

# Preconception planning in diabetes mellitus

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## Abstract

Preconception planning is an important part of obstetric care in women with preexisting diabetes who want to ensure a healthy pregnancy with optimal foetal and maternal outcome. This review discusses the goals and opportunities for preconception counseling. It focuses on the organization of care and the evaluation required, prior to conception. It emphasizes monitoring and treatment with insulin, medical nutrition therapy, physical activity and behavioural therapy to ensure good glycemic control. The review also covers complication and co-morbid conditions such as nephropathy, neuropathy, retinopathy, hypertension and dyslipidemia, and touches upon the male factor.

## INTRODUCTION

We work hard to achieve our primary goal of a healthy child for every expectant mother patient. As gynaecologists, we take best possible measures to achieve this aim once the antenatal patient comes to our OPD.

However we sometime forget that the unborn baby is most sensitive to harm two to eight weeks after conception. At this stage major organs such as heart, brain and kidney begin to form. Some life styles, illness or/and medicine can affect the baby even before the mother to be comes for consultation.

Thus optimal medical care and patient education must begin well before conception to prevent early pregnancy loss and improve pregnancy outcome.

The four golden steps to success are:

1. Plan purposefully
2. Prepare prayerfully
3. Proceed positively
4. Pursue persistently

While starting a pregnancy, parents and the extended family need to be emotionally prepared for the future baby. Choosing the best time of having the baby is an equally important aspect for improving birth quality and ensuring the health of both the mother and baby.

This is particularly important in women with chronic diseases, such as diabetes mellitus, which may affect pregnancy adversely.

## GOALS OF PRECONCEPTIONAL PLANNING (1)

1. Improve the chances of successful pregnancy
2. Prescreen women of childbearing age for any health risk before attempting pregnancy.
3. Minimize risk factors.
4. Treat or stabilize medical condition prior to conception.
5. Discuss concerns (medical, social or emotional) with patients/ spouses.
6. Make a plan for actions to be taken prior to, and during, pregnancy.

## WINDOWS OF OPPORTUNITY

A clinician should view each visit of a sexually active woman of reproductive age as an opportunity for counseling and encouraging preventive care.

Windows of opportunity for counseling are:

- Visit for birth control
- Visit for negative pregnancy test
- Post -natal visit.

- Visit for gynaecological consultation, e.g. pruritis vulvae
- As a component of routine primary medical care, to all women of child bearing age
- Visit while accompanying spouse with chronic medical disease, e.g. diabetes

**MANAGING DIABETES (1-10)**

**A. ORGANIZATION OF CARE**

- Multi disciplinary, patient-centred care
- Educate about the need for good control of diabetes.
- Effective family planning; educate about fertile period
- Manage complications, esp. retinopathy and hypertension
- Detect and manage thyroid dysfunction.
- Review concomitant drug therapy and discontinue:
  - ACE (I)
  - ARBs-
  - Diuretics
  - Beta-blockers
  - Statins
  - Non insulin diabetes drugs
- Educate about breast feeding, long term treatment
- Complete history, physical exam & evaluation (Table 1)

**Figure 1**

Table 1: Laboratory and special exam components of the initial and subsequent evaluation of pregnant women with preexisting type 1 or type 2 diabetes (in addition to usual prenatal lab tests)(1)

Initial evaluation	Subsequent testing
HbA1c	Every 1- 3 months
Fasting lipid profile,* including triglycerides, total HDL, and LDL cholesterol	As indicated
TSHU and thyroid peroxidase antibodies; consider TSH-receptor antibodies if TSH is suppressed <0.03 µU/ml	To monitor treatment
Hemoglobin, serum ferritin; consider vitamin B12 in type 1 diabetes	To monitor treatment
Consider transglutaminase antibodies in type 1 diabetes to diagnose celiac disease*	Repeat to confirm abnormal result or monitor effect of gluten-free diet
ALT/AST; possible ultrasound	As indicated
Random urine for ACR or 24-h urine collection for microalbuminuria and creatinine clearance (measure 24-h total protein excretion of urine is dipstick positive for albumin or protein). Serum creatinine for estimated GFR if preconception; creatinine clearance if pregnant	Every 1- 3 months if abnormal
Dilated retinal exam*	Every 1- 6 months according to risk of progression
Asses risk factors for CHD. Resting ECG* in asymptomatic patients age 35 years or older (note change of prior silent ischemia, LVH, and QTc). Women with suspect angina, atypical chest pain, significant dyspnoea, abnormal ECG, or other reasons to suspect CHD should have cardiology consultation with stress ECG, stress echocardiogram, or another appropriate imaging technique*	As indicated
Consider testing* for cardiac autonomic neuropathy (heart rate variability with deep breathing, blood pressure response to standing)	As indicated
Consider 2-D or Doppler echocardiogram or tissue Doppler imaging* with indication of diabetic cardiomyopathy or systolic or diastolic heart failure	As indicated
Consider testing* for peripheral arteriosclerotic vascular disease if high risk (carotid ultrasound, ankle/brachial blood pressure).	As indicated

\*May be delayed or omitted if performed before pregnancy. LVH, left ventricular hypertrophy; QTc, Q-T interval controlled for heart rate;

