Gestational Diabetes Mellitus Management

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Definition:

- It is defined as glucose intolerance that develops for the first time during pregnancy.

- A woman with gestational diabetes has a 35 to 60% chances of developing type 2 diabetes over 10–20 years.

- Human placental lactogen is the major hormone linked with increased insulin resistance in gestational diabetes (GDM),which is characterized by pancreatic beta-cell malfunction or delayed beta-cell responsiveness to glycemic levels.

Types of (GDM):

There are two types of gestational diabetes mellitus which are categorised based on the treatment required.

Type 1 gestational diabetes mellitus or A1GDM

Type 2 gestational diabetes mellitus or A2GDM

- **Type 1 gestational diabetes mellitus or A1GDM**

  This type is also known as "diet-controlled gestational diabetes," as it can be managed without medication and will be responsive to nutritional therapy.

- **Type 2 gestational diabetes mellitus or A2GDM**

  This type of gestational diabetes can be treated with medicine to keep blood sugar levels in an optimum range.

- Most women (70 to 85 percent) with gestational diabetes based on Carpenter and Coustan criteria can achieve normoglycemia with lifestyle modification alone.

- Lifestyle modification includes nutritional intervention, physical activity, and weight management.

- In the two randomized trials in which diagnosis and treatment of mild gestational diabetes improved outcomes, only 20 and 8 percent of women, respectively, required insulin.

- Lifestyle behavior change is an essential component of management of gestational diabetes mellitus and may suffice as treatment for many individuals. Insulin should be added if needed to achieve glycemic targets.

- Insulin is the preferred medication for treating hyperglycemia in gestational diabetes mellitus. Metformin and glyburide should not be as first-line agents, as both cross the placenta to the fetus.

- Other oral and noninsulin injectable glucose-lowering medications lack long-term safety data.

- Metformin, when used to treat polycystic ovary syndrome and induce ovulation, should be discontinued by the end of the first trimester.

- Telehealth visits for pregnant people with gestational diabetes mellitus improve outcomes compared with standard in-person care.

- Glycemic control is the cornerstone of management of any diabetic pregnancy.

- Glucose monitoring

- medical nutritional therapy

- exercise

- insulin and anti-hyperglycemic agents

Antepartum glycemic targets:

- Fasting blood glucose concentration: <95 mg/dL (5.3 mmol/L)

- One-hour postprandial blood glucose concentration: <140 mg/dL (7.8 mmol/L)

- Two-hour postprandial glucose concentration: <120 mg/dL (6.7 mmol/L)

  -There are no standard criteria for describing suboptimal versus poor glucose control.

  - Glucose values 20 to 30 percent above the target range is considered suboptimal.

The goals of therapy:

- Achieve normoglycemia

- Prevent ketosis

- Provide adequate gestational weight gain based on maternal body index(BMI)

- Contribute to fetal well-being

- When initially diagnosed with gestational diabetes mellitus, we ask patients to measure their blood glucose concentration at least four times daily (fasting and one or two hours after the first bite of each meal).

- Multiple daily measurements allow recognition of women who should begin an anti-hyperglycemic agent. Results should be recorded in a glucose log, along with dietary information.

- Some authors suggest to decrease the frequency of glucose monitoring when good glycemic control is accomplished with medical nutritional therapy in individualized cases.

