

CRIBSHEET

The Regional Perinatal System Newsletter

WINTER 2005

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WHEN DIET AND EXERCISE ARE NOT ENOUGH TO CONTROL GLUCOSE: NEW INSULIN USES FOR GESTATIONAL and PREGESTATIONAL DIABETES

Written by: Maribeth Inturrisi RN, MSN, PNP, CDE

Over the past 5 years, we have seen changes in the management of gestational diabetes including the use of oral agents. The Sweet Success Guidelines, revised in 2002 do not completely reflect this information since they were being revised just as the new therapies became available in pregnancy. This is intended to be a brief update to review insulin analogues and their use during pregnancy for women with diabetes and pregnancy, including gestational diabetes.

Advances in Insulin Therapy- Insulin Analogues

Even though insulin has an unlimited ability to control glucose, it is the most underused diabetes therapy today. It is the gold standard for use in pregnancy because it does not cross the placenta and is highly effective. Reasons for underuse of insulin include an aversity to injections (both the patient's and provider's), as well as the perceived complexity of initiating insulin therapy and a lack of understanding about how to use the insulins available. The new insulin analogues include **Lispro Humalog**, **Aspart**, **Novolog**, rapid-acting insulins and **Glargine**, **Lantus**, long-acting background insulin. These insulins can be divided into 2 categories: mealtime insulin and background insulin. **Mealtime** insulin (Lispro, Aspart, or Regular) is used to control **Postmeal** blood glucose levels. Endogenous insulin secretion generally peaks within one hour after a meal. Once the meal-stimulated glycemia has subsided, insulin and glucose levels return to premeal levels within two hours. Most women with gestational diabetes are unable to secrete sufficient insulin to overcome the resistance to its effect mediated by hormones and other factor during pregnancy. This is most often seen in abnormally high postprandial glucose elevations. Commonly prescribed regimens consisting of combined short-acting (regular) and intermediate-acting insulins were used to mimic endogenous insulin response. However, these regimens have been incapable of adequately simulating the basal or meal-stimulated components of normal insulin secretion. The physiologic profile of insulin requires rapid changes in concentration as a result of food ingestion or other factors, such as exercise. Inappropriate timing of insulin administration results in a mismatching of postprandial carbohydrate absorption and post injection insulin peak. Regular human insulin is still present in the blood when peripheral glucose disposal occurs. This mismatch predisposes patients to development of acute complications of diabetes such as hypoglycemia. The new rapid-acting **insulin analogues** Lispro and Aspart are more effective at controlling postprandial hyperglycemia without an increased risk of hypoglycemia and may reduce the need for snacks. Both have been found to be safe and effective in pregnancy. When switching from Regular premeal insulin to Lispro or Aspart equal doses can be used.

Background insulins (NPH & Glargine) are used to control **between-meal** and **overnight** blood glucose levels. **NPH** continues to be the background insulin of choice because it has more predictability than Lente or ultra lente. The insulin analogue, **Glargine** has a steady rate of absorption and effect and can be given once a day. Insulin Glargine has an acidic pH, resulting in slow absorption from the subcutaneous tissue. Because of the acidic pH, insulin



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Glargine cannot be mixed in the same syringe with other insulins. Although it is a long acting or background insulin, it is a clear insulin, so our teaching and educational materials about clear and cloudy insulins will need to change. Results from clinical trials show less overnight hypoglycemia with Glargine and in many cases lower fasting glucose levels. A promising new therapy is once-daily insulin Glargine administered in combination with mealtime rapid-acting insulin (Lispro or Aspart). However, **use in pregnancy is not yet recommended** at this time since it has nine times the capability of increasing IGF. If this IGF crosses the placenta, it may have adverse effects on fetal growth and development. No data exists at this time (2004) concerning use of Glargine in pregnancy. If a woman with type 1 or 2 diabetes is planning pregnancy she should consider switching from Glargine to NPH **before** becoming pregnant. A period of poor control may follow the switch while the appropriate dose of NPH is determined. The dose of Glargine may need to be divided in to 3 smaller doses of NPH given about 8 hours apart to mimic the steady state achieved by Glargine.

The following table describes the action of insulins within each category.

Type of Insulin	Onset of Action	Duration
Mealtime Insulins (clear)		
Lispro, Humalog or Aspart, Novolog (rapid-acting)	5-15 minutes	2 hours
Regular Humalin (short-acting)	30-60 minutes	4 hours
Background Insulin		
NPH Humalin or Novolin (Cloudy, intermediate-acting)	2-4 hours	8-10 hours
Glargine. Lantus (clear, long-acting)	No peak	Up to 24 hours

*Blood glucose levels obtained at these times reflects the activity of the corresponding insulin.

