INTRODUCTION:

Expertise in the management of “medical complications of pregnancy” (otherwise known as Obstetric Medicine) is an expectation for trainees completing residency training in Internal Medicine in Canada, as outlined in the Objectives of Training and Specialty Training Requirements in Internal Medicine of the Royal College of Physicians and Surgeons of Canada. This objective is meant to be achieved despite the lack of a formal or standardized national framework for training in obstetric medicine, along with infrequent and regionally variable clinical experience in caring for pregnant women with medical disorders. The great majority of Internal Medicine residents will not have received any systematic instruction about the assessment and management of medical problems in pregnancy, thereby failing to link the curriculum to certification requirements and health care needs, as advocated by experts in curriculum design. A recent survey of Canadian graduates of General Internal Medicine residencies confirmed that obstetric medicine is one of the areas within the CanMEDS competencies which showed the greatest perceived gap between importance (high) and preparation (low) among new specialist physicians (Card et al., 2006). In response to similar concerns in other countries, the International Society of Obstetric Medicine (ISOM) recently began a process to: outline the body of knowledge in Internal Medicine of particular relevance to pregnancy, identify specific conditions unique to pregnancy, and to define the context in which training in this knowledge should occur.

Recognizing the abundance of talented obstetric medicine physicians in Canada, as well as the unique scope of practice of training and in General Internal Medicine in this country, a national curriculum validation project was undertaken to synthesize a comprehensive Obstetric Medicine Curriculum for training of specialty residents in Canada. This document is the product of that process.

This Canadian Obstetric Medicine Curriculum is a summary of the attitudes, abilities and knowledge which should be imparted to Canadian Internal Medicine trainees in the domain of Obstetric Medicine. The information is organized in three sections: general principles, competencies specific to each organ system and tabular data. The competencies are presented in CanMeds format. The curriculum document may serve as a blueprint for the creation of curricular objectives, may guide the selection of appropriate instructional strategies, and may stimulate the development of valid alternative educational strategies (ie. for rare conditions) and assessment methods. It may also assist in defining the context in which training should occur, and serve as a model for local curricula adapted to the level of the trainees involved.

Toronto, April 24th, 2010
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CanCOM Obstetric Medicine Curriculum

This table describes the competencies required to practice Obstetric Medicine. The content of this curriculum blueprint is based on several sources including the curriculum endorsed by the International Society of Obstetric Medicine, validated by subject-matter experts across Canada, and adapted to reflect the educational standards of the Royal College of Physicians and Surgeons of Canada.

SECTION 1: GENERAL PRINCIPLES

1. CanMEDS COMPETENCIES FOR OBSTETRIC MEDICINE

1.0 Medical Expert
Medical expert is the central role and refers to the application of medical knowledge, clinical and professional skills. This role will be developed for each discipline under section 2.

1.1 Communicator
1.1.1 CONCEPTS:
Establishes effective rapport, trust and ethical therapeutic relationships with:
- Patient and family
- Multidisciplinary team and allied health professionals
Accurately obtains, synthesizes and conveys relevant data from:
- Patient, family, colleagues and other professionals
Develops a common understanding on issues, problems and plans with:
- Patient, family and multidisciplinary team
Provides accurate and sensitive information:
- During preconceptual counseling of women with chronic medical disorders
- On risk:benefit profile of medication use in pregnancy and breastfeeding
- On risk:benefit of various diagnostic and therapeutic options in pregnancy
- On the need to discuss the reliability of information obtained from the internet

1.2 Collaborator
1.2.1 CONCEPTS
Consults effectively with inter-professional healthcare team
Understands and respects the role of each healthcare provider
Contributes effectively to other interdisciplinary activities and meetings
Facilitates care and coordination of follow-up during the pregnancy and post-partum
### 1.3 Manager

**1.3.1 CONCEPTS:**
- Organizes investigations within an acceptable time frame, taking into consideration the availability of resources
- Works efficiently within a health care organization

### 1.4 Health advocate

**1.4.1 CONCEPTS:**
- Provides accurate and sensitive counseling on:
  - Impact of smoking, alcohol, and recreational drugs on health of mother and fetus
  - Tools available in pregnancy for a healthier lifestyle
  - Psychological impact of a complicated pregnancy on mother and family
  - Promotes preventive health care in the setting of preconception care, pregnancy and the post-partum
  - Responds to the individual patient’s and community health needs

### 1.5 Scholar

**1.5.1 CONCEPTS:**
- Seeks and critically appraises medical information to answer clinical questions
- Facilitates learning of patients, families, and other health professionals
- Demonstrates leadership in the development of appropriate protocols for care, when possible
- Consults available resources for medication risk-benefit profile in pregnancy and lactation

