Chapter 15: Pregnancy at Risk: Pre-Existing Conditions – Diabetes Mellitus, HIV, Obesity

Pre-existing Conditions

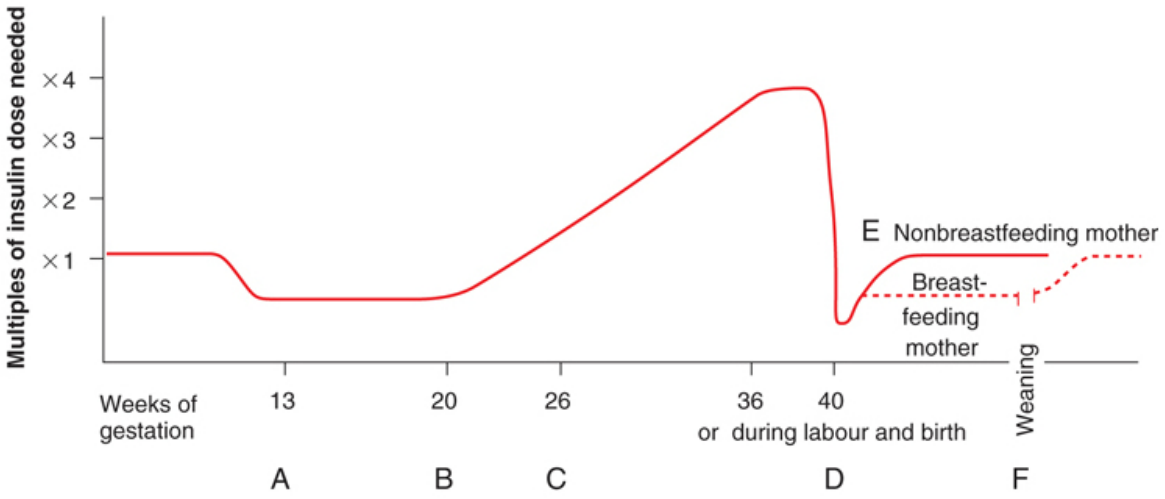
- For some women pregnancy represents significant risk because it is **superimposed on pre-existing or chronic illness.**
- Unique maternal and fetal needs caused by these conditions must be met, in addition to the usual pregnancy-related feelings, needs, and concerns.
- Metabolic disorders
  - **Diabetes mellitus**
  - Thyroid disorders
- Cardiovascular disorders
- Respiratory, gastrointestinal, integumentary, and central nervous system disorders
- Autoimmune disorders
- Substance use
- **Human immunodeficiency virus (HIV)**
- Spinal cord injury
- **Obesity**

Metabolic Disorders

- Diabetes mellitus (Pre-existing)
  - Advances in knowledge have improved outcomes for women with diabetes with good tracking and care
  - Diabetes can be successfully managed with a multidisciplinary approach.
    - Clinics where physicians, nurses, and dieticians work together to help the client learn more about their disease and how to manage it for their best health possible
  - **KEY: Preconception counselling** is strongly encouraged.
    - Letting people know who are of childbearing age that have pre-existing diabetes that it is important for them to **have strict glycemic control before conception and throughout pregnancy**
    - Incidence of diabetes is ~4-14% of pregnant women
    - If they are well controlled, perinatal mortality rate for women, excluding major congenital malformations, is the same that they are for other pregnancies
    - Begin folic acid supplementation
    - If pre-existing diabetes is not well controlled, they have an increased risk for early pregnancy loss and congenital anomalies
- Pathogenesis
  - Group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both
  - Diabetes may be caused by either or both of the following:
    - Impaired insulin secretion – type 1 diabetes
      - When the beta cells of the pancreas are destroyed by an autoimmune process
    - Inadequate insulin action in target tissues at one or more points in the metabolic pathway
  - If the woman's diabetes is poorly controlled, it can result in structural changes in the organ systems including the heart - premature atherosclerosis, eyes – retinopathy, the kidney – nephropathy, the nerves – neuropathy
    - In babies it can cause congenital anomalies

