



Treatment Pearls

- P1.** Patients who cannot obtain optimal blood glucose control (BGC) with maximum doses of oral therapy should be considered for insulin therapy.
- P2.** Patients may continue or be weaned from oral agents when initiating insulin. Metformin may benefit insulin-treated patients to control weight gain commonly observed with insulin therapy.
- P3.** Basal insulin is commonly used as initial treatment for uncontrolled type-2 diabetes. Basal insulin therapy typically is treatment with Lantus (insulin glargine) or Humulin N at bedtime.
- P4.** Patients uncontrolled with basal insulin or with more severe disease may consider a split mixed regimen or more intensive regimen.
- P5.** Physicians Plus covers all Lilly insulin products to tailor use to patient needs.

Links

Physicians Plus diabetes guidelines:

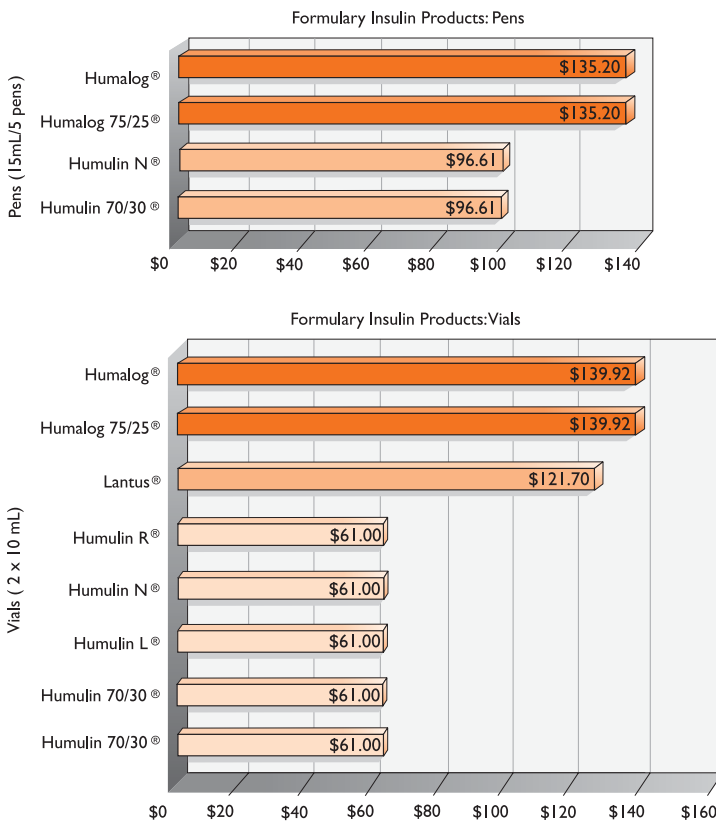
www.pplusic.com and click "Care Guidelines" under "Providers"

Wisconsin Diabetes Control & Prevention Program:

www.dhfs.wisconsin.gov/health/diabetes/

Treatment Costs

(based on AWP) for formulary items



*Price Bases: Average Wholesale Price or Maximum Allowable Cost. July 2004

Background

- Type-2 diabetics are at risk for microvascular and macrovascular complications
 - Within nine years of disease development
 - 9% of patients develop microvascular disease
 - 20% of patients develop macrovascular complications
 - Macrovascular complications lead to death in 59% of diabetic patients
- Hyperglycemia is an independent risk factor for the development of microvascular and macrovascular complications
- Tight blood glucose control (BGC) can decrease the risk of complications
- Most patients cannot maintain tight BGC with weight management, balanced diet and oral medications
- Patients who cannot maintain tight BGC or have severe disease, may need insulin therapy
- UKPDS 33 found 44% of type 2 diabetics require additional therapy within six years of initial diagnosis
- Key patient characteristics to review before initiating insulin therapy
 - Daily schedule
 - Meal times
 - Exercise
 - Age
 - Treatment adherence
 - Self medication administration
 - Risk of hypoglycemia
 - Disease severity
- Type 2 diabetics may require long-term insulin; or only for a short period until blood glucose levels are controlled or the underlying cause of hyperglycemia is resolved
- Common insulin therapy misconceptions:
 - Insulin results in insulin resistance
 - Increases cardiovascular risk
 - Causes weight gain
 - Leads to hypoglycemia

Initiating Treatment

Basal insulin therapy

- Single evening dose of Lantus, or Humulin N
- Patients can remain on oral therapy
- Suppresses glucose production between meals and overnight
- May experience nocturnal hypoglycemia with this regimen
- Less weight gain compared to short-acting insulin regimens
- Dosing
 - Starting dose 10 units or 0.3-0.6 units/kg/day
 - Dose given at bedtime
 - Titrate every 3-4 days

