Saskatchewan Gestational Diabetes Advanced Insulin Dose Adjustment Module

March 2012

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INTRODUCTION

Saskatchewan has had a basic insulin dose adjustment module since 2002 with the most recent update done in 2009. The module was modified in 2010 to add the section "Insulin Dose Adjustment for Tests/Procedures When Fasting is Required", and include additional case studies.

A recommendation was made to the Provincial Diabetes Advisory Body to develop an advanced module covering Insulin Dose Adjustment (IDA) for Sick Days, Travelling across Time Zones, and Shift Work; this module was completed in November 2010. A further recommendation was made to develop an advanced module on IDA in Gestational Diabetes Mellitus (GDM).

This current module covers IDA in GDM.

Other aspects of IDA also considered 'advanced' which are not covered by this module include:
- children with diabetes,
- insulin pumps, and
- pregnancy in women with preexisting diabetes (type 1 or type 2).

Health care providers who wish to use the advanced IDA modules should be familiar with the policies and procedures in the basic module.*

Additional modules available on the Saskatchewan Ministry of Health[1] website:
- Saskatchewan Insulin Dose Adjustment Module - Basic* (March 2009)
- Saskatchewan Insulin Dose Adjustment Module for Test/Procedures with Fasting (May 2010)
- Saskatchewan Advanced Insulin Dose Adjustment Module (November 2010)

PURPOSE

The purpose of this advanced module is to facilitate and ensure:
- development and continuing competency for the Registered Nurse (RN) who meets the qualifications to adjust insulin in the circumstances covered in this module
- promotion of client safety, self care management and/or enhance the quality of life for women with GDM
- achievement of optimal blood glucose control, or as close as possible, in GDM

[1] http://www.health.gov.sk.ca/diabetes-info (cited 25August2010)

As with the basic IDA, this advanced GDM module is a template which will require review and, as needed, customizing to the policy and procedures by each Regional Health Authority (RHA). The Transfer of Medical Function is an RHA-specific process. There are several options for the actual process. RNs and physicians in each RHA must agree and be comfortable with the parameters that are RHA specific.

Before starting this GDM module: It is recommended that RNs have completed the Basic Insulin Dose Adjustment Module and have accumulated at least 50 hours of working experience with women who have diabetes (GDM, type 1 or type 2) in pregnancy.

HOW TO USE THE TEMPLATE

The purpose of the template is to provide guidance for RHAs and other health care organizations to have the RN, who meets the required competencies, adjust insulin doses for women with GDM.

The following steps are helpful in applying the template:

1. Review the full module
   The module includes:
   - the policy template
   - guidelines for each of the GDM topics
   - practice cases

Since this module is a guide, individuals may customize the policy and/or procedures to suit particular organizational policies/client needs.

An organization may decide to exclude one or more of the components of this GDM module from the Transfer of Medical Function.

2. Write the policy as it applies to the organization. If you are not familiar with the policies and procedures for a Transfer of Function within your organization, consult within the Nursing and/or Medical Departments for advice. Most health organizations have guidelines for obtaining the Transfer of Function through a Medical Advisory Committee or similar process.

3. Implement a process for the RN to learn about advanced IDA components. The RN must demonstrate competency to perform IDA for clients with GDM. To learn more about IDA an RN may do all or some of the following:

   a. Review the procedures and references. The procedures are written to provide guidelines and serve as a study guide. The RN will be required to read and review several of the references as well as the information in the procedures. In some cases, reference summaries are provided within the procedures section. To have the appropriate degree of understanding and skill necessary to achieve the competencies of IDA in GDM, more detailed reading will be necessary.

b. Consult with others. For some of the competencies there are no research studies and limited references in the literature. An RN may choose to 'mentor' with another RN or physician who has experience with the module components (see listing on page 7).

c. Complete the practice cases. The answers are found at the end of the module. If you are unsure about a topic area, speak with RNs and/or your local physicians who are already practicing with a delegated medical function for IDA.

d. Attend a provincial workshop on IDA. When a workshop is held, there will be details on the Saskatchewan Ministry of Health website.

Implement a process for the RN to demonstrate competency in IDA for individuals with GDM:

There are two steps to demonstrate competency as part of the provincial template:

1. Write and successfully pass the provincial exam. The exam can be obtained from Primary Health Services (PHS) Branch, Saskatchewan Ministry of Health. The provincial exam is issued by PHS and written in a supervised environment. The completed exam is returned to PHS, marked, and the results are sent to the candidate. A passing mark is 80%. Successful candidates will receive written documentation to use as part of their Transfer process.
2. Complete physician-supervised cases. The successful delegation of a medical function requires a collaborative working relationship between the RN and the physician(s) who participate. The RN and physician(s) need to feel confident that clients with GDM will receive optimal diabetes management.

The provincial template suggests that the RN be supervised by a physician before obtaining the Transfer of Medical Function. Ideally, the cases will represent a diversity of client situations which are likely to be encountered in practice. Through practiced supervision, the physician will be able to ensure the RN demonstrates the required competencies.

The supervising physician may be an endocrinologist, an internist or a family physician with an interest in diabetes management and a willingness to provide the required supervision.

Sign and Implement the Transfer of Medical Function. A sample signature form for Transfer of Medical Function is provided in the policy template.

Each organization will need to decide on the best implementation method to meet the needs of the RN, the physicians involved, and the woman with GDM. In each situation below, the policy template was adapted to reflect the method chosen.

Examples of implementation include:

- The Diabetes Program has a Medical Director who provides the case supervision for the RN. The Medical Director signs the competency sheet and the Transfer of Medical Function is authorized for all physicians in the RHA. Physicians have the choice to "opt

out" of the Transfer of Medical Function and may state that they do not wish to have the RN provide the IDA service.

- The Diabetes Program does not have a Medical Director. A physician with an interest in diabetes management is asked to provide the supervision for the RN. This physician signs the competency sheet to complete the Transfer of Medical Function. The RN approaches individual physicians or physician group practices, explains the policy and procedures and requests their signatures for participation in the IDA service.

Establish a policy for annual demonstration of competency. The competency performance checklist should be signed annually to ensure continuing competency. Ideally, the signing physician will be familiar with the practice of the RN in IDA.

Options to ensure continuing competency of the RN:
- A physician who is very familiar with the RN's practice may complete the performance checklist based on ongoing and regular review throughout the year.
- A physician may complete a chart audit of 3-5 recent cases where the RN was adjusting insulin for the advanced GDM components covered in this module.
- A physician may provide practice supervision similar to the initial competency assessment.

RESOURCE PERSONNEL

The table below highlights individuals who have experience with the Transfer of Medical Function and advanced GDM competencies in Saskatchewan. These individuals are willing to talk with others who may need support or mentoring.

Name	Email	Telephone/Fax
Linda Bachiu, Nurse Clinician	linda.bachiu@saskatoonhealthregion.ca	655-1571
Marion Boyd, Diabetes Nurse Educator	marion.boyd@rqhealth.ca	766-4415
Charlene Obrigewitsch, Diabetes Nurse Educator	charlene.obrigewitsch@rqhealth.ca	766-3776

For more information about other provincial templates or to apply for the GDM Advanced IDA exam, contact:

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POLICY FOR TRANSFER OF MEDICAL FUNCTION IN GESTATIONAL DIABETES MILLETUS (GDM) ADVANCED INSULIN DOSE ADJUSTMENT (IDA)

PURPOSE

A Registered Nurse (RN), who has demonstrated advanced competence to adjust insulin doses, may make changes to insulin doses and assist clients to self adjust their insulin for glycemic targets.