- Classification of diabetes
  - **Pre-gestational diabetes mellitus** –
    - (existed before pregnancy)
    - Type 1 diabetes
      - Absolute insulin deficiency caused by pancreatic islet beta cell destruction which makes them more prone to ketoacidosis – theorized to be caused by autoimmune process (cause is primarily unknown)
    - Type 2 diabetes (most prevalent)
      - Insulin resistance
      - Most prevalent
      - May have occurred many years before diagnosis as hyperglycemia develops gradually and not clear enough to notice classic signs of polyuria, polydipsia (thirst), and polyphagia (being compelled to eat due to a state of starvation)
      - Often strong genetic predisposition, often obese or increased amount of body fat in the abdomen
  - **Gestational diabetes mellitus GDM**)
    - is any degree of glucose intolerance with onset or recognition during pregnancy.
    - After delivery they are assessed at 6 weeks and 6 months postpartum as glucose intolerance may have preceded the pregnancy – want to determine whether it was gestational diabetes or pre-existing undiagnosed diabetes
- Metabolic changes are associated with pregnancy.
- **Pregestational diabetes mellitus**
  - Preconception counselling**
  - Maternal risks and complications
    - Preterm labour and birth
    - Infections
    - Polyhydramnios
    - Ketoacidosis
    - Hypoglycemia
  - In pregnancy, glucose is transported across the placenta, insulin does not transfer which means that the glucose levels in the fetus are directly proportional to maternal levels but insulin is secreted by the fetus since 10 weeks gestation and as maternal glucose levels rise, fetal glucose levels are also increased resulting in increased fetal insulin secretion

Changing insulin requirements (Fig 15-01 p. 360)



- Figure 15-01. Changing insulin needs during pregnancy.
- A: First trimester/early second trimester:
  - Insulin need is reduced because of increased insulin production by the pancreas and increased peripheral sensitivity to insulin;
  - nausea, vomiting, and decreased food intake by mother and glucose transfer to the embryo or fetus contribute to hypoglycemia.
- B: Late second trimester:
  - Insulin need increases as placental hormones, cortisol, and insulinase act as insulin antagonists, decreasing the effectiveness of insulin.
- C: Third trimester:
  - Insulin requirements gradually increase until about 36 weeks of gestation.
- D: Day of birth:
  - Maternal insulin requirements drop drastically to approach pre-pregnancy levels on the day of birth
- E: Breastfeeding mother maintains lower insulin requirements, as much as 25% less than pre-pregnancy;
  - insulin need of nonbreastfeeding mother returns to pre-pregnancy levels in 7 to 10 days.
- F: At weaning of breastfeeding infant, mother's insulin need returns to pre-pregnancy levels.

Metabolic Disorders—cont.

- Maternal risks and complications
- Fetal and newborn risks
  - Large-for-gestational-age infants
  - Macrosomia of 400-4500 g birth weight or greater than the 95th percentile
  - Sudden stillbirth – significant risk
  - Congenital anomalies
    - Heart, eyes, kidneys, nerves
    - Higher rate of open spina bifida as well as cardiac defects
  - Birth injuries
    - Increased risk for shoulder dystocia and failure to progress
    - Tend to have a higher rate of c-sections
  - Hypoglycemia at birth
    - Once the baby is delivered the high rate of circulating glucose is lost, insulin production leads them to be at high risk of hyperglycemia

- If pregestational diabetes mellitus either type 1 or 2, almost all patients are insulin dependent during pregnancy
    - Use of just oral hypoglycemic medications is not recommended by the CDA
    - Those with type 2 with oral meds, when pregnant often are switched to insulin
    - Insulin resistance begins as early as 14-16 weeks – it is a glucose sparing mechanism that ensures an adequate supply of glucose for the fetus
    - Pregnancy may accelerate the progress vascular complications in the woman
        - If poorly controlled during preconception or during pregnancy there is increased risk for the factors already listed previously

Nursing Care Management

- Assessment
    - Interview
        - Collect info
        - Pre-pregnancy counselling
        - Strict metabolic control in the early weeks of gestation during the early formation of the organs – instrumental in decreases congenital anomalies
        - Having discussions with women of childbearing age who have pre-existing diabetes to help them plan their pregnancy and get their blood sugar in good control beforehand
    - Physical examination
    - Laboratory tests
        - For blood sugars in particular but their baseline for other values as well
        - A1C – glycosated hemoglobin test
            - If its greater than 7.0 percent theres a 2 fold increase in early pregnancy loss
                - Reflects the average amount of glucose in the blood over the past 2 months so it gives a good sense of the amount of control if the diabetes has been under or not
- Antepartum care
    - Diet and exercise
    - Monitoring blood glucose levels
    - Insulin therapy
    - Complications requiring hospitalization
    - Determination of birth date and mode of delivery