Mealtime and background insulins are used in various combinations to achieve close to normal glycemic control during pregnancy. The type of regimen and number of injections per day are determined with the patient based on the individual's needs and lifestyle. Self-monitored blood glucose goals for gestational diabetes are: premeal target of 60-95 mg/dL; peak postmeal target of 100-135 mg/dL. Insulin regimens usually consist of 2, 3, or 4 injections per day. Since the advent of rapid acting insulins, *Regular* insulin is rarely optimum. The following is a summary of common insulin regimens using insulin Lispro (*Humalog*). Please note that Aspart (*Novolog*) may be interchanged for Lispro.

Calculating Insulin Dosages

Dosage monitoring and administration regimen are adjusted based on individual response to nutrition interventions, exercise and insulin administration techniques. For a woman who first presents during pregnancy for care, whether she has type 1, type 2 or gestational diabetes, an insulin dose based on gestational age and current weight provides a starting point for further adjustments based on activity, meal plan and other factors. Stress, sepsis, steroids, obesity and advancing pregnancy increase insulin needs. Multiple daily injections provide the most optimal control during pregnancy.

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Table 1. Total Daily Insulin requirements during Pregnancy

Weeks of Gestation	Total Daily Insulin
Week 1-18	0.7 U/kg actual body weight
Weeks 18-26	0.8 U/kg actual body weight
Weeks 26-36	0.9 U/kg actual body weight
Weeks 36-40	1.0 U/kg actual body weight

To initiate insulin therapy with mild hyperglycemia (Postmeal elevations >135<180, fastings >95 <120), the provider may follow the formulas presented in the table below.

Glycemic derangement	Suggested Insulin type and dose
Persistent FPG > 95mg/dl	Start 8 –20 NPH (N) @ bedtime (0.65 unit per kg. actual body weight)
One hour post breakfast plasma value > 135 mg/dl	Start 2- 4 Lispro (H);
One hour post lunch plasma value>135 mg/dl	Add 6-10 N to pre-breakfast injection (And eat lunch 4-5 hrs after breakfast) Or Give 2- 4 H pre-lunch.
One hour post dinner plasma value>135 mg/dl	Start 2- 4 H pre-dinner

SMBG values assist in determining an effective dose and regimen and therefore should be obtained *pre* and *post*- meal during insulin therapy (and more often as needed).

Glycemic derangement	Suggested Insulin type and dose
If pre-dinner plasma values are >100mg/dl	Increase AM of N dose if dinner is within 8 hrs.of the AM injection. If the patient eats a late dinner, N with lunch is often more effective –add 4 N @ lunch and titrate as needed
If increasing the AM N dose ineffective in controlling post lunch	Add 2 - 4 H pre lunch



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Titrate these doses up or down by 1 - 4 units based on BG values that are out of range for 2 to 3 days at a time.

Alternative approach to isolated elevations or mild hyperglycemia:

Calculate total insulin daily dose based on body weight (kg) then divide dose as follows:

Before breakfast: N= 5/18

Before breakfast: R or H = 2/9

Before lunch: R or H = 1/6

Before Dinner R or H = 1/6

Before bed: N =1/6

To initiate insulin therapy with marked hyperglycemia throughout the day, start insulin using split doses of short-acting and intermediate acting insulin. Calculate total daily dose using Table 1(above). Approximately 2/3 of the total dose is given in the morning (33% short-acting, 66% intermediate -acting) and 1/3 in the evening with half as short-acting insulin before dinner and half as intermediate insulin before bed.

For example, for a 50 kg woman at 30 weeks gestation calculate 24-hour total dose: $0.9 \times 50 = 45$ units per day. Give 2/3 total dose (30) in the AM and 1/3 (15) in the PM as follows:

Insulin Type	Before breakfast	Before dinner	Before bed
H or R	10 units	5 units	
N	20 units		5 units*
* The dawn (early morning hyperglycemia) is increased in pregnancy and often requires larger doses of NPH than 1/2 of the evening dose			

It is important to note that these doses will need to be adjusted according to individual needs such as insulin sensitivity or resistance etc.

Women with type 1 or type 2 diabetes who exhibit variable fasting blood glucose levels, should check HS and 3 am BG's for 2 or 3 days, to differentiate rebound vs. dawn phenomena.