**B. GLYCEMIC CONTROL (1,2,5)**

**MONITORING**

- Target HbA1c as close to normal, without significant hypoglycemia
- Check HbA1c at initial visit, monthly until target < 6.0 is achieved, then quarterly.
- SMBG – begin, maintain & intensify regular self monitoring of blood glucose (SMBG) as much as possible.
  - Finger stick SMBG is best
  - 1 hour post prandial blood glucose (PPG) is best
- Urine ketones should be checked when indicated (Table 2)

**Figure 2**

Table 2

Indication for urine ketones testing
FBG $\geq$ 200 mg % PPBG $\geq$ 300 mg % Abdominal symptoms, e.g. nausea, vomiting, pain. Breathlessness / use of accessory muscles respiration Smell of rotten fruits in health Alcohol intake Dry tongue Any atypical symptoms / presentation Any febrile illness

## INSULIN THERAPY

- Intensive regime is preferred.
- Regular insulin or aspart or lispro + NPH are preferred. NPH provides the basal component to control fasting glycemia, while rapid acting insulin controls post prandial peaks. Rapid acting analogues such as aspart and lispro have the advantage of better post prandial control flexibility of timing of injection (before or after meals), and less hypoglycemia.
- One may use premixed or NPH insulin if blood glucose levels are not very high.
- Abdomen and thighs are preferred sites.
- Insulin doses increase during pregnancy

## ORAL HYPOGLYCEMIC AGENTS

- Stop OHAs in preconception period
- Shift to insulin; titrate dose before conception.
- Metformin and glibenclamide can be continued until insulin is started after diagnosing pregnancy.

## C. MEDICAL NUTRITION THERAPY (3,4)

- By dietician as well as other team members.
- Base energy intake according to
  - BMI
  - Physical activity
  - Fetal growth
  - Desire to prevent excess maternal gain
- 3+3 meal pattern should be advised, with 3 major meals and snacks per day. A late night snack is

essential to prevent nocturnal hypoglycemia.

- Folic acid 400-600 $\mu$ g/day should be supplemented.
- Supplementary vitamin/mineral/trace element intake from food sources; but prenatal exogenous supplement should be considered if food intake is inadequate. Folate supplementation may mask signs of vitamin B12 deficiency.
- Vegetarian pregnant women may need vitamin D, Vitamin B12 supplements
- Diabetic women are encouraged to eat at least 2 meals of oily ocean fish/week, but should avoid eating fish high in methyl mercury (sword fish, king mackerel, shark, and tilefish)

## D. PHYSICAL ACTIVITY (7,8,9)

- Daily exercise regime is necessary.
- Benefits of exercise include well being, less weight gain, less adiposity, better glycemic control, and better tolerance of labour.
- Upper limb exercises are safe, while exercise with abdominal strain should be avoided.
- Three-10 minute sessions, preferably after meals, daily should be encouraged. to all patients on an exercise prescription.
- Teach warning signs of hypoglycemia, imminent labour to all patients on an exercise prescription.

## E. BEHAVIOURAL THERAPY (10)

- Detect, and manage
  - Anxiety
  - depression
  - Eating disorders
- Utilization of non-pharmacological therapy
  - -Cognitive Behavioural therapy
  - -Relaxation therapy
- Tricyclic antidepressants are recommended for panic disorders in pregnancy.

## **MANAGING COMPLICATIONS**

### **A. HYPERTENSION**

- Aim for systolic blood pressure < 130 mm Hg and diastolic blood pressure < 80 mm Hg.
- Two or more agents at maximal doses will often be needed for optimal control
- Safe drugs are methyl dopa, calcium channel blockers and labetalol. Clonidine and prazosin may also be used.
- Lifestyle therapy should be encouraged.

### **B. DYSLIPIDEMIA**

- Target LDL cholesterol < 100 mg % in women without overt cardiovascular disease (CVD) and <70 mg % in those with CVD.
- Statin and fenofibrate therapy should be discontinued
- Bile acid binding resins are approved for use in pregnancy.
- For diabetic pregnant women with triglyceride >1000 mg % treatment is indicated to reduce risk of pancreatitis. Add fish oil capsules to low fat diet to attain n-3 fatty intakes of 3-9 g / day

### **C. DIABETIC NEPHROPATHY**

- Optimize glucose and blood pressure control
- Discontinue ARBs, ACE (1).

### **D. DIABETIC RETINOPATHY**

- Optimize glucose and blood pressure control
- Lower hyperglycemia slowly to near – normal over 6-month period in patient with proliferative or severe non-proliferative retinopathy before attempting pregnancy.
- Laser photocoagulation can be carried out if indicated, in preconception and in pregnancy
- Advise elective LSCS to women with proliferative diabetic retinopathy.

### **E. DIABETIC NEUROPATHY**

- Metoclopramide and erythromycin are safe for use in pregnancy, for gastro paresis
- Local Capsaicin and oral clonidine can be used for painful neuropathy
- Amitriptyline and nortriptyline can be used after the first trimester

### **F. MALE FACTOR**

- “Endocrine disruptors” reduce sperm quality and temporal trends reveal that male fertility, and sperm counts, are declining
- Exogenous supplements may be given e.g. coenzyme Q, lycopene, zinc l-carnitine
- Ensure sexual function is normal
- Preempt performance anxiety.

## **CONCLUSION**

Meticulous attention to these simple details in the preconception period will help improve the chances of a healthy pregnancy, resulting in a healthy baby, a happy mother, and a satisfied obstetrician.

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