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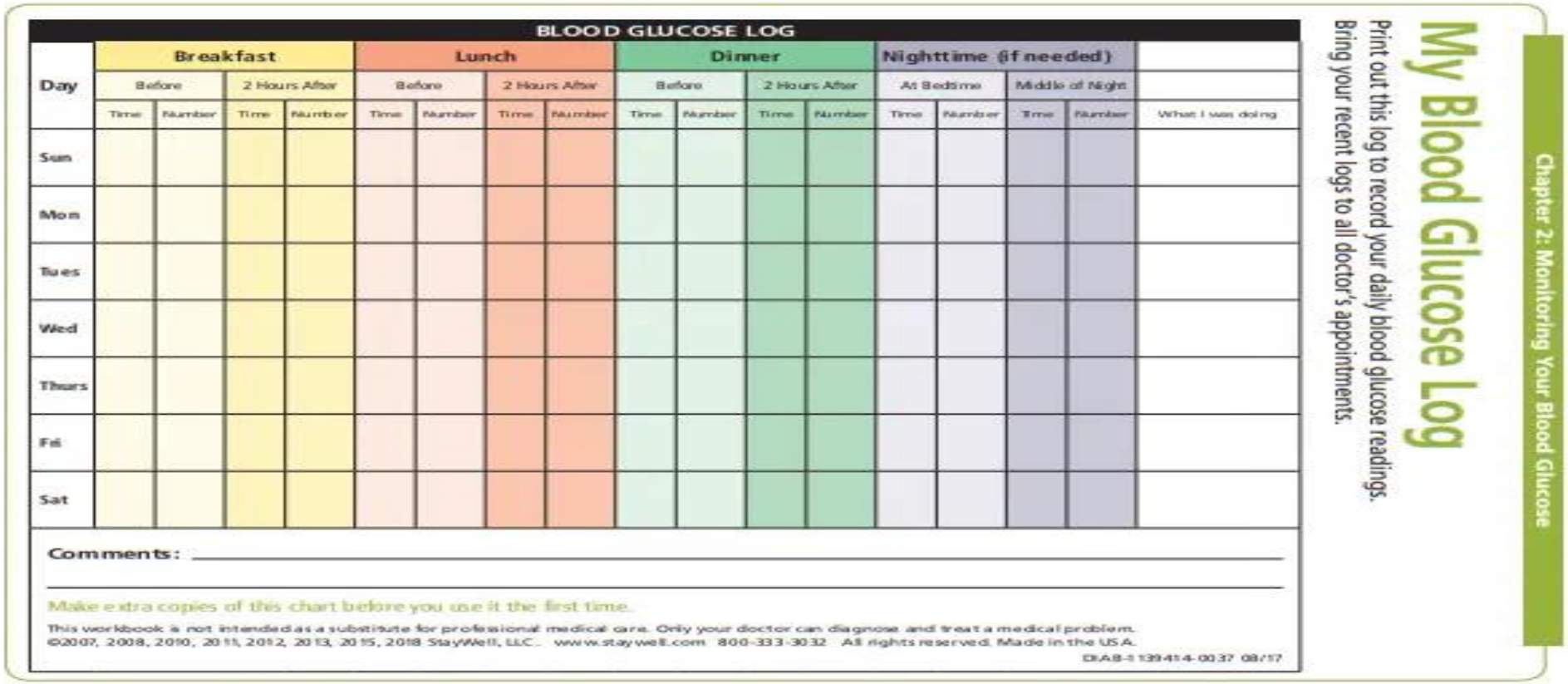

BLOOD GLUCOSE LOG

Day	Breakfast				Lunch				Dinner				Nighttime (if needed)				
	Before		2 Hours After		Before		2 Hours After		Before		2 Hours After		At Bedtime		Middle of Night		
	Time	Number	Time	Number	Time	Number	Time	Number	Time	Number	Time	Number	Time	Number	Time	Number	What I was doing
Sun																	
Mon																	
Tues																	
Wed																	
Thurs																	
Fri																	
Sat																	

Comments: _____

Make extra copies of this chart before you use it the first time.

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Chapter 2: Monitoring Your Blood Glucose

My Blood Glucose Log

Print out this log to record your daily blood glucose readings.
Bring your recent logs to all doctor's appointments.

Timing:

- For women with gestational diabetes mellitus, we suggest measuring blood glucose on awakening (before eating) and after meals throughout pregnancy .

Glucose target:

ADA and ACOG glucose targets are:

- Fasting blood glucose concentration: <95 mg/dL (5.3 mmol/L)

- One-hour postprandial blood glucose concentration: <140 mg/dL (7.8 mmol/L)

- Two-hour postprandial glucose concentration: <120 mg/dL (6.7 mmol/L)

Glycated hemoglobin

- A1C may be a helpful ancillary test in assessing glycemic control during pregnancy. It is not clear how often it should be monitored in women with apparently well-controlled gestational diabetes mellitus.

- Good normative data for A1C during each trimester are not available. A1C values tend to be lower in pregnant compared with non-pregnant women because the average blood glucose concentration is approximately 20 percent lower in pregnant women, and in the first half of pregnancy, there is a rise in red cell mass and a slight increase in

- Other factors that affect A1C levels include race (A1C concentration is higher in African American, Hispanic, and Asian women than in White women) and iron status (chronic iron deficiency anemia increases A1C, treatment of iron deficiency anemia with iron lowers A1C).

