

## Recommendations on overcoming patient barriers to insulin therapy.

<b>Barriers</b>	<b>Communicate to Patient</b>
<p>"Failing oral therapy" 58% of patients believe using insulin means they have failed OAD therapy</p>	<p>OAD failure is due to progressive nature of T2DM; insulin is best agent to control disease</p>
<p>"Needle phobia" Fear associated with early experiences</p>	<p>Newer needles are finer, considered painless; easy-to-use injection systems are available; give injection of saline in office</p>
<p>"Fear of complications" Causal association of insulin with diabetic complications</p>	<p>Complications due to uncontrolled, progressive disease and insulin results in reduction of vascular damage</p>
<p>"Complex and inconvenient" Perceive that insulin therapy is complicated and inconvenient</p>	<p>New easy-to-use injection systems are discrete and convenient; once-daily basal and rapid-acting analogs allow adherence to insulin regimen regardless of patient's lifestyle</p>
<p>"Weight gain" Believe it is a major side effect with insulin therapy</p>	<p>Various causes of weight gain (reduced glycosuria, fluid retention); ensure patient is not overeating to "treat" perceived hypoglycemia or because glycemic control justifies "cheating" with diet; combining metformin with insulin is associated with weight loss</p>
<p>"Fear of Hypoglycemia" Memory of past hypoglycemic event, particularly a nocturnal event; perhaps from older family member's experience</p>	<p>Current understanding of hypoglycemia has reduced its frequency and severity; past hypoglycemia was with older insulin formulations; newer insulin analogs mirror endogenous insulin physiology and better fit into patients' lifestyles; help patients recognize, treat, and avoid hypoglycemia</p>

OAD = oral antidiabetic drug; T2DM = type 2 diabetes mellitus

Meese J. *Diabetes Educ.* 2006; 32:95-185; Peyrot M, et al. *Diabet Med.* 2005;22:1379-1385.

■ **Recommended Targets for Glycemic Control, Blood Pressure, and Lipid Parameters in Patients with Type 2 Diabetes Mellitus**

Parameter	Recommended ADA level <sup>1</sup>	Recommended AACE level <sup>2</sup>
<b>Glycemic control</b>		
A1C	<7.0%*	≤6.5%
Fasting preprandial plasma glucose	90-130 mg/dL	<100 mg/dL
Peak postprandial glucose	<180 mg/dL <sup>†</sup>	<140 mg/dL
<b>Blood pressure</b>	<130/80 mm Hg	
<b>Lipids</b>		
LDL-C	<100 mg/dL	
Triglycerides	<150 mg/dL	
HDL-C	>40 mg/dL (men) >50 mg/dL (women)	
*The A1C goal for the individual patient is an A1C as close to normal (<6.0%) as possible without significant hypoglycemia. The A1C goal for patients in general is <7%.		
<sup>†</sup> 1- to 2-hour peak postprandial capillary plasma glucose.		

■ **Algorithms for Basal Insulin Dose Initiation and Titration**

<b>Weekly insulin titration schedule<sup>3</sup>:</b> Start with 10 U/day bedtime basal insulin and adjust weekly; target FPG = 100 mg/dL	
Mean self-monitored FPG values from preceding 2 days	Increase of insulin dosage (U/day)
≥180 mg/dL (10 mmol/L)	8
140-180 mg/dL (7.8-10.0 mmol/L)	6
120-140 mg/dL (6.7-7.8 mmol/L)	4
100-120 mg/dL (5.6-6.7 mmol/L)	2
Exceptions include no increase in dosage if plasma-referenced glucose <72 mg/dL was documented at any time in the preceding week and, in addition to no increase, small insulin dose decreases (2-4 U/day per adjustment) were allowed if severe hypoglycemia (requiring assistance) or plasma-referenced glucose <56 mg/dL was documented in the preceding week.	
<b>Alternative strategy<sup>4</sup>:</b>	
Increase basal insulin dose by 2 U/every 3 days until FPG is ≤100 mg/dL. (Certain populations [children, pregnant women, and the elderly] require special considerations.)	

**References**

1. ADA. *Diabetes Care*. 2006;29(suppl 1):S4-S42.
2. AACE. *Endocr Pract*. 2007;13(suppl 1):-68.
3. Riddle MC, et al. *Diabetes Care*. 2003;26:3080-3086.
4. Davies M, et al. *Diabetes*. 2004;53(suppl 2):A473. Abstract 1980-PO.