Insulin doses will be adjusted to optimize blood glucose control, promote self care management and enhance safety and quality of life.

PERSONNEL

An RN who meets the criteria and demonstrates advanced competency in IDA for GDM is eligible to obtain the Transfer of Medical Function.

POLICIES

Adjustment of insulin dosages may be done by an RN who demonstrates advanced competency, has completed all the requirements, and obtained the basic Transfer of Function. Extensive experience in educating clients in diabetes self-care and demonstrated competence for adjusting insulin dosages are prerequisites. See Appendix B for a detailed overview of RN competencies for the advanced Transfer of Medical Function.

Transfer of Medical Function may be granted for RNs to provide advanced insulin dose adjustment confined to GDM. With additional training and experience, appropriate RNs may obtain an advanced Transfer of Function in other clinical aspects of IDA[2], but these are not covered by this GDM policy.

Experience

To obtain the advanced Transfer of Medical Function covered by this policy, a Registered Nurse must have obtained the basic Transfer of Function according to the Regional Health Authority (RHA) or organizational policy, have 50 hours of working experience with women in pregnancy and diabetes (GDM, type 1, or type 2), and have a minimum of 6 months of practice with the basic Transfer[3].

To be prepared to write the Advanced IDA in GDM provincial exam, obtain the Transfer of Function and implement it, RNs are required to master several competencies (See Appendix B).

Advanced Transfer of Medical Function

The delegation of medical function will apply to IDA for adult women with GDM:

- any insulin schedule including intensive therapy/multiple injections.

[2] Diabetes in children; pre-existing diabetes in pregnancy (type 1 or type 2); and insulin pump management.

[3] This is a general recommendation and will need to be reviewed by each RHA in the development of their own policy.

Maintenance of the Advanced Transfer of Medical Function
Maintenance will be completed annually by the RN.

RN - Physician Collaboration
- The physician retains responsibility for the insulin schedule that is ultimately selected – initial dose (amount, type of insulin, timing) and any subsequent adjustments to insulin type and/or timing; for example, moving an insulin dose from supper to bedtime or switching from a premixed to short and intermediate acting insulin.
- The RN, physician and client will collaborate to establish the appropriateness for both RN involvement and client participation in IDA.
- The RN and physician will collaborate on a regular basis to ensure clients receive optimal insulin/oral medication doses during pregnancy and if required postpartum.

Conditions – RNs/Physicians
This Medical Function procedure will only be considered for specific clients referred by a physician who is willing to **be available to provide ongoing advice** and support to the RN. Both parties (physician and RN) must mutually agree to this.

Neither an RN nor physician will be obliged to participate in this particular delegation of a medical function unless there is mutual agreement.

The RN and physician(s) who wish to use this Advanced Transfer of Medical Function will sign an agreement to indicate their mutual willingness to participate in all the responsibilities of the delegation of the medical function.[4]

When a medical function has been delegated and accepted by a nurse, the RN is responsible and accountable for competent performance.

The Advanced Transfer of Medical Function is applied only with clients whom the RN assesses, teaches and reviews directly. The delegation of this medical function does not include the RN doing IDA for other health care providers such as Home Care nurses, dietitians, pharmacists, etc.

Insulin doses will be changed according to the IDA guidelines. There will be appropriate resources to facilitate client learning.

The RN will continuously assess a client's metabolic status and refer a client to their physician or obstetrician in all situations that are beyond their scope of practice, and/or situations where the client's metabolic control is deteriorating despite adjustments made to the insulin or other components of the treatment plan.

If the client is seen for periodic follow-up or returns to a Diabetes Education Program or High Risk Diabetes and Pregnancy Clinic, the RN may continue to guide the client who requires ongoing interventions to maintain blood glucose control with agreed periodic contact with the physician of record.

[4] A sample form is provided in the Policy Appendix A. The RN and physician signatures mean the Transfer applies to all the appropriate clients as designated in the RHA's Policy.

If the client does not demonstrate the potential for, or interest in, safe self-adjustment of insulin, the attending physician will resume responsibility for the client's insulin dosage.

It is understood by all parties that the RN will only be available to support clients in IDA during regular working hours [insert RHA schedule].

Conditions – Clients
The policy applies to clients who are living independently in the community and do not reside in an acute care setting or long term care facility.

To receive education about IDA and/or support in actually making the adjustments, clients will meet the following conditions:

- Able and willing to monitor blood glucose at least 4 times per day, record and report the results.
- Able and willing to contact the RN on a regular basis for assistance and further education regarding IDA.
- Not acutely or severely ill (examples: immediately post-op, end stage renal disease).
- Demonstrate an interest in improving control and having regular follow-up.
- Has had a consultation with a dietitian and has a suitable nutrition strategy to support IDA in GDM and postpartum.

Client Assessment
Detailed information for client assessment is provided in the Procedures Section of this module.

Precautions
There is potential for hypoglycemia or hyperglycemia when adjusting insulin doses.

Documentation and Reporting
A detailed note will be written for each client's outpatient visit. This will contain relevant data, assessment and plan including the specific recommendations for GDM and postpartum care. A copy of the note will be sent to the client's physician and/or obstetrician.

If the client's visits are frequent and close together, at minimum a summary letter will be written monthly and sent to the client's physician and/or obstetrician.

PROCEDURES

Transfer of Medical Function

The following diagram outlines the process to achieve a Transfer of Medical Function.

Regional Health Authority (RHA) reviews advanced provincial guidelines/template
+ revises as needed
↓
RHA Medical Advisory Committee approves Transfer
↓
Determine RN who meets criteria
↓
Review policy + procedures
↓
RN attends provincial course[5] (when available)
AND/OR
Completes self study module
↓
RN writes advanced GDM exam and submits to
liaison at Primary Health Services Branch
↓
After successful completion of the exam,
the RN is supervised by local physician(s)
↓
Physician(s) sign documentation of RN's
competency for IDA in GDM according to
the RHA's policy and Transfer is completed
↓
RHA's policy determines procedure for implementation
within RHA with some/all physicians

Adjusting Insulin Doses

An RN practicing an advanced delegated medical function to adjust insulin doses will follow the procedures outlined in the Saskatchewan Advanced GDM Insulin Dose Adjustment Module. If the procedures are amended by the RHA, changes will be documented in the Module.

[5] Registered Nurses are encouraged to invite a physician to attend with them.

LEARNING PACKAGE

1. GDM BACKGROUND

Learning Objectives

- To state the background information (GDM definition, prevalence, risk factors) to be considered when creating an individualized client plan for managing IDA in GDM.
- To demonstrate application of the principles of IDA in selected case scenarios.