### 1.6 Professional

**1.6.1 CONCEPTS:**
- Demonstrates commitment to patients and profession through an ethical practice
- Recognizes the predominant ethical dilemmas in Obstetric Medicine
- Delivers quality care with integrity and compassion
- Recognizes limitation in knowledge and skills, and appropriately consults another health professional in:
  - Caring for patients with rare or complex medical conditions (for example: cancer, transplant, obstetric complications)

### 2. PHYSIOLOGY OF PREGNANCY

#### 2.1 Cardiovascular changes

**2.1.1 CONCEPTS:**
- Demonstrates applied knowledge of the:
  - Impact of pregnancy on blood volume, vascular resistance, and cardiac output
  - Impact of normal hemodynamic changes on symptomatology, physical findings and laboratory parameters (table I)
  - Hemodynamic changes associated with labor, delivery, and the postpartum period
## 2.2 Respiratory physiology

2.2.1 CONCEPTS:
- **Demonstrates applied knowledge of the:**
  - Impact of pregnancy on respiratory rate, lung volumes and normal symptomatology
  - Impact of pregnancy on sleep quality, architecture, and time

## 2.3 Renal physiology

2.3.1 CONCEPTS:
- **Demonstrates applied knowledge of the:**
  - Impact of the increase in renal blood flow on kidney size and function (table I)
  - Changes in renal collecting system due to hormonal and mechanical factors
  - Impact of pregnancy on renal tubular function and findings on urinalysis
  - Impact of placental vasopressinase on ADH metabolism

## 2.4 Metabolic changes

2.4.1 CONCEPTS:
- **Demonstrates applied knowledge of the:**
  - Normal metabolic and endocrine changes associated with pregnancy
  - Impact of placental hormones on maternal glucose and lipid metabolism
  - Relative insulin resistance and hypercorticolism associated with pregnancy

## 3. PHARMACOLOGY OF PREGNANCY AND LACTATION

### 3.1 General principles

3.1.1 CONCEPTS:
- **Demonstrates applied knowledge of the:**
  - Background risks of congenital anomalies, spontaneous abortion, and fetal complications
  - Etiologies related to congenital anomalies
  - Notion of critical period for anomalies specific to each organ system
  - Importance of antenatal counseling to reduce risk of congenital anomalies
  - Impact of pregnancy of drug pharmacodynamics
  - Factors that affect drug transfer into breast milk
  - Drugs that influence milk supply
  - Importance of an evidence-based approach when communicating risks and benefits of a pharmacotherapeutic agent with a patient
4. DIAGNOSTIC AND THERAPEUTIC RADIATION IN PREGNANCY

4.1 Diagnostic imaging

4.1.1 CONCEPTS:
- Demonstrates applied knowledge of the:
  - Potential impact of fetal radiation exposure according to timing during pregnancy
  - Expected fetal radiation exposure associated with common radiological examinations (refer to table II)
  - Approach to imaging with intravenous contrast agents or radiopharmaceuticals during breastfeeding

4.2 Therapeutic radiation

4.2.1 CONCEPTS:
- Demonstrates applied knowledge of the:
  - Risk:benefit of radiation therapy during each trimester of pregnancy

5. ACUTE CARE AND MATERNAL RESUSCITATION

5.1 Acute respiratory failure

5.1.1 CONCEPTS:
- Demonstrates understanding of:
  - Expected changes in blood gas parameters associated with pregnancy
  - Impact of pregnancy and medications on risk of pulmonary edema

5.1.2 MANAGEMENT:
- Demonstrates applied knowledge of the:
  - Impact of pregnancy on approach to intubation
  - Risk of mucosal friability associated with nasal intubation
  - Appropriate investigation and treatment of the pregnant patient with acute shortness of breath
  - Target pO2 and pCO2 in the intubated pregnant patient
  - Indications for ICU consultation and assisted ventilation

5.1.3 COMPLICATIONS:
- Demonstrates applied knowledge of the:
  - Risk of maternal complications associated with inadequate ventilator parameters
  - Impact of position, hypovolemia and alkalosis on uteroplacental flow

5.2 Cardiopulmonary resuscitation

5.2.1 CONCEPTS:
- The impact of pregnancy on mucosal friability and chest compliance
  - The impact of aortocaval compression on venous return and effectiveness of resuscitation efforts
5.2.2 MANAGEMENT:
Demonstrates applied knowledge of:
- ACLS in pregnancy including left lateral displacement of the uterus, early intubation, use and placement of adhesive pads for defibrillation, and removal of fetal monitor to avoid electrical arcing
- The role of caesarian delivery after 4 minutes of unsuccessful resuscitation for cardiac arrest in a patient at 20-24 weeks gestation or more
- The coordination of care in the ICU setting and the importance of glycemic control and thromboprophylaxis