## ■ Algorithms for Rapid-Acting Insulin Dose Initiation and Titration<sup>1,2</sup>

- Typical starting dose for prandial insulin: 5 to 10 U per meal
- Prandial insulin titration\*:

Preprandial or bedtime blood glucose levels for 3 consecutive days (mg/dL)	Adjust rapid-acting insulin dose (Units)
≥180	+3
140-180	+2
120-140	+1
100-120	Maintain dose
80-100	-1
60-80 <sup>†</sup>	-2
<60 <sup>†</sup>	-4

\*For elevated preprandial or bedtime blood glucose levels, adjust the insulin dose as follows:

- If elevated preprandial blood glucose at lunch, adjust breakfast rapid-acting insulin dose
- If elevated preprandial blood glucose at dinnertime, adjust lunchtime rapid-acting insulin dose
- If elevated bedtime blood glucose, adjust dinnertime rapid-acting insulin dose

<sup>†</sup>If any single blood glucose measurement is in this range, make the appropriate reduction in insulin dose.

## ■ Regimen for Transition to Basal-Prandial Therapy; Additional Injections at Other Meals as Needed<sup>3</sup>

Initiation		
<ul style="list-style-type: none"> <li>– Divide the current basal dose by 10</li> <li>– Add a dose of this amount of rapid-acting insulin at meal with largest glycemic impact</li> <li>– Reduce the current basal dose by the same amount</li> </ul> <p><b>Example: Current <i>basal</i> dose = 30 U; rapid-acting dose = 3 U; therefore, new <i>basal</i> dose = 27 U</b></p>		
Titration*: Titrate the dose of each basal and mealtime injection to target		
Current Dose	Pattern of Lows	Pattern of Highs
≤10 U	Decrease by 1 U	Increase by 1 U
≥10 U	Decrease by 2 U	Increase by 2 U
<p>*A true pattern is a series of blood glucose readings taken at the same time each day that are outside the target range for ≥3 days. Adjust only to doses of injections associated with a pattern of high or low readings on a weekly basis as needed.</p>		

### References

1. <http://www.metabolicpulse.org/IntActivities.do>.
2. Raccach D, et al. *Diabetes Metab Res Rev*. 2007;23:257-264.
3. Hirsch IB, et al. *Clin Diabetes*. 2005;23:78-86.

## AGENTS FOR THE MANAGEMENT OF TYPE 2 DIABETES (INSULINS)

Category	Brand Name	Generic Name	How Supplied
<b>Rapid-acting analogs</b>	NovoLog	Insulin Aspart	100 mL vials, 3 mL cartridges, 3 mL pens (100 U/mL)
	Apidra	Insulin Glulisine	10 mL vials, 3 mL cartridges (100 U/mL)
	Humalog	Insulin Lispro	10 mL vials/3 mL cartridges, 3 mL pens (100 U/mL)
<b>Short-acting (Insulin regular)</b>	Humulin R	Insulin injection regular	100 U/mL, 500 U/mL (SC only)
	Novolin R	Insulin injection regular	10 mL vials (100 U/mL)
<b>Rapid-acting (mixed combinations)</b>	NovoLog Mix 70/30	Insulin Aspart Protamine/ Insulin Aspart	10 mL vials, 3 mL PenFill cartridges, 3 mL FlexPen Prefilled Syringe (100 U aspart/mL)
	Humalog Mix 75/25	Insulin Lispro Protamine/Insulin Lispro	10 mL vials, 3 mL pens, 3 mL cartridges (100 U/mL)
	Humalog Mix 50/50	Insulin Lispro Protamine/Insulin Lispro	10 mL vials, 3 mL pens (100 U/mL)
<b>Intermediate-acting</b>	Humulin N	Insulin Isophane Suspension (NPH)	10 mL vials, 3 mL pens (100 U/mL)
	Novolin N	Insulin Isophane Suspension (NPH)	10 mL vials, 3 mL pens (100 U/mL)
	Humulin Mix 50/50	Insulin Isophane Suspension/insulin injection	10 mL vials, 3 mL pens (100 U/mL)
	Humulin Mix 70/30	Insulin Isophane Suspension/insulin injection	10 mL vials, 3 mL pens (100 U/mL)
<b>Long-acting (Basal insulin)</b>	Lantus	Insulin Glargine	10 mL vials, 3 mL pens, 3 mL cartridges (100 U/mL)
	Levemir	Insulin Detemir	10 mL vials, 3 mL pens (100 U/mL)