Another **relatively new insulin preparation is premixed insulin using 75% NPL (neutral Protamine Lispro), which is NPH with 25%Lispro** in place of Regular insulin. Premixed insulins such as this one and 70/30 do not allow the ability to regulate the dose of one type of insulin without the other being altered. This approach is usually **not conducive to tight control**. However, if one of these is effective in maintaining glucoses within target, then there are no contraindications to its use in pregnancy.

Key Points for Using Insulin Therapy

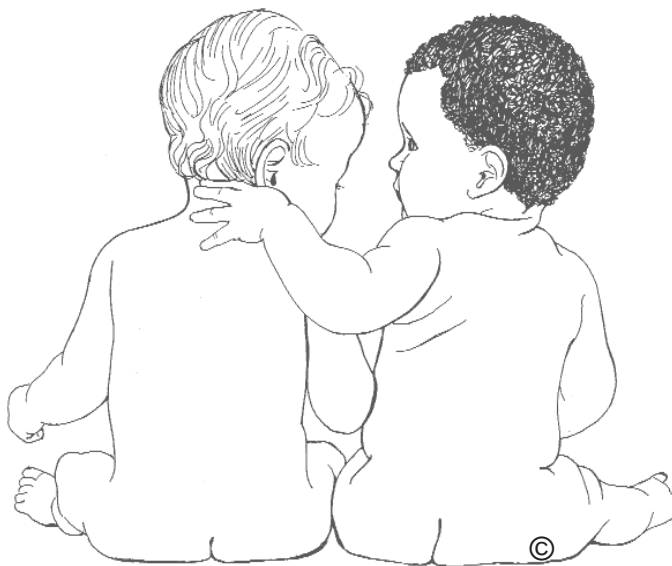
- Monitor blood glucose 1 hour Postmeal and adjust rapid-acting insulin by 1-2 units every 2-3 days until within target range.
- Patient education is essential, especially understanding the progressive nature of insulin resistance in pregnancy and the fact that doses will change over time.
- Tailor the insulin regimen to the needs and lifestyle of the patient. For example, an individual who has an erratic work/meal schedule may do very well using #1 of the 4-injection/day regimens outlined above.
- Initiating insulin must include instruction on insulin injection technique, carbohydrate counting to control **Postmeal peak glucoses**, and prevention and treatment of hypoglycemia.
- General guidelines for starting insulin recommend starting with 0.5 units insulin/kg total daily dose in the first trimester; 0.7 in the second trimester and 0.9 in the third trimester.
- Self-monitoring of blood glucose by using a meter with memory (including date and time of test) is essential for optimal diabetes management with insulin. Review results with the patient at each visit.
- Teach patients how to self-adjust insulin based on glucose patterns. **Pattern control** is an easily understood and effective method for insulin self-adjustment.
- Use enough insulin! Individuals with type 2 diabetes and /or obesity and pregnant are insulin-resistant and often require a total insulin dose as much as 1 unit/kg to achieve optimal control (over 100 units per day in a 100-kg patient).

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2. Pettitt DJ, Ospina P, Kolaczynski JW, Jovanovic L. Comparison of an insulin analog, insulin aspart, and regular human insulin with no insulin in gestational diabetes mellitus. *Diabetes Care* 26:183-186, 2003
3. Zinman B, Tildesley H, Chiasson JL, Tsui E, Strack T. Insulin lispro in CSII: results of a double-blind crossover study. *Diabetes* 1997; 46:440-3.
4. Jovanovic, L., DJ Pettitt, K Hugo, M Gutierrez, RR Bowsher and EJ Bastyr Metabolic and immunologic effects of insulin lispro in gestational diabetes. *Diabetes Care*, Vol 22, Issue 9 1422-1427.





Kit for New Parents: San Diego
Welcome Baby Program
A Project of First 5 San Diego
News & Updates
by Beverly Brashear

Kit Distribution & Partner Support:

Since January 2002, over **140,000** Kits have been ordered on behalf of San Diego parents by WBP partners.

- WBP Outreach Workers have made over **500** site visits and follow-up phone calls to WBP partners
- WBP partners can order Kits in bulk in several ways:
 - a) fax completed one-time or subscription order form located in your tool kit.
 - b) call the WBP at 858-536-5090.
 - c) place an order online at www.regionalperinatalssystem.org/welcome_baby.htm.
- Parents can receive a Kit:
 - a) from a community partner agency.
 - b) call the State's toll free number. For an English Kit call 1-800-543-7028.
For a Spanish Kit call 1-800-506-4667.