Required Registered Nurse Competencies

See Appendix B. Review the competencies, complete a self assessment and identify learning needs for IDA in GDM prior to beginning this section of the learning module.

a) Gestational Diabetes Mellitus (GDM) Definition:

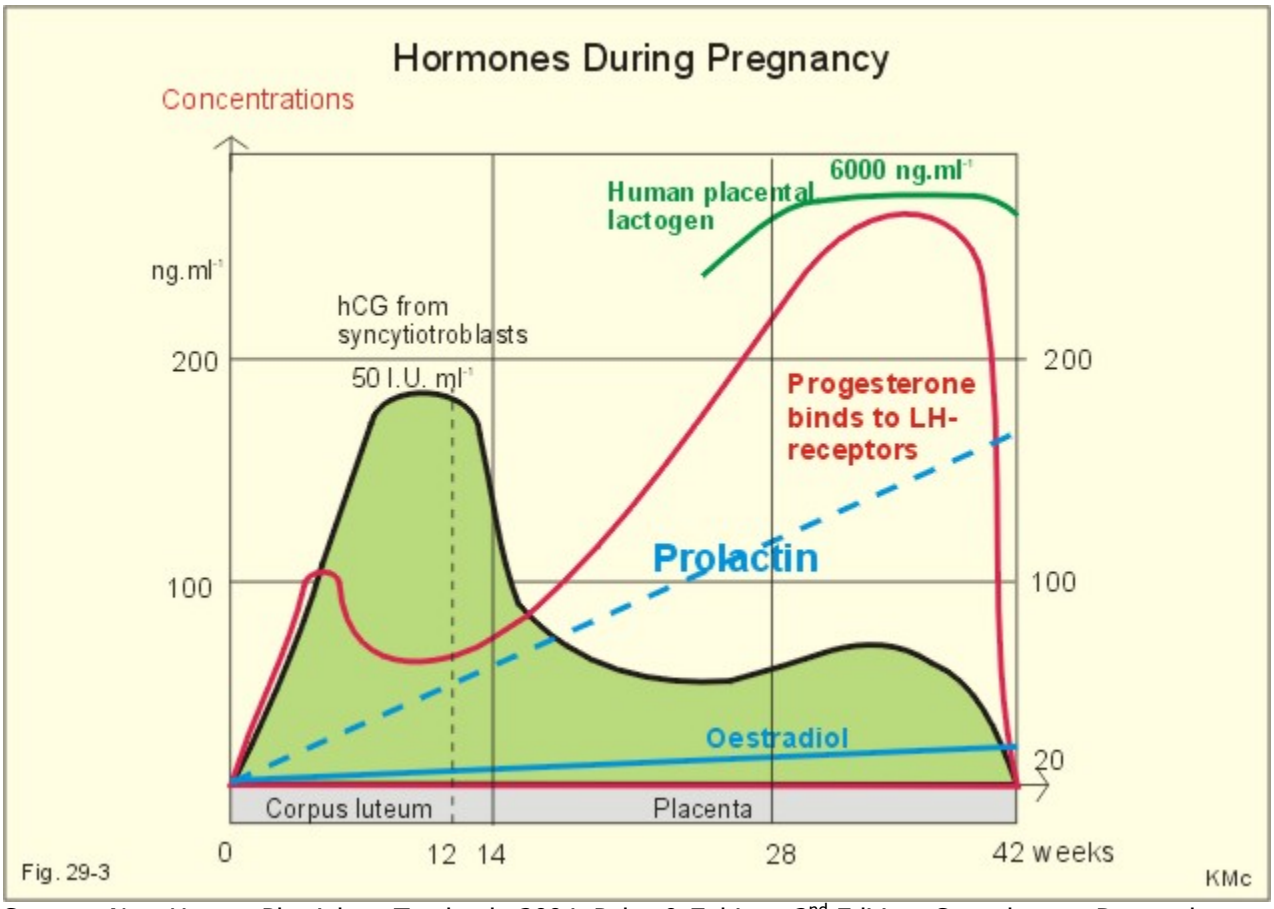
Gestational diabetes mellitus (GDM) is defined as "hyperglycemia with onset or first recognition during pregnancy" (Clinical Practice Guidelines Expert Committee, 2008). GDM is known to increase the risk of fetal macrosomia, jaundice, polycythemia, and hypocalcemia as well as neonate hypoglycemia. GDM is also associated with an increased frequency of maternal hypertensive disorders and the need for cesarean or operative delivery due to fetal growth disorders (American Diabetes Association, 2003).

Normal pregnancy is associated with both physiological and psychological stress. There is enhanced catabolism in the fasting state, maximizing fuels available for the fetus, leading to lipolysis, ketogenesis and fasting hypoglycemia. There is an increase in basal metabolic rate, fetal fuel uptake and limited precursors for gluconeogenesis. In the fed state, there is enhanced anabolism as the mother's body maximizes the use of fuel consumed. In the postprandial state hyperglycemia is associated with hyperinsulinemia, which permits maximal food storage with associated suppression of glucose production by the liver, lipolysis and proteolysis. This process facilitates glucose uptake in muscle and fat, triglyceride formation, and amino acid uptake for maternal use and transfer to the fetus (Meltzer, 2005).

During pregnancy, fasting BG values are lower and increase postprandially to slightly higher than the non-pregnant state. Hyperglycemia is a concern throughout pregnancy, increasing chances of fetal malformation in the first trimester, fetal metabolic development in the second trimester and fetal growth and ability to thrive in the third trimester. Some women diagnosed with diabetes in pregnancy may have "evolving type 1 diabetes", or preexisting (undiagnosed type 2 diabetes). These women, once identified, should be referred to experts in the field of diabetes and pregnancy.

The following graph illustrates the primary hormonal influence noted throughout pregnancy. Initially human chorionic gonadotrophin is elevated in the first trimester and drops off in late second and third trimester. At 24 weeks gestation, the estrogen and progesterone levels rise rapidly and this continues usually up to the last trimester. Human placental lactogen (HPL), cortisol, and prolactin also increase in the third trimester causing significant insulin resistance.

A woman's ability to make enough endogenous insulin may be challenged as insulin requirements often double in pregnancy in order to maintain glycemic control. Some women are unable to maintain glycemic control, and when screened at 24-28 weeks gestation, they are found to have GDM.



Source: New Human Physiology Textbook, 2004, Palev & Zubieta, 2nd Edition, Copenhagen, Denmark.

The information in this module is designed to give RNs assistance with insulin dose adjustment for significant hormonal influence and the more frequently seen problem of uncontrolled GDM.

b) GDM Prevalence:

In Canada, the prevalence of GDM is higher than previously thought, varying from 3.7% in the non-Aboriginal population to 8-18% in Aboriginal populations (CPGEC, 2008; Dyck et al, 2002).

c) GDM Risk Factors:

The following factors put women at high risk for or are associated with GDM:

General:	• Strong family history of diabetes in parents and/or siblings • Obesity (BMI >30 kg/m^2) • Increased age ≥35 years • Member of high-risk population (e.g. people of Aboriginal, Hispanic, South Asian, Asian or African descent).
Related to current pregnancy:	• Excess weight gain • Glycosuria • More than one baby (multiple pregnancy) • Polyhydramnios or preterm labour • Corticosteroid use
History of:	• Polycystic ovarian syndrome (PCOS) • Hirsutism • Acanthosis nigricans • Previous delivery of large-for-gestational–age infant • History of abnormal glucose metabolism or previous GDM • History of poor obstetric outcome (e.g. macrosomic infant in previous pregnancy) • Maternal low weight at birth

2. GDM SCREENING AND DIAGNOSIS

Learning Objectives

- To demonstrate application of GDM screening/diagnosis principles in selected case scenarios.