PHARMACOLOGIC THERAPY

- If normoglycemia cannot be maintained by medical nutritional therapy, then anti-hyperglycemic agents should be initiated.

- The optimum threshold for initiating pharmacologic therapy has not been established. Initiate therapy when over 30 percent of the blood glucose values are above the following thresholds:

Choice of pharmacologic therapy:

- There are two pharmacologic options in pregnant patients who require medical therapy aimed at controlling blood glucose:

1- Insulin (and some insulin analogs)

2- Oral anti-hyperglycemic agents (metformin, glyburide)

- The American College of Obstetricians and Gynecologists (ACOG) and the American Diabetes Association (ADA) consider:

Insulin the treatment of choice, and believe that oral anti -hyperglycemic agents are a reasonable alternative for women who fail nutritional therapy and decline to take, or are unable to comply with, insulin therapy.

- The ADA suggested metformin should not be used in women with **hypertension, preeclampsia, or at risk for intrauterine growth restriction** due to the potential for growth restriction or acidosis in the setting of placental insufficiency.

- If diabetes is diagnosed and therapy instituted early in pregnancy (prior to third trimester screening), we generally use slightly lower doses since insulin resistance has not reached its maximum level in the first and second trimesters.

- The 2:1 proportion of intermediate to rapid-acting insulin is based on the pattern of insulin release in normal pregnant women in the third trimester.

- Hospitalization is not necessary to initiate insulin therapy. However, if teaching of insulin technique and dose of multiple insulin injections, self-monitoring blood glucose, and charting of the blood glucose and insulin is not possible in the outpatient setting, then the use of an inpatient setting to utilize the expertise of the hospital's nursing staff may justify the cost of hospitalization.

- Typically, regardless of body weight, insulin dosing is based on the - glucose levels recorded in the patient's blood glucose log. For example, if glucose elevations are mostly postprandial, then a starting dose of 10 to 20 units of intermediate-acting insulin and 6 to 10 units of rapid-acting insulin are prescribed in the morning before breakfast, based on the degree of

-We do not use insulin pumps in women with gestational diabetes mellitus.

- If the post-dinner glucose level is elevated, then an additional injection of rapid-acting insulin is given just prior to dinner.

- If fasting glucose is elevated, then intermediate-acting insulin is preferably given at bedtime but can be given before dinner instead on an individualized basis.

- Sometimes an additional dose of rapid-acting insulin is necessary to maintain euglycemia after lunch, so that a total of four injections per day are needed.

- In a study, a four-times-per-day regimen improved glycemic control and perinatal outcome compared with a twice-daily regimen in one randomized trial, although macrosomia rates were not impacted.

- The titration of insulin dose to blood glucose levels is based upon frequent self-monitoring. Four to six glucose measurements each day are needed to optimize therapy (fasting and one or two hours postprandial with the possible addition of pre-lunch and pre-dinner as needed) and ensure a smooth increase of insulin as insulin requirements increase with pregnancy progression

