PA required)	500-2000mg/day given QD to BID	2-4 hrs/24 hrs	\$20
<b>COMBINATION AGENTS</b>					
glyburide/ metformin	Glucovance	Limit: #2/ day Limit: #4/day for 25mg/500mg	1.25mg/250mg to 5mg/500mg BID	N/A	\$15
glipizide/ metformin	Metaglip	PA Required	2.5mg/500mg BID to 5mg/500mg QID	N/A	\$85
pioglitazone/ metformin	Actoplus Met	PA Required	15 mg/850 mg QD	N/A	\$120
rosiglitazone/ glimepiride	Avandaryl	PA Required	4 mg/1 mg to 8mg/4mg given QD	N/A	\$270
rosiglitazone/ metformin	Avandamet	PA Required	2mg/500mg to 4mg/1,000mg BID	N/A	\$280
sitagliptin/ metformin	Janumet	PA Required	50mg/500mg to 50mg/1,000mg BID	N/A	\$205
<b>ALPHA-GLUCOSIDASE INHIBITORS</b>					
acarbose	Precose	Limit: #3/ day	75 -300mg/day given TID	0.5-1 hr/4-6 hrs	\$115
miglitol	Glyset	Limit: #3/ day	150-300mg/day given TID	2-3 hrs/4-6 hrs	\$130
<b>MEGLITINIDES</b>					
repaglinide	Prandin	Limit: #3 per day Limit: #6 per day for 2mg	1.5-16mg/day given TID to QID	0.5-1.5 hrs/<4 hrs	\$385
nateglinide	Starlix	Must currently receive metformin and not a sulfonylurea. Limit: #3/ day	360mg/day given TID	0.5-1.5 hrs/<4 hrs	\$180
<b>THIAZOLIDINEDIONES</b>					
pioglitazone	Actos	Must first try metformin or a sulfonylurea. Limit: #1/ day	15-45mg/day given QD	N/A	\$265
rosiglitazone	Avandia	Must first try metformin or a sulfonylurea. Limit: #1/ day	4-8mg/day given QD to BID	N/A	\$255
<b>DIPEPTIDYL PEPTIDASE-4 INHIBITOR</b>					
sitagliptin	Januvia	PA Required	100mg QD	1-4 hrs/24 hrs	\$205
saxagliptin	Onglyza	PA Required	2.5mg or 5mg QD	2-4 hrs	\$205
<b>INCRETIN MIMETIC</b>					
exenatide Injection	Byetta	Must receive metformin or a sulfonylurea; limit: #1.2mL/ mo for 5mcg and #2.4mL/ mo for 10mcg	5-10mcg SQ BID	1-2 hrs/5 hrs	\$290
<b>Amylin Analog</b>					
pramlintide	Symlin	PA Required	30-120mcg before major meals	0.3 hrs/3 hrs	\$165

\*F=Formulary, PA=Prior Authorization required

†= Cost based on AWP or average MAC based on Max. recommended doses for generic 30-day supply; rounded to the nearest \$5 as of January 2010.  
 January 2010