Required Registered Nurse Competencies

See Appendix B. Review the competencies, complete a self assessment and identify learning needs for IDA for GDM prior to beginning this section of the learning module.

Screening for GDM

In women at high risk in their first trimester and all women between 24 and 28 weeks gestation do a 50-g glucose screen with a one-hour plasma glucose (1hPG). Screen may be done at any time of day. In women with a previous history of GDM, earlier screening can be done (16-20 weeks and if normal, rescreened at 24-28 weeks).

The Canadian Diabetes Association, Clinical practice Guidelines for the prevention and Management of Diabetes in Canada (CPGEC), 2008 provides the following GDM screening values for 50-g OGTT:

50-g OGTT Screening Values:

Normal screen	1hPG <7.8 mmol/L
GDM Diagnosis	1hPG ≥10.3 mmol/L
Abnormal Screen	1hPG 7.8–10.2 mmol/L For abnormal result, rescreen with a 2-hour 75-g glucose tolerance test after 3 days of unrestricted CHO, test fasting plasma glucose (FPG), 1hPG and 2hPG.

Diagnosis of GDM
In Canada, GDM is diagnosed if two of the following three values are met or exceeded using a 2-hour 75-g OGTT (CPGEC, 2008):

Two-hour 75-g OGTT Screening Values:

FPG	≥5.3 mmol/L
1hPG	≥10.6 mmol/L
2hPG	≥8.9 mmol/L

Current identification of overt diabetes is not diagnosed until postpartum.

At present in Saskatchewan we must continue with the CDA 2008, CPG thresholds but anticipate that once revised, both screening and diagnostic cutoffs in Canada will change (see rationale in text box that follows).

Internationally, there is much controversy regarding the optimal method of diagnosing GDM (Simmons et al, 2006). In an effort to resolve the issue, the large, multi-center Hyperglycemia and Adverse Pregnancy Outcome (HAPO) trial was undertaken. The HAPO study demonstrated a strong, continuous and positive association between maternal glucose and increased birth weight and fetal hyperinsulinemia at levels below the 2008 CDA guidelines for diagnostic threshold for GDM (HAPO Study Cooperative Research Group, 2009).

The daunting task for finding international consensus for GDM diagnosis was led by the International Association of Diabetes and Pregnancy Study Groups (IADPSG). The Canadian Diabetes in Pregnancy Study group (CanDIPS) also joined the deliberation regarding diagnostic criteria for GDM (International Association of Diabetes and Pregnancy Study Groups Consensus Panel, 2010).

The revised GDM diagnostic criteria include (IADPSGCP, 2010):
1. Eliminate the 50-g glucose screen
2. Use the 2-hour 75-g OGTT

Thresholds for CanDIPS screen if one value is met or exceeded:

FPG	≥5.1 mmol/L
1h PG	≥10.0 mmol/L
2h PG	≥8.5 mmol/L

IADPSGCP (2010) recommends:
Conduct a measured FPG or random PG or A1C with first prenatal blood work. **Overt diabetes** is diagnosed if:
A1C ≥6.5% at any time in pregnancy (requires confirmatory testing)
FPG ≥7.0 mmol/L (requires confirmatory testing)
Random PG ≥11.1 mmol/L (if reconfirmed by FPG or A1C)
Implementation of the proposed international guidelines in Canada using the lower glycemic threshold for a diagnosis of GDM would dramatically increase the proportion of women with GDM diagnosis. The volume of women requiring intervention with insulin therapy would also dramatically rise.

Source: International Association of Diabetes and Pregnancy Study Groups Consensus Panel, 2010.

3. GDM MANAGEMENT

Learning Objectives

- To state the principles to be considered when creating an individualized client plan for GDM.
- To demonstrate application of the principles of IDA in selected GDM case scenarios.

Required Registered Nurse Competencies

See Appendix B. Review the competencies, complete a self assessment and identify learning needs for IDA in GDM prior to beginning this section of the learning module.

a) Preconception Care and Management of Preexisting Diabetes Mellitus:

It is expected that women with preexisting diabetes prior to pregnancy would be referred to an interdisciplinary team composed of diabetes educators, dietitian, obstetrician and an endocrinologist. Referral should occur for preconception and during pregnancy. Optimal prenatal and diabetes management has been shown to minimize maternal and fetal risks.

This module covers the principles for management of GDM only; type 1 or type 2 diabetes management is not detailed within.

Untreated GDM carries significant risks for perinatal morbidity; timely and effective treatment may substantially improve outcomes (Langer et al, 2005). GDM may lead to maternal and perinatal morbidity. GDM should be identified early and managed by a health care team.

b) Blood Glucose Monitoring:

Accurate home glucose testing using a meter, reliable in various hematocrit ranges, is required as pregnant women may have low hemoglobin, related to an iron-deficiency anemia.

Glucose testing ideally, would be done fasting, preprandial and 1- or 2-hour postprandial and at bedtime. The most common option for glucose testing would be four times a day, done at fasting, and 1- or 2-hour post-meal.

During pregnancy, the increased risk of nocturnal hypoglycemia increases the need for nighttime tests among women on insulin (CPGEC, 2008). Nighttime tests should be utilized on an individual basis as needed.

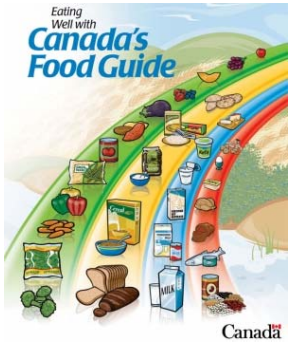
Optimal glucose control can be achieved when testing is done using fasting and one-hour glycemic targets. The majority of women with GDM can achieve glycemic targets with four-times-a-day testing (International Diabetes Federation, 2009). Women who experience preprandial or nocturnal hypoglycemia on insulin therapy should be encouraged to continue to monitor more often.

c) ketone testing:

In pregnancy, if a woman's diet does not contain enough carbohydrate, stored fat is broken down and ketones are produced. Monitoring of ketones is warranted in pregnancy as starvation ketosis may have negative effects on the fetus. Urine and/or blood monitoring of ketones is suggested to confirm that the pregnant woman's diet is adequate (CPGEC, 2008).

d) Lifestyle Suggestions:

Nutrition



During pregnancy, women should be evaluated and followed by a registered dietitian to ensure that nutrition therapy promotes euglycemia, appropriate weight gain, and adequate nutrition intake (Franz et al, 2002; CPGEC, 2008).

The foundation for glycemic control is the medical nutrition therapy (diet), with a balance of carbohydrates (CHO) spread over the day in three meals and three snacks (CPGEC, 2008). Many women, while optimizing their diet to obtain glycemic targets, may have reduced their CHO intake down to 15-30 grams at breakfast, 45-60 g at other meals and snacks at 15-30 g. Most women should be initially provided with 1-2 weeks of lifestyle modifications to try and achieve targets.

During late pregnancy, food ingestion results in higher plasma glucose concentrations and more prolonged periods of elevated glucose concentrations. These changes enhance transplacental glucose delivery to the fetus and promote fetal growth. The maternal insulin and glucagon do not cross the placenta. The hormonal influence is often strongest before, and with, the first morning meal of the day. Many women with GDM will experience a high

fasting glucose and elevated 1-hour post-breakfast glucose. The post-lunch and post-supper readings may be in target. All women have different glycemic patterns, and some may only require insulin to cover a later meal. Shift work may make control difficult, as glucose trends are less predictable. Nausea and vomiting can also make glycemic control a challenge as it may persist throughout pregnancy.