HIV AIDS (supplementary links)

- World AIDS DAY Dec 1
- **CATIE Canada's source for HIV and hepatitis C information** https://www.catie.ca/
    - **U=U**
        - "The evidence is in: If you are HIV+, take treatment and maintain an undetectable viral load, you can have sex knowing that you won't pass HIV to your sex partner. In short, when HIV is undetectable, it's untransmittable."
    - https://www.catie.ca/en/positiveside/summer-2017/uu
- CAAN Canadian Aboriginal AIDS Network (update in process) https://caan.ca/en/

NSG3111 LECTURE – CHAPTER 15 – PREGNANCY AT RISK: PRE-EXISTING CONDITIONS, DIABETES MELLITUS, HIV, OBESITY

HIV and AIDS (p. 392)

- Preconception counselling
  - Recommended for all pregnant women in canada when they initially enter prenatal care
  - Women initiating in high risk behaviours should be offered counselling and testing during each trimester of their pregnancy
  - If woman did not intend to get pregnant they need intensive support and counselling as well for herself and her partner
- Pregnancy risks
  - Pregnancy does not accelerate the condition.
  - Strict adherence to antiretroviral medication is needed.
- Perinatal transmission
  - Anyone admitted for labour/birth with HIV status unknown should be screen with a rapid HIV test unless they decline
  - Can occur through maternal circulation as early as the first trimester
  - To the infant during labour and birth
  - To the infant through breastmilk
  - Factors that increase the likelihood of perinatal transmission listed in box 15.4
  - Pregnancy doesn't accelerate the condition

BOX 15-4 FACTORS INCREASING THE RISK OF MOTHER-TO-CHILD PERINATAL HIV TRANSMISSION

Lack of maternal and infant treatment with antiretroviral medications and prevention
Maternal plasma viral level greater than 1000 copies per millilitre
Maternal vaginal infections during pregnancy
Amniocentesis, chorionic villus sampling, or both
Ruptured membranes
Presence of chorioamnionitis
Fetal scalp monitoring and venous scalp sampling
Interventions such as forceps, vacuum, and external cephalic version
Breastfeeding

- Obstetrical complications
  - There is a subset of HIV positive women that will have confounding variables that can also lead to obstetrical conditions
    - When looking at social determinants of health issues related to substance use, mental health, poverty, poor nutrition, limited access to prenatal care, or other STIs – account for mom being at higher risk of preterm birth, premature rupture of membranes, perinatal loss
  - Mode of birth for HIV positive women depends on woman's plasma viral level and her status of labour upon admission
    - If plasma level is less then 1000 copies per ml and she has received ART she can progress with vaginal birth
    - If HIV positive and not receiving ART and have a plasma load greater than 1000, unkown plasma level, or antepartum bleeding – C-section recommended
  - PP period of HIV pos women may be notable for infection hemorrhage or both
    - Women without symptoms may have an unremarkable PP course alternatively, immunosuppressed women with symptoms may be at increased risk for UTI, vaginitis, PP endometritis, poor wound healing
- SOGC- JOGC- 2014 guidelines for care of pregnant women living with HIV and interventions to reduce perinatal transmission http://www.jogc.com/article/S1701-2163(15)30515-6/fulltext
- Nursing care management
  - HIV-infected women should be treated with antiretroviral therapy (ART) during pregnancy regardless of CD4 counts
    - HIV nursing management revolves around helping a pregnant women with her ART management and to help ensure that she is able to continue it
    - Should include drugs from at least 2 classes of antiretroviral drug classifications
    - Rate of HIV in Canadian women about 23%
      - Works to decrease transmission and decrease AIDs related complications
  - They should be tested for other sexually transmitted infections, including hepatitis.
  - Opportunistic infections should be treated with medications specific for that infection.
  - Every effort should be made to decrease the newborn's exposure to blood and secretions.
    - CHEO has an HIV program – interprofessional team of physicians, pharmacist, volunteers, dietician, nurses, social worker, psychologist

Reduce risk of transmission

- During pregnancy treat with ART regardless of CD4 counts
- Dose of IV Zidovudine during intrapartum period – loading dose then continuous maintenance dosage throughout labour
- Avoid ruptured membranes - keep membranes intact until the birth or as long as possible
- If ruptured membranes – induction
- Avoid fetal scalp electrode and PH blood sampling, forceps, vacuum, ext cephalic version
    - Don't want to risk exposure

HIV and AIDS—cont.