Split mixed regimens

- Two injections per day
- Therapy usually with regular, NPH or lispro



Product	Insulin type	Onset	Peak	Duration	Compatibility	Incompatibility	Other
Humulin N	Isophane Insulin suspension w/zinc and protamine	1-2 hours	4-8 hours	10-20 hours	NPH and Ultralente	Lente, ultralente, glargine	Does not mimic basal insulin profile. Can cause unpredictable hypoglycemia
Humulin R	Regular Insulin	30-60 minutes	2-4 hours	4-8 hours	NPH and lente/ultralente if stabilized	glargine	Give 20-40 minutes prior to meal. Potential for late postprandial hypoglycemia
Humulin L	Lente-insulin zinc suspension w/zinc and acetate buffers	1-2 hours	4-8 hours	10-20 hours	Ultralente and regular if stabilized	NPH and glargine	Does not mimic basal insulin profile. Can cause unpredictable hypoglycemia
Humulin U	Ultralente-extended insulin zinc suspension	2-4 hours	Unpredictable (8-20 hours)	16-20 hours	Lispro, regular and lente	NPH and glargine	Does not mimic basal insulin profile. Can cause unpredictable hypoglycemia
Humulin 70/30	70% NPH insulin and 30% regular insulin	30 minutes	Variable (1.5-16 hours)	12 hours	None	All insulins	Give approximately 30 minutes prior to meals
Humalog	Insulin lispro	5-15 minutes	1-2 hours	3-4 hours	NPH and Ultralente	glargine	Take immediately prior to meals. Limited postprandial hypoglycemia
Humalog 70/30	75% insulin lispro protamine and 25% insulin lispro	0-15 minutes	Variable (1.5-16 hours)	15-18 hours	None	All insulins	Give immediately prior to meals
Lantus	Insuline glargine	1-2 hours	No significant peak	Approximately 24 hours	None	All insulins	Once daily dosing. Decreased potential for hypoglycemic events

** Note: All vials are 100 units/ml with exception of Humulin R which comes as both 100 units/mL and 500 units/mL

Education

- Insulin Administration
- Checking blood glucose levels
- Weight gain
- Monitoring for hypoglycemia (fasting and two-hour postprandial)

Storage and Stability of Insulin Products

VIALS	OPENED		UN-OPENED	
	Room Temp	Refrigerated	Refrigerator	Room Temp
Humulin Products	28 days	28 days	until exp. date on vial	28 days
Lantus®	28 days	28 days	until exp. date on vial	28 days
PENS	OPENED		UN-OPENED	
	Room Temp*	Refrigerated**	Refrigerator	Room Temp
Humalog mix 75/25	10 days		until exp. date on vial	not recommended
Humalog	28 days		until exp. date on vial	not recommended
Humalin N	14 days		until exp. date on vial	not recommended
Humalin 70/30	10 days		until exp. date on vial	not recommended

* Room Temp = 59- 86 °F ** Refrigeration Temp = 36 - 46 °F

Split mixed regimens (continued)

- Patient should eat regular meals and snacks throughout the day
- Limits hyperglycemia after meals; increased risk of hypoglycemia with this regimen
 - Starting 0.8 units/kg/day (0.5 to 1.2 units/kg/day)
 - Initial large daily doses may be needed in excess of 1.5 units/kg to help with insulin resistance
 - Example regimen:
 - 2/3 of daily dose in AM, 1/3 daily dose in PM
 - AM dose
 - 2/3 NPH, 1/3 regular/lispro
 - PM dose (prior to evening meal)
 - 1/2 NPH, 1/2 regular/lispro

Intensive insulin regimens

- Three to four injections daily
- Combination of basal insulin with short-acting insulin
- Offers some flexibility with timing of meals and activity
- Requires detailed patient education and frequent monitoring of glucose levels
- Dosing:
 - 0.5 units/kg/day (doses may be higher depending on patients level of insulin resistance)
 - 1/2 of dose as basal insulin, 1/2 daily dose split between meals
 - Basal insulin
 - Can be NPH or Lantus
 - Mealtime insulin
 - Can be regular or lispro

Oral agents

- Can continue current oral regimen
- May discontinue sulfonylurea
- Metformin may help with weight gain caused by insulin
- Glitazones may help with glycemic stability

References:

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- Information on basal insulin for healthcare professionals. Aventis Pharmaceuticals. Available at <http://www.lantus.com/professional/basal/index>. Accessed March 16, 2004.
- UW Health Insulin Therapy Guidelines, 2004.