The food plan should fulfill minimum nutrient requirements for pregnancy and achieve glycemic goals without inducing weight loss and ketonemia. When CHO is significantly restricted, and physical activity is already consistent, medication intervention is required, if blood glucose levels are above target. Physicians will need to assess and initiate insulin therapy, especially when risk of fetal macrosomia is a concern. The dietitian should reassess current diet as women may feel hungry and they would like more to eat at breakfast. If women have overrestricted their CHO-containing foods, the dietitian (RD) may increase the CHO, to avoid starvation ketosis. Health Care Professionals (HCP) should consider any diet changes when starting insulin. The insulin dose at the first meal of the day may need to be adjusted upwards to accommodate the increased CHO ingested, if recommended by RD (Homko, 2008).

Physical Activity

Regular physical activity is an important component of GDM management. Physical activity should be encouraged unless obstetrical contraindications are evident or glycemic control is worsened by activity (CPGEC, 2008). Women with GDM should be assessed to determine current physical activity levels and planned levels throughout the pregnancy.

e) Insulin Management and Glycemic Targets During Pregnancy:

The decision about which insulin regimen to start should be discussed with the client and members of the health care team. Consider starting insulin when 50% of readings are elevated in a pattern at a specific time of day.

Basal bolus combinations provide optimal choice for glycemic control in pregnancy. The benefit of a basal bolus regime given four times a day is that it allows for easier and safer adjustment of insulin doses. The assessment by the RN includes the client's financial concerns, current glycemic patterns, and need for glycemic control. Client fears/phobias regarding insulin, and other social, emotional, psychological issues that may affect their control should also noted. Some women may have social barriers that affect their ability to manage their diabetes, and/or keep medical appointments.

Insulin pens are more acceptable, flexible, and accurate than syringes. Syringe use should be limited to women who cannot afford cartridges for pen use.

Humulin R/Toronto at meals times can be used if financial cost is a consideration for clients. It must be taken at least 30 minutes pre-meal to attempt to achieve glycemic targets at 2 hours postprandial. The glucose test done 1 hour postprandial is optimal for glycemic control, but control may not be possible with short acting insulin.

Remember that larger doses of insulin will shift and delay the action period of the insulin used. Remind women to have snacks and meals "on time" to prevent hypoglycemia.

Rapid insulin analogs such as insulin lispro (Humalog) and insulin aspart (NovoRapid) are safe in pregnancy, and provide an optimal action profile to cover postprandial glycemic rise. These rapid insulins are the first line of choice as they can be matched to CHOs ingested at mealtime. There is currently no data for the use of insulin glulisine (Apidra) in pregnancy (International Diabetes Federation, 2009).

A common **insulin start dose** is rapid insulin at 4 units t.i.d., taken with meals; timing is fine tuned as required for each individual.

RECOMMENDED GLYCEMIC TARGETS DURING PREGNANCY: (CPGEC, 2008)

Plasma Glucose (PG)Timing	**Glycemic Target During Pregnancy (mmol/L)**
Fasting and preprandial	3.8–5.2
1h postprandial	5.5–7.7
2h postprandial	5.0–6.6

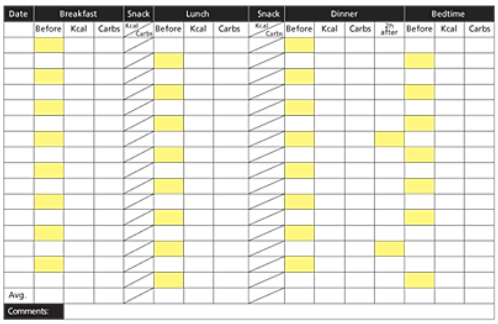
RN to titrate dose 1-2 units every two days until targets obtained.

While the dose is being titrated 1-2 units every two days to achieve glycemic targets, RNs should educate the client on dose titration and the importance of maintaining contact (telephone calls) for ongoing support. Ensure women understand the timing, onset, action peak, and duration of their insulin.

Insulin doses are usually titrated by 10% of total 24-hour dose, as needed, every two days. Titration may increase as the pregnancy progresses (due to increased hormonal interference) and based on glucose readings. Women should see their physician regularly for diabetes management. Physicians may need to titrate the dose and increase insulin units significantly more than 20% (the highest amount recommended for RNs to titrate), as the pregnancy progresses or if the woman is overweight and insulin resistant.

At 34-36 weeks gestation, the glycemic levels may continue to rise, may level off, or slightly drop off resulting in hypoglycemia. Women with frequent hypoglycemia not explained by activity or changes in food should be reassessed by a physician. Obstetricians should assess the woman's pregnancy for a drop in insulin requirements, and assess if this is from a significant hormonal drop which may affect fetal health. If the total daily dose (24-hour total) of insulin needs to be reduced to prevent hypoglycemia and is reduced by more than 20% of the total dose, the fetus is monitored daily by fetal non-stress test to ensure viability.

Achieving glycemic control in pregnancy may be difficult due to the ongoing rise of hormones and insulin resistance. It may, even with best efforts, take up to 3 weeks to obtain glycemic control.



Physicians should review glycemic patterns every one to two weeks from 28-36 weeks gestation and weekly thereafter. Assessments are done for both obstetrical/diabetes management of the client and to provide adequate dose titration. If, despite best efforts, glycemic control is not achievable, RNs should encourage a referral to experts in the field of diabetes and pregnancy.

RNs should review values with client by phone weekly or biweekly to optimize glycemic levels:

- Documentation and communication with the physician for dose changes should be in place for each client.
- It is helpful to encourage the client to use a glucose logbook, so all insulin doses and glucose tests are evident throughout the pregnancy.

If fasting glucose is elevated, start either Humulin N or Novolin NPH at bedtime. Often the bedtime dose is started at four units, but if fasting glucose is well above 7 mmol/L a dose of 0.1 units per kilogram body weight may be initiated.

Encourage women to titrate their dose 1-2 units every 2 days for a fasting target below 5.3 mmol/L.

Newer agents such as insulin glargine (Lantus) and insulin detemir (Levemir) are <u>not</u> recommended in GDM management. To date, these newer agents are not well-studied in pregnancy and have not been proven to be safe.

In all cases, hypoglycemia risks should be discussed with the woman and her physician on an individual basis.

For women with pre-existing diabetes (type 1 or type 2), refer to a specialist to balance the risks for hypoglycemia and medication safely in pregnancy. The physician may choose to switch long acting insulin to Humulin N or Novolin NPH b.i.d. These older insulins (Humulin N, Novolin NPH) are known and considered safe, but do have a higher risk of hypoglycemia. For women who are unable to tolerate NPH due to nocturnal hypoglycemia, it may be wiser to leave them on their current agents.