## AGENTS FOR THE MANAGEMENT OF TYPE 2 DIABETES

Category	Brand Name	Generic Name	Dosages	How Supplied
<b>Alpha-Glucosidase Inhibitors</b>	Precose	Acarbose	25 mg to 100 mg tid with the first bite of each meal	25 mg, 50 mg, 100 mg tabs
	Glyset	Miglitol	25 mg to 100 mg tid with first bite of each meal	25 mg, 50 mg, 100 mg tabs
<b>Glinides</b>	Starlix	Nateglinide	60 to 120 mg/tid before meals; maximum 360 mg/day	60 mg, 120 mg tabs
	Prandin	Repaglinide	0.5 to 4 mg bid/tid/qid before meals; maximum 16 mg/day	0.5 mg, 1 mg, 2 mg tabs
<b>Biguanides</b>	Fortamet	Metformin	500 to 2000 mg once daily	500 mg, 1000 mg ext-rel tabs
	Glucophage	Metformin	500 mg/bid or 850 mg once daily with meals to 2000 mg daily in divided doses with meals; maximum 2550 mg/day	500 mg, 850 mg, 1000 mg tabs
	Glucophage XR	Metformin	500 mg to 2000 mg once daily with evening meal	500 mg, 750 mg ext-rel tabs
	Glumetza	Metformin	1000 to 2000 mg once daily with evening meal	500 mg ext-rel tabs
	Riomet	Metformin	500 mg (5 mL) bid or 850 mg (8.5 mL) once daily with meals; may increase by 500 mg/day at 1-week intervals or by 850 mg/day in divided doses at 2-week intervals	500 mg/5mL oral solution
<b>Dipeptidyl Peptidase-IV Inhibitor</b>	Januvia	Sitagliptin	100 mg once daily with or without food	25 mg, 50 mg, 100 mg tabs
	Janumet	Sitagliptin/ Metformin	50 mg/500 mg to 50 mg/1000 mg twice daily with meals; maximum 100 mg/2000 mg daily	50 mg/500 mg/ 50 mg/1000 mg tabs
<b>Sulfonylureas</b>	Amaryl	Glimepiride	1 to 4 mg once daily; maximum 8 mg once daily	1 mg, 2 mg, 4 mg scored tabs
	Diabinese	Chlorpropamide	2.5 to 5 mg daily with breakfast; increase by 2.5 mg at weekly intervals if needed	100 mg, 250 mg scored tabs
	Glucotrol	Glipizide	2.5 to 40 mg daily in single or divided doses (total daily doses above 15 mg should be divided)	5 mg, 10 mg scored tabs
	Glucotrol XL	Glipizide	5 to 10 mg once daily; maximum 20 mg/day	2.5 mg, 5 mg, 10 mg scored tabs
	Diabeta	Glyburide	1.25 to 20 mg daily in single or divided doses	1.25 mg, 2.5 mg, 5 mg scored tabs
	Micronase	Glyburide	1.25 to 20 mg daily in single or divided doses	1.25 mg, 2.5 mg, 5 mg scored tabs
	Glynase PresTab	Glyburide (micronized)	0.75 to 12 mg daily in single or divided doses	1.5 mg, 3 mg, 6 mg scored tabs
<b>Sulfonylurea + Biguanide Combination</b>	Glucovance	Glyburide/ Metformin	1.25/250 mg once daily or twice daily to 20 mg/2000 mg per day with meals	1.25 mg/250 mg, 2.5 mg/500 mg, 5 mg/500 mg tabs
	Metaglip	Glipizide/ Metformin	2.5 mg/250 mg once daily to 10 mg/2000 mg daily in divided doses with meals; maximum 20 mg/2000 mg daily	2.5 mg/250 mg, 2.5 mg/500 mg, 5 mg/500 mg tabs
<b>Thiazolidinediones</b>	Actos	Pioglitazone	15 mg or 45 mg once daily	15 mg, 30 mg, 45 mg tabs
	Avandia	Rosiglitazone	4 mg once or twice daily to 8 mg daily	2 mg, 4 mg, 8 mg tabs
<b>Thiazolidinedione + Biguanide Combination</b>	Actosplus Met	Pioglitazone/ Metformin	15 mg/500 mg once daily to 45 mg/2550 mg in divided doses with meals	15 mg/500 mg, 15 mg/850 mg tabs
	Avandamet	Rosiglitazone/ Metformin	2 mg/500 mg to 4 mg/1000 mg once or twice daily; maximum 8 mg/2000 mg daily	1 mg/500 mg, 2 mg/500 mg, 4 mg/500 mg, 2 mg/1000 mg, 4 mg/1000 mg tabs
<b>Thiazolidinedione + Sulfonylurea Combination</b>	Duetact	Pioglitazone/ Glimepiride	30 mg/2 mg to 30 mg/4mg once daily; maximum 45 mg/8 mg daily	30 mg/2 mg, 30 mg/4 mg tabs
	Avandaryl	Rosiglitazone/ Glimepiride	4 mg/1 mg to 8 mg/4 mg (two of the 4 mg/2 mg tabs) once daily with first meal of the day	4 mg/1 mg, 4 mg/2 mg, 4 mg/4 mg tabs
<b>Incretin mimetic</b>	Byetta	Exenatide	5 mcg to 10 mcg twice daily; 60 minutes before AM and PM meals	5 mcg or 10 mcg pens (250 mcg/mL) SC
<b>Amylin analog</b>	Symlin	Pramlintide	60 mcg to 120 mcg immediately before major meals	5 mL vials (0.6 mg/mL) SC