- Nursing care management
    - Immediately after birth, infants should be wiped free of all body fluids.
    - Prior to blood testing or injections clean site well with soap and water before puncturing the skin
    - Breastfeeding discouraged in countries where safe alternative existing – recommendation from WHO
        - Skin-to-skin encouraged but NO breastfeeding in North America – safe alternative exists
    - All staff working with the mother or infant must adhere strictly to infection control techniques.
        - Universal but extra efforts are used for this when the woman is known to be HIV positive
        - There are no specialized precautions, encourage rooming in
    - Observe routine precautions for blood and other body fluids.
    - Infant treated AZT Zidovudine within 6 hrs of life then q 6 h for 6 weeks
        - This is where the IP team at CHEO works with the families to help them understand that it can have an impact on the child's life, and the importance of giving doses strictly every 6 hours for 6 weeks (oral)

HIV and infant feeding

- WHO for developing countries
- Balance between risk of infants acquiring HIV through breastfeeding vs higher risk of death from causes other than HIV (malnutrition, diarrhea and pneumonia) (in developing countries where no reliable access to electricity and clean water)
    - Because of risk of contaminating formula and risks to baby from contaminated drinking water – safer for them to continue to breastfeed
- With ARV (antiretrovirals) to mom or infant significantly reduces risk of transmission through breastfeeding (1-2%) in developing countries

CPS (Canadian Pediatric Society) Addendum June 2011

- CPS endorses the WHO recommendations BF HIV positive mothers in resource-limited settings
- "for HIV infection in resource-rich settings such as Canada, where a safe and culturally accepted replacement is available, breastfeeding is not recommended…..
    - Women in Canada because of the risk, even if they are on anti-virals, should NOT breastfeed
    - For people that have come to canada from different countries, the norm in their cultural group would have been to breastfeed their babies but if they are being seen in Canada to be bottle feeding, within their cultural group there can be stigma surrounding this method of feeding and HIV
        - If they were to go back and forth between breastfeeding and formula feeding, they increase the risk of contracting HIV - multilayer
- http://www.cps.ca/english/statements/id/pidnote_oct2006.htm

Obesity (p.381)

- Serious health concern, with 43.7% women in Canada overweight
  - BMI of being overweight – 25-29.9
  - BMI of obesity – greater than 30
  - Before conception, overweight or obesity can cause difficulties with becoming pregnant – usually counselled to obtain an ideal body weight before conception
  - If the woman has had bariatric surgery, they are suggested to NOT get pregnant for 12-18 months after that surgery
- Antepartum risks
  - Require increased surveillance and care during pregnancy
  - Increased risk of spontaneous abortion or stillbirth
  - Once pregnant, weight loss program not recommended but nutritional counselling may be required, earlier gestational diabetes screening is done as well as at increased risk of diabetes mellitus and gestational diabetes, ultrasounds to accurately date baby due date
  - Screening:
    - Increased risk for defects
    - Increased risk for neural tube defects, ventral wall defects
    - Increased risk of pre-existing hypertension or hypertensive disorders during pregnancy
    - Risks increase as BMI increases
- Intrapartum and postpartum risks
  - Increased risk of shoulder dystocia with microsomia
  - Increased risk of Caesarean birth
    - Often have prolonged active phase and cephalopelvic disproportion with macrosomia
  - Increased likelihood of being induced because uterine contractility may be altered in obese women and higher doses of oxytocin may be required
  - Issues with accurate fetal monitoring
  - Difficulty with breastfeeding positions
  - If had c-section have more problems with wound infections and dehisces (to rupture or break open a surgical wound), increased risk for thromboembolisms – may be receiving low molecular heparin
  - Risk for postpartum hemorrhage
    - Related to decreased muscle tone, decreased physical activity, large placement, implantation of a macrosomic infant
    - Difficult to palpate uterus to assess
- Nursing care management
  - Larger BP cuffs, beds, stretchers, operating table, wheelchair
  - Monitor O2 sat in labour
  - If external fetal monitoring is not possible or is difficult, may need to go in with an internal spiral electrode for fetal heartrate and intrauterine pressure catheter to monitor contractions
  - Specific set of standing orders for high BMI patients for PP care at TOH
  - Encourage early ambulation and use of compression stockings when they are up and walking
- SOGC guideline – obesity in pregnancy (2010)
  - https://sogc.org/wp-content/uploads/2013/01/gui239ECPG1002.pdf