Basal and Rapid Insulin Titration Based On Home Blood Glucose Testing*
(Canadian Journal of Diabetes, 2005)

Basal Insulin: **If average BG before breakfast is (mmol/L):**	**Rapid Insulin:** **If average BG 1-h after the meal is (mmol/L):**
<4.0: reduce bedtime dose by 2-4 units that evening	<5.5: reduce dose taken for that meal by 2 units the next day
4.1–4.9: maintain the present dose	5.6–7.8: maintain present dose
5.0–5.4: add 1 unit to dose taken day before	
5.5–6.9: add 2 units to dose taken day before	7.9–10: add 1 unit to that meal's dose the next day *If addition by one unit is not effective, increase and titrate dose by 2 units*
>6.9: add 2-4 units to dose taken day before	

**Grid above is for GDM and query type 2 DM in pregnancy with pre-breakfast or post-meal changes every 1-2 days.*

f) Other Pharmacologic Interventions (Glyburide and Metformin):

If the woman with GDM is opposed to insulin therapy, or is non-adhering to current insulin regime, RNs should discuss the options and risks of Oral Hypoglycemic Agents (OHAs) such as Metformin or Glyburide. Often women with PCOS are on Metformin to ovulate and conceive. Discussion on when to switch these women to insulin should be done with their physician.

Presently, RNs working with women on OHA's will require a physician to adjust the dose for glycemic targets.

Metformin and Glyburide have been shown to be reasonably safe in pregnancy (International Diabetes Federation, 2009). Other oral hypoglycemic agents have not been proven to be safe in pregnancy and hence should not be used.

Women with GDM should, however, be informed of the risks (and currently off label use of diabetes oral agents), as some studies have shown a risk for perinatal morbidity and preeclampsia (CPGEC, 2008).

Many women on Metformin will need supplementation with insulin to maintain glycemic targets. Metformin has been used internationally in GDM treatment plans. A starting dose of 500 mg b.i.d. titrated up to 2 grams if needed. To date, combination therapy has not been specifically studied.

To date, only Glyburide has been demonstrated to have minimal transfer across the human placenta and has not been associated with excess neonatal hypoglycemia in clinical studies. Numerous studies have demonstrated that Glyburide is an alternative to insulin therapy for women who are unable to take or decline insulin therapy (Langer et al, 2000).

The starting dose for Glyburide is 2.5 mg b.i.d. and titrated to maximum dose as indicated. A disadvantage of using Glyburide is that it may take up to a week before the effect of dose titration is evident (Scollan-Koliopoulos et al, 2006).

g) Labour and Birth:

Most women with GDM will carry their baby to 38 weeks, after that individual delivery plans will be determined by the woman's physician and/or obstetrician.

Most women with GDM will not require insulin therapy during labor or after delivery. Glucose testing is done after delivery q.i.d. fasting and 1 or 2 hours postprandial. Based on glucose readings, the majority of women who had GDM will not need medication.

h) Postpartum Care:

Breastfeeding

Encourage breastfeeding (nutritional and immunological benefits to the baby), unless there is a specific contraindication.

For women who may require oral agents postpartum, it important to verify if they have an overt type 2 diagnosis first (i.e. preexisting, undiagnosed). In the postpartum period, some women have high glucose levels and are not prepared to continue insulin therapy while

breastfeeding. Oral diabetes agents may be offered. For oral agents, women should be advised that the transfer of Metformin to human milk is minimal (<0.4% of the maternal concentration). There is some concern that sulfonylurea agents may cause hypoglycemia in the breast-fed baby. Further study is required.

Current data is limited, but the Global Guideline on Pregnancy and Diabetes (2009) reviewed a small study where Glyburide and Gliclazide could not be detected in the breast milk of mothers and hence appears to be safe in mothers with diabetes on oral hypoglycemic agents who wish to breast-feed their babies.

Postpartum Screen

Between 6 weeks and 6 months postpartum, women should be rescreened for diabetes, using a 2-hour 75-gram glucose tolerance test. Women with previous GDM are considered high risk to develop type 2 diabetes. All women should receive counseling on healthy lifestyles.

Maternal Risk

The diagnosis of GDM is linked to "impairment of insulin secretion and action" which persists postpartum and increases the risk of impaired glucose, IGT and type 2 diabetes (CPGEC, 2008). The risk for diabetes to be diagnosed is most evident in the first 5 years postpartum and more slowly after 10 years. The strongest predictor of early postpartum diabetes development is in women with elevated FPGs during pregnancy (CPGEC, 2008).

Women with previous GDM should be screened postpartum (see above section) and receive lifestyle education to prevent diabetes.

Subsequent Pregnancies

Women with previous GDM should plan subsequent pregnancies in consultation with their healthcare team. Ideally, glucose tolerance should be determined preconception to ensure euglycemia at the time of conception (CPGEC, 2008).

Any degree of abnormal glucose in pregnancy has been found to independently predict an increased risk of glucose intolerance postpartum (Retnakaran et al, 2008). Women with GDM have a high risk of developing type 2 diabetes in the years following the GDM pregnancy. This relationship reflects the fact that GDM and type 2 diabetes share similar pathophysiology (Retnakaran et al, 2008).

In their retrospective study, Kwak et al, 2008 found that GDM recurred in nearly half of all subsequent pregnancies among 120 Korean women followed for recurrent pregnancy. Early postpartum examination of maternal glycemic status may help to assess the risk of GDM at subsequent pregnancies (Kwak et al, 2008).

Kim et al, 2007 found GDM to recur more predominantly among non-white women. Non-Caucasian women should be considered at higher risk for future development of GDM than Caucasian women. In Saskatchewan, a study by Dyck et al, 2002; found that there may be fundamental differences in risk of GDM between Aboriginal and non-Aboriginal women. Follow-up screening and review of glycemia prior to future pregnancies is especially important among ethnic women (Dyck et al, 2002; Kim et al, 2007).

***NOTE**: The detail of GDM treatment plans will depend on the learning needs and problem-solving ability of the individual women.*

CASE STUDIES

CASE STUDY A

Hyperglycemia in Pregnancy

Anna, a first Nation's woman, age 23, gravida 2, term 1, living 1. She had one child delivered in 2010 that weighed 4.08 kg. She is now at 30 weeks gestation, her weight is 100 kg, at 160 cm tall. Anna has a family history of type 2 diabetes on both the maternal and paternal sides. Her 50-gram glucose screen was 12.0 mmol/L.

Anna has seen the dietitian, and dramatically reduced the juice and regular soda pop in her diet. She has been testing her blood sugars for 2 weeks with fasting 6.0–7.0 mmol/L range and all her one-hour after meals blood sugars are above 8.9 and range 8.9–13 mmol/L, her post breakfast reading average is the highest at 13 mmol/L. She states she is following her CHO restrictions, and is eating 30 g at breakfast, 60 g at lunch and 60 g at supper. Her am, pm and bedtime snack are 15–20 g CHO.

You have advised the physician of your concern and are seeking insulin orders for Anna.
The physician agrees to see Anna today, and gives you her insulin orders over the phone, as he wants her started on therapy as soon as possible.

Insulin orders from physician:
Start Humalog 5 units t.i.d. pre-meals and Humulin N 5 units at bedtime, Subcutaneous (SQ)
Formula could be used such as: 100 kg x 0.2 units/kg = 20 units
20 units divided up into 4 doses = 5 units q.i.d.

Later in the week, Anna calls and is concerned because her blood sugars have worsened since she started on insulin.

What would you review?