Videotapes

For your convenience the WBP had all six Kit videos re-recorded onto **3-hour tapes** that can be used in waiting areas. You have the option of choosing the videos recorded in the following ways:

- English (1-tape)
- Spanish (1-tape)
- Alternating English & Spanish (2-tapes)

Creating Teachable Moments with the Kit for New Parents

A 4-hour training session is available to all WBP partners. The trainings are offered four times a year. All partners distributing the Kit are encouraged to attend. They are designed to equip distribution partners with the knowledge and information about what's in the Kit and how to use it. The trainings also gives WBP partners the opportunity to discuss distribution strategies and other methods for presenting the Kit to parents effectively. The trainings are now available in Spanish.

Update

DVD versions and Asian versions of the Kit for New Parents are expected December 2005. VHS versions of English and Spanish will be available by special request only. Asian Kit languages are:

- Vietnamese
- Chinese, Mandarin & Cantonese
- Korean

Extras

The WBP has several loose Kit video tapes, children's books, and pamphlets available free of charge to WBP partners. If interested in any of these items, contact us for more information.

Staff

The WBP program has added two new staff members to our team this year:

- Cynthia Martin, Administrative Assistant
- Cheryl Rudy-Goodness, Evaluation & Data Coordinator

Contact the Welcome Baby Program at 858-536-5090.

For more Welcome Baby Program information, please visit our web site:
www.regionalperinatalssystem.org/welcome_baby.htm



Maternal and Newborn Nursing Care Winter Session

The next session of the Maternal & Newborn Nursing Care (MNNC) course will be held January 12, 2006 thru February 17, 2006. Classes will be held every Thursday and Friday over the six week period including half a day on 2/21/06. This course prepares nurses, with little or no obstetric background, for clinical preceptorship in the labor and delivery setting. Classes will be held at the Regional Perinatal System's *Chestnut Conference Center* and are taught by clinical nurse educators from the San Diego community. Approximately 72 nursing continuing education credit hours will be provided. The course fee is \$610.00.

For registration information, please contact Anabel Soto or Lizette Lozano at (858) 536-5090.

SPECIAL NOTE:
New address, phone and fax numbers
for Regional Perinatal System.

9170 Camino Santa Fe
San Diego, CA 92121-2254

Phone: 858.536.5090

Fax: 858.536.5099



Order Form and Mailing List Update

Name/Credentials

Agency/Affiliation

Mailing Address

City

State

Zip

Phone

Fax

Email

Please send me RPS information about:

- Board and Advisory Council
- Committee Activities
- Perinatal Nurse Leaders Council
- Perinatal Nurse Educators
- Maternal & Newborn Nursing Care
- Educational Opportunities
- Other _____

Please send me CDAPP information about:

- Classes
- Affiliation
- Guidelines for Care
- Education Material
- GDM Screening & Diagnosis Worksheet
- Other _____

Please send me information about
The Kit for New Parents on:

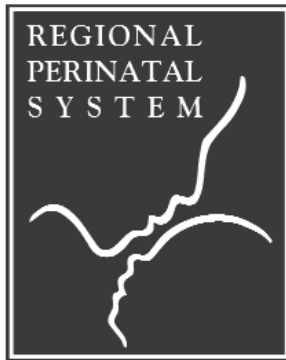
- Becoming a Distribution Partner
- Ordering Kits
- Other _____



Mail or Fax to:

Regional Perinatal System
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www.regionalperinatalssystem.org
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UPCOMING CONFERENCES

Preventing Prematurity, Birth Defects and Infant Mortality

March of Dimes, Sixth Annual Conference
January 18 - 20 , 2006

*For information call Sadie Sacks or
Lucy VanOtterloo @
(714) 456.6706

AWHONN 2006 CONVENTION:

The Power of Nursing
June 24-28, 2006

*For information call (202) 261.2400 or log on to
website at www.awhonn.org

Sweet Success 2006

Pathways for Progress....
November 2- 4, 2006
Orange, CA

*For information Sherrill Tillger, RN or
Joann Henry, RNC, MSHS @ (530) 343.3504 or
704.968.0735

UPCOMING CLASSES

MATERNAL NEWBORN NURSING CARE (MNNC) **Winter SESSION, 2006**

January 12, 13, 19, 20, 26, 27 and
February 2, 3, 9, 10, 16, 17 and 21 (half day), 2006
Call Regional Perinatal System

BASIC FETAL MONITORING

January 20, 2006

*Call Regional Perinatal System @
(858) 536.5090 or log on to
www.regionalperinatalssystem.org

Sweet Success: Diabetes & Pregnancy Program, **Affiliate Training & Clinical Update**

May 1 -2 , 2006

*Call Regional Perinatal System
@ (858) 536.5090

Illustrations

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