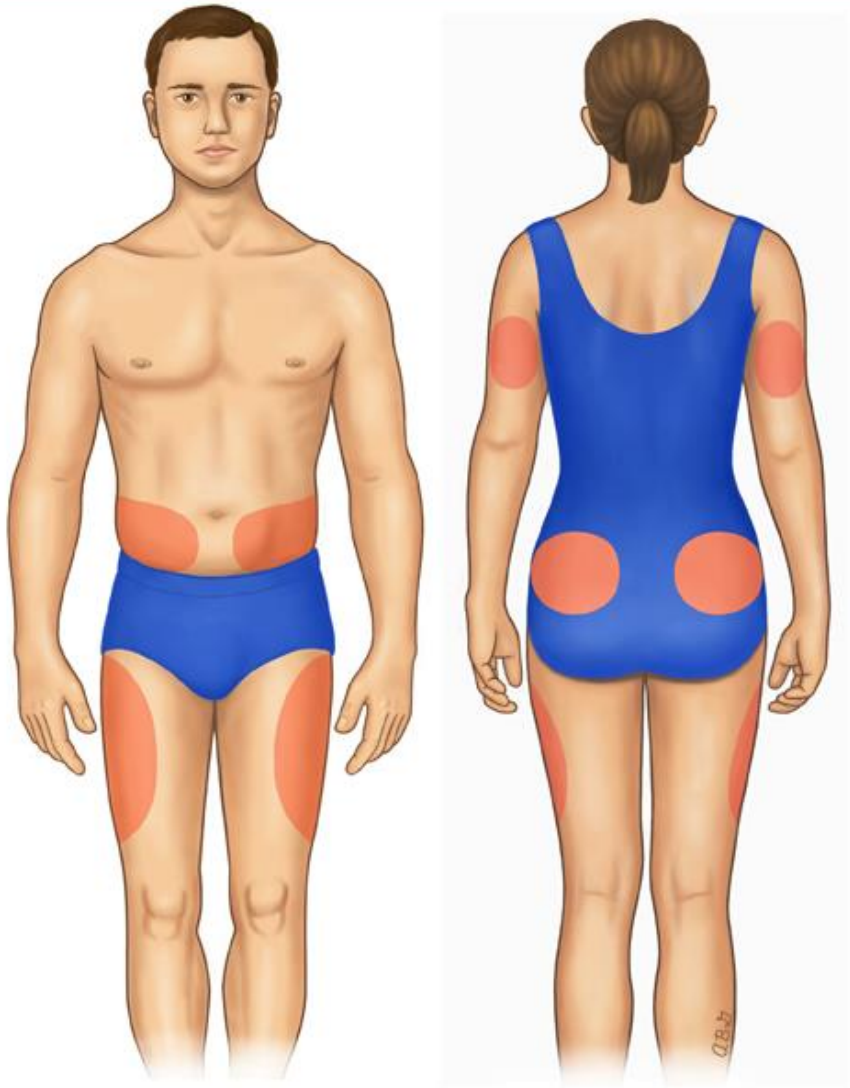
Type of insulin:

- The three rapid-acting insulin analogs (lispro, aspart, glulisine) are comparable in immunogenicity to human regular insulin, but only lispro and aspart have been investigated in pregnancy and shown to have acceptable safety profiles, minimal transfer across the placenta, and no evidence of teratogenesis. Neonatal outcomes are similar to those of women treated with regular insulin.

- Long-acting insulin analogs (insulin glargine, insulin detemir) have not been studied as extensively in pregnancy. In 2012, a multinational trial on the safety and efficacy of insulin detemir for the treatment of women with type 1 diabetes reported reassuring safety and efficacy results, which led the FDA to reclassify insulin detemir from "C" to "B."

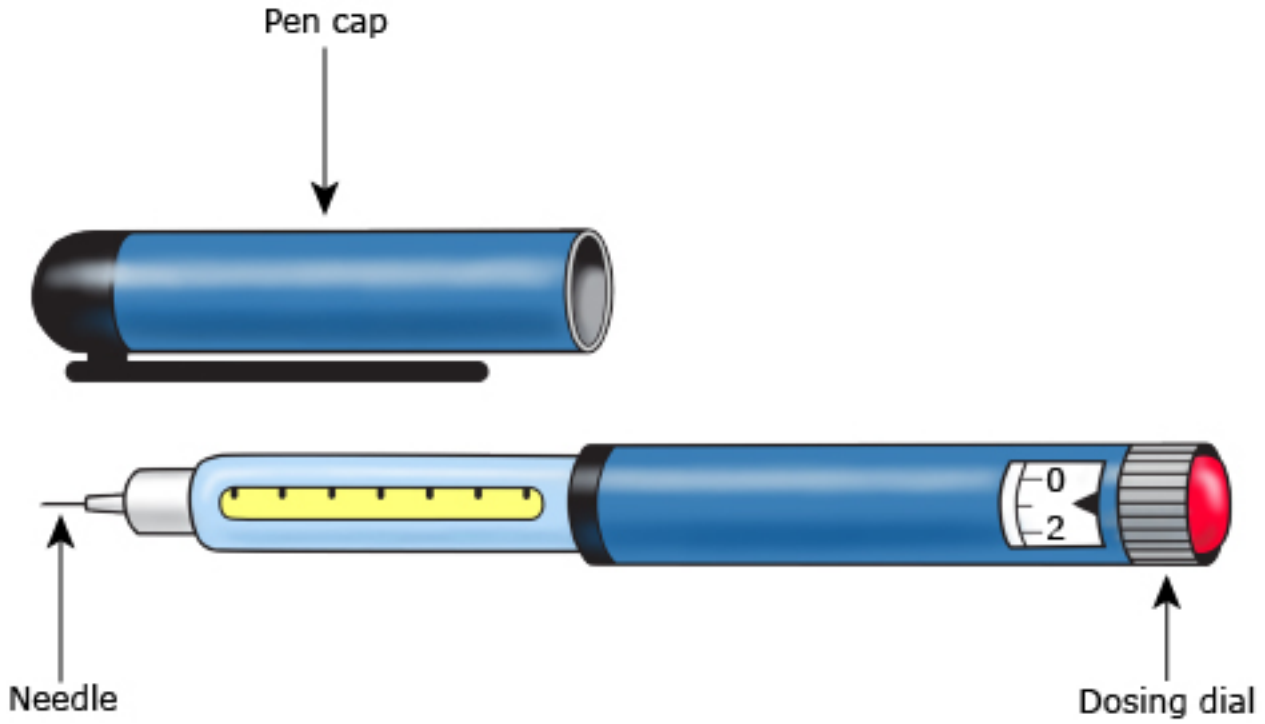
- Based on available data, we prefer use of human NPH insulin as part of a multiple injection regimen in pregnant women with gestational diabetes, especially given the peak at four to six hours after the morning dose, which can help decrease lunch postprandial blood glucose levels without an additional dose of rapid-acting insulin.