CASE STUDY B

Post-breakfast Hyperglycemia

Jenny is pregnant with her first child. She had her glucose screen at 30 weeks gestation, fasting 6.1, one hour 11.8, 2 hour 10 mmol/L. Weight is 75 kg at 167.6 cm tall. Jenny saw the diabetes educators and has improved her glucose levels over the past two weeks. When contacted by phone today, you note that the majority of her readings are in target, but the one-hour after-breakfast readings are still above target.

You contact Jenny's physician and she provides the following order:
NovoRapid (NR) insulin, 4 units to be with breakfast only, SQ

One week, after starting the insulin, Jenny calls you with the values below. The insulin dose was titrated as per the table below.

Jenny's glucose readings & insulin dosing:

Day	Before breakfast	NR 4 units	1 hr after breakfast	1 hr after lunch	1 hr after supper
1	5.2	same	7.8	6.6	6.9
2	5.1		7.9	6.6	6.6
3	5.0	NR 5	8.3	6.4	6.9
4	5.1		8.4	6.7	7.0
5	5.2	NR 6	8.5	6.9	7.1
6	5.0		8.6	6.4	6.9

What advice should the RN give?

CASE STUDY C

Fasting Hyperglycemia

Jane, age 39, weight 100 kg, was seen in your clinic about one week ago and started on Humulin N 10 units at bedtime, as her fasting glucose was 7–8.3 mmol/L the previous week. She is overweight and has a family history of diabetes.

Jane is now 34 weeks gestation, she increased her dose to 12 units over the weekend, and today (on day 5) she reports the following blood glucose readings:

Day	Before breakfast	1 hr after breakfast	1 hr after lunch	1 hr after supper	Humulin N
Day 1	8.2	7.6	6.0	6.9	N10
Day 2	7.3	7.5	5.9	6.8	
Day 3	7.0	7.4	7.0	7.0	N 12
Day 4	6.9	7.7	7.3	7.2	
Day 5	6.9	7.4	7.0	7.5	?

The 2-unit insulin dose increase every 2 days appears insufficient to get Jane's fasting glucose into glycemic target.

What should an RN do in this situation?

CASE STUDY D

Oral Hypoglycemic Agent Prior to Pregnancy

Melissa, age 28, has been on Metformin 500 mg t.i.d. with meals for the past 5 years to manage polycystic ovarian disease and impaired fasting glucose. Her family doctor recently referred her to an obstetrical physician, and she had her glucose screen done while on Metformin. The 2-hour 75-g glucose was: fasting 6.0, 1 hr 10.6, 2 hr 9.0 mmol/L. She meets GDM Criteria.

When you see Melissa in your office, she is 28 weeks gestation, is already glucose testing and her diet recall shows healthy food choices with moderation in CHO.

Melissa wishes to continue the Metformin, and is aware that it is not well studied in pregnancy but is considered safe. She agreed to start bedtime insulin.

Melissa's physician sent her to the pharmacist. She is using a Novolin pen with Novolin NPH insulin. Initial dose started was 8 units at bedtime. She was increasing her doses as per the table below:

Date	Before breakfast	2 hrs after breakfast	Before lunch	Before supper	2 hrs after supper	Bedtime	Novolin NPH
Day 1	6.1	6.2	5.0	4.9	6.7	5.9	NPH 8
Day 2	6.4	6.6	5.4	4.1	6.4	5.4	NPH 9
Day 3	6.5	6.0	5.0	4.5	5.5		NPH 10
Day 4	6.5	5.7	4.8	4.4	5.0	5.6	NPH 11

What advice would you give Melissa?

CASE STUDY E

Documented Hypoglycemia on Insulin Therapy

Susan, age 19, obese at 110 kg, is referred to your care, at 33 weeks gestation. She is already on Humulin R 10 units t.i.d. pre-meal, and Humulin N 18 units at bedtime.

Susan shares her glucose log and states she is having trouble with high and low blood sugars. You note a pattern in her book with hypoglycemia every day before lunch and again before bedtime.

All Susan's 2-hour post-meal blood sugars are well above target for two hour testing. She eats around 60 g of CHO at each meal and 15 g CHO at a.m., mid-p.m. and bedtime snacks. Susan's food intake is very consistent. She reduced her dose at breakfast by one unit and has persistent hypoglycemia occurring.

Day	Before breakfast	2 hrs after breakfast	Insulin	Before lunch	2 hrs after lunch	Insulin	Before Supper	2 hrs after Supper	Insulin	Bedtime	Insulin
1	5.9	14	R10	3.6	10	R10	4.8	9.0	R10	3.4	N18
2	5.2	13.0	R10	3.1	9.0	R10	4.5	8.9	R10	3.2	N18
3	5.1	12.0	R9	3.0	14	R10	4.9	10.9	R10	3.5	N18

Part A
What would you advise for Susan?

Part B
At 36 weeks gestation Susan contacts you concerned about hypoglycemia. You review her glucose patterns and she is having both fasting hypoglycemia in the 3.0–3.8mmol/L range and the majority of her postprandial readings at two hours after breakfast, lunch and supper are under 4 mmol/L.
Susan explains that she has dropped all her insulin doses by 10% of each individual dose, and is still having hypoglycemia.

What would you advise?

ANSWERS FOR CASES STUDIES (A-E)

Answer Case Study A:
Check to make sure Anna is taking insulin doses correctly and her pen is not empty. Clarify what her current insulin doses are: States she is on Humalog 7 units at all three meals and Humulin N 7 units.

Obtain her current glucose readings:

	Pre-breakfast	1 hr after breakfast	1 hour after lunch	1 hr after supper
March 10	9	13.4	10	11.9
March 11	9.1	14.0	10.6	11.0
March 12	9.3	14.1	11.0	12.2
March 13	9.4	14.6	10.9	13.8

Remind Anna that she is not on enough insulin yet to help her blood sugars. The RN should recommend a dose increase of 2 units across the day and again have her titrate the all insulin doses up 2 units every two days.

Today the RN should contact the physician by phone to have him review current glycemic values and obtain insulin orders for the appropriate insulin dose increase for Anna (physician may order: dose changed to Humalog ten units with meals and Humulin N 12 at bedtime).

Assess Anna's fears about insulin therapy. Provide support and encouragement. If Anna remains reluctant to do her titration of Humalog and Humulin N, then encourage her to focus on only one time of day, and to increase her bedtime Humulin N by 2 units every two days, and the nurse will call her more often to adjust the insulin.

Anna's physician will need to make a significant dose increase to match the insulin resistance seen in her glycemic pattern, at the next office visit. He/she may choose to set up a correction grid for hyperglycemia using one unit of insulin to drop or correct 1–2 mmol/L.

Or
RN may write out a basal dose and rapid dose adjustment for Anna, as below:

Basal Insulin: glucose value (mmol/L) If average (2-day) **before breakfast** glucose:	**Rapid Insulin:** **Glucose value (mmol/L):** If average (2-day) 1 hour **after meal** blood glucose**:**
<4: reduce bedtime dose by 2 units that evening	<5.5: reduce dose taken for that meal by 2 units the next day
4.1–4.9: maintain bedtime dose	
5.0–5.4: add 1 unit to bedtime dose taken the day before	5.6–7.8: maintain present dose
5.5–6.9: add 2 units to bedtime dose taken the day before	7.9–9: add 1 unit to that meal's dose the next day
>6.9: add 2-4 units to bedtime dose taken the day before	10–13: add 2 units to that meal's dose the next day

A safe dose to start is Humalog 5 units at meals and Humulin N at 5 units.

Anna likely will need more insulin due to her obesity in pregnancy (the formula for a higher dose (0.4 units/kg) could be considered by the physician). As her post-breakfast reading is significantly elevated, suggest addition of 1-2 units to the planned Humalog breakfast dose.

Anna should be asked to titrate her insulins doses, 1-2 units every 2 days until she reaches glycemic targets. Ensure she is aware of the low and high end for targets to avoid risk for hypoglycemia.
Anna should continue to balance her CHO and walk for 15 minutes after each meal. If Anna remains too nervous to adjust the insulin dose, encourage her to contact you twice a week to have glycemic pattern reviewed and insulin doses titrated to target.

Answer Case Study B:
The RN would advise Jenny's dose be increased by 2 units to NR 8 units, as 1 unit dose titration is not working quickly enough to balance with the increasing hormonal resistance.

Advise Jenny to increase her NovoRapid dose 2 units q 2 days until in target, or until reassessed by RN or physician.

Answer Case Study C:
The RN would contact the physician by phone for an order to titrate and increase Jane's bedtime dose by 3 units to Humulin N 15 units and then 3 units q 2 days until in glycemic target. It is urgent to achieve glycemic control as early as possible because at 34 weeks fetal macrosomia is likely.

Encourage Jane to see her physician regularly and get clear directions on self-dose titration of her bedtime Humulin N.

Answer Case Study D:
Assess Melissa's readiness to switch her from Metformin to mealtime rapid insulin, at 28 weeks gestation her postprandial readings are in target but that may change over the next few weeks. Suggest that at her next visit she will likely be switched to prandial rapid insulin. Her dose of Novolin NPH needs adjustment, you will advise dose titration of 2 units now and then increased every 2 days, until fasting under 5.3 mmol/L.

Answer Case Study E:
<u>Part A</u>
Review appropriate treatment for hypoglycemia with Susan. Determine if there is any nausea or vomiting contributing to the hypoglycemia pattern. If vomiting daily, Susan may wish to see her physician for an antiemetic agent such as Doxylamine Succinate/pyridoxine HCL (Diclectin) to prevent this. Assess if she is eating CHO appropriately and if there delayed meal/snack or omission of snacks. Assess activity and whether or not this is a possible cause of the hypoglycemia. If there is no other explanation (such as food or activity) contributing to hypoglycemia, contact Susan's physician, with the suggestions below:

Susan would meet "Exceptional Drug Status" criteria for a switch to rapid insulin.

Suggest Susan switch her Humulin R insulin to rapid insulin, such as Humalog and reduce the dose to 8 units t.i.d. pre-meal to prevent hypoglycemia. Explain that this rapid insulin will prevent hypoglycemia because its insulin action profile matches CHO food better and insulin duration is shorter.

If nauseous and vomiting, Susan can eat her meal first, and if tolerated, take the Humalog right after food ingested to prevent hypoglycemia.

Encourage Susan to test, checking her blood sugars before and either 1 or 2 hours after meals until targets are reached.

Teach Susan how to match her insulin to food using an insulin to CHO ratio of 1:8 at meals, or she could try 2 units for 15 g carb. Review how this may change throughout pregnancy (due to hormonal influences) and **review the principles of dose adjustment for pattern.**

1. Prevent hypoglycemia – reduce the insulin dose that is acting over that time period and causing the hypoglycemia.
2. If all blood sugars are well above target, increase all doses 1-2 units every 2 days, for her doses of Humalog and Humulin N.
3. If fasting glucose is in target but elevated after meal then only change the meal dose of Humalog.
4. If fasting is above target, change the bedtime Humulin N by 2 units (10-20% of the dose).
5. If only one time of the day is elevated above target, use more insulin to correct the glucose level for that that time of day.

Part B

Susan is in third trimester with frequent hypoglycemic episodes over her whole day. The RN is to assess whether her loss of appetite is the factor for hypoglycemia. Rule out other contributing factors for the hypoglycemia, such as lack of CHO, increased activity, a new insulin cartridge started, wrong doses taken, etc.

If no cause for hypoglycemia is found then ask her about fetal movement counts (FMC) to assess if the baby's movements are within normal range. If there is no fetal movement advise her to go to the nearest obstetrical physician and or emergency room for fetal assessment. If fetal movement is active, contact Susan by phone and reduce all the insulin doses by 20%. She can then continue to reduce her insulin doses daily if hypoglycemia persists.

Explain to Susan that you are concerned about the dramatic drop in insulin requirements and that you will contact her physician as soon a possible so she is aware that there is no diabetes explanation for the change. The risk for placenta insufficiency needs to be assessed by the physician as soon as possible. The physician will determine if daily fetal monitoring/biophysical ultrasound is indicated or if there is a need to induce labour or intervene via C-section to prevent neonatal mortality.

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APPENDICES

APPENDIX A - SAMPLE PHYSICIAN/REGISTERED NURSE (RN) SIGNATURE SHEET

The following is a **SAMPLE** which may be used within an RHA for the RN and physician(s) to sign once the RN has successfully demonstrated the advanced competencies for IDA in GDM.

_____ HEALTH REGION

PHYSICIAN/REGISTERED NURSE SIGNATURE SHEET

TRANSFER OF FUNCTION
ADVANCED GDM INSULIN DOSE ADJUSTMENT[6]

_____ has achieved advanced competency to adjust insulin for clients
[Name of Registered Nurse]

with GDM according to policy _____. We have read the Regional Health Authority policy for

advanced insulin dose adjustment in GDM and agree to the conditions outlined in the policy.

Signed: _____ Physician

Signed: _____ Diabetes Nurse Educator/Registered Nurse

Date: _____

[6] This form can be customized to cover all advanced procedures or selected ones depending on the scope of the delegated function

APPENDIX B - COMPETENCY PERFORMANCE CHECKLIST

Registered Nurse: _____

	PERFORMANCE CRITERIA	*OBSERVED*	NOT OBSERVED	COMMENTS
GENERAL COMPETENCY				
1	Demonstrates full competence and is confident with basic insulin dose adjustment and has at least 6 months experience after obtaining the basic Transfer of Function.			
Gestational Diabetes				
1	Identifies gestational hormonal influence in diabetes management			
2	Identifies variables in the glycemic control in pregnancy			
3	Using recognized principles and guidelines to assists and or teach insulin dose adjustment for clients			
4	Provides client education about pregnancy and diabetes: diagnosis, management, glycemic control and IDA pattern management; postpartum screen and follow-up			
5	Makes appropriate referral to physician when titrating insulin doses			
Patient ability to self adjust insulin				
1	Identifies variables in diabetes management and client capacity which may affect adherence to self management in pregnancy			
2	Assists client with CHO and insulin balance for glycemic control			

Pregnancy with SICK DAY/NAUSEA MANAGEMENT				
1	Able to rapidly assess client situation for home management versus emergency room visit/ hospital admission.			
2	Identifies variables in diabetes management and client capacity which may affect IDA for home management of nausea/ sick days.			
3	Identifies situations which require referral to medical care or hospital or are not suitable for IDA by RN.			