Where to give an insulin shot



The shaded areas can be used for insulin shots. You should change areas so that you do not use the same area each time. Insulin gets into the blood more quickly when injected into the belly, as compared with the arms or legs.

Insulin pen



Insulin pens are about the size of regular writing pens. They come with prefilled insulin cartridges and have a dial at the top that you use to set your dose. You replace the needle each time you use the pen.

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Oral antihyperglycemic agents

Choice of glyburide versus metformin

When metformin was compared with glyburide in a 2017 systematic review, there were no statistical differences in important outcomes, such as perinatal mortality or neonatal hypoglycemia, but several other outcomes were not evaluated.

In a 2020 meta-analysis that evaluated some of these outcomes, metformin did have some benefits:

- Lower mean birth weight
- Less macrosomia and large for gestational age infants
- Less gestational weight gain

- Glyburide is that the fetal drug level is high (70 percent of maternal level), and metformin is that fetal drug levels are even higher than with glyburide (200 percent of maternal level), which has unknown long-term consequences .

- Although metformin and glyburide have not been associated with an increased risk of anatomic birth defects, when either drug prescribed, patients should be made aware that information regarding the long-term effects of trans-placental passage is not known, and thus, caution is warranted until more data are available.

Metformin:

- A typical metformin dosing regimen is starting 500 mg once daily with the evening meal and if tolerated, adding a second 500 mg dose with breakfast. The dose can be increased by 500 mg per week until reaching the usual effective dose of 1500 to 2000 mg per day divided into two doses.

- The most common side effects of metformin are gastrointestinal, including a metallic taste in the mouth, mild anorexia, nausea, abdominal discomfort, and soft bowel movements or diarrhea.

Glyburide:

- Glyburide, a second-generation sulfonylurea, is the other commonly used oral anti-hyperglycemic drug treatment for gestational diabetes mellitus . Use of glyburide has not resulted in better pregnancy outcomes than use of insulin, and some outcomes may be worse.

2020- meta-analysis of randomized trials

- Glyburide therapy in comparing with insulin therapy in women with gsetational diabetes mellitus, glyburide had a higher mean birth weight in offspring, higher risk for macrosomia ; increased risk for a large for gestational age infant less gestational weight gain the glyburide group had a higher rate of neonatal hypoglycemia

- Maternal hypoglycemia is the most common side effect of glyburide therapy.
- Starting doses of 2.5 to 5 mg once daily are commonly used, and the dose is increased as needed to a maximum of 20 mg/day. Twice daily dosing is often necessary to maintain euglycemia. Taking the drug 30 to 60 minutes before a meal, rather than with the meal, to improve efficacy..


Thank You for
Your Attention