6. SURGICAL AND ANAESTHETIC CONSIDERATIONS

6.2 General principals

6.2.1 CONCEPTS:
Demonstrates understanding of the:
- Most common indications for surgery and ideal timing for surgical intervention in pregnancy
- Impact of pregnancy on presentation of acute abdomen
- Variety of anaesthetic approaches and impact on maternal physiology
- Maternal and fetal risks associated with various surgical and anesthetic procedures in pregnancy
- Impact of the pregnancy on risk of hypoxemia, aspiration and intubation

6.2.2 MANAGEMENT:
Demonstrates applied knowledge of the:
- Indications for thrombotic and antibiotic prophylaxis
- Specific maternal and fetal considerations such as volume replacement, positioning, and monitoring

7. RELEVANT OBSTETRIC AND GYNECOLOGIC CONDITIONS

7.1 Septic pelvic vein thrombosis

7.1.1 CONCEPTS:
Demonstrates applied knowledge of the:
- Typical presentation, risk factors, and types of septic thrombosis
- Associated risk of pulmonary embolism or regional extension

7.1.2 EVALUATION:
Demonstrates applied knowledge of the:
- Approaches to diagnosis

7.1.3 MANAGEMENT:
Demonstrates applied knowledge of the:
- Therapeutic modalities
### 7.2 Amniotic fluid embolism

#### 7.2.1 CONCEPTS:
- Demonstrates applied knowledge of the:
  - Major clinical findings in AFE
  - Hemodynamic alterations associated with AFE

#### 7.2.2 MANAGEMENT:
- Demonstrates applied knowledge of the:
  - Supportive measures taken to correct hypoxemia and hypotension

### 7.3 Endometritis

#### 7.3.1 CONCEPTS:
- Demonstrates applied knowledge of the:
  - Prevalence and risk factors for endometritis in the postpartum period
  - Differential diagnosis of fever in the postpartum
  - Prevalence of polymicrobial infection with sexually transmitted infections

#### 7.3.2 MANAGEMENT:
- Demonstrates applied knowledge of the:
  - Usual approach to treatment

#### 7.3.3 COMPLICATIONS:
- Possibility of lethal toxic-shock syndrome associated with rare Clostridial infections

### 7.4 Postpartum hemorrhage

#### 7.4.1 CONCEPTS:
- Demonstrates an understanding of:
  - Most common causes of early and delayed PPH

#### 7.4.2 EVALUATION:
- Demonstrates applied knowledge of the:
  - Circumstances in which medical etiologies or contributing factors should be sought

#### 7.4.3 MANAGEMENT:
- Demonstrates an understanding of the:
  - Sequence of non-operative and operative interventions for the treatment of PPH

### 7.5 Assisted reproduction technology (ART)

#### 7.5.1 CONCEPTS:
- Demonstrates an understanding of the:
  - Variety of options available to patients with fertility problems
  - Obstetrical and medical complications associated with ART
  - Risk factors and classification of ovarian hyperstimulation syndrome (OHSS)
7.5.2 MANAGEMENT:
Demonstrates an understanding of the:
Indications for thromboprophylaxis in OHSS
Treatment modalities for OHSS

7.5.3 COMPLICATIONS:
Demonstrates an understanding of the:
Complications associated with ART and grade III OHSS

SECTION 2: SPECIFIC DISORDERS

8. HYPERTENSIVE DISORDERS

8.1. Chronic hypertension

8.1.1 EVALUATION:
Demonstrates applied knowledge of the:
Baseline investigations to be done prior to or at the onset of pregnancy in a woman with hypertension
Work-up of secondary causes of hypertension as it pertains to pregnancy
Physiologic changes to BP in pregnancy
Associated conditions that may alter BP targets, and related complications
Demonstrates skills in the:
Appropriate approach to BP measurement in the pregnant woman

8.1.2 MANAGEMENT:
Demonstrates applied knowledge of the:
Current national guidelines on the management of hypertensive disorders in pregnancy
Safety profile of antihypertensive medications during pregnancy and breastfeeding
Approach to BP control and indications for drug therapy
Appropriate antenatal and post-partum follow-up of hypertensive women
Strategies to reduce the risk of preeclampsia
Laboratory investigations for diagnosis of preeclampsia
Demonstrates appreciation of the:
Role played by uteroplacental doppler ultrasound in obstetrical management

8.1.3 COMPLICATIONS:
Demonstrates competency in:
Counseling mothers regarding the risk of maternal complications
Demonstrates understanding of the:
Fetal complications associated with maternal chronic hypertension
Accurately educates the mother on the:
Symptoms and signs of preeclampsia

### 8.2 Gestational hypertension / Preeclampsia

#### 8.2.1 EVALUATION:
**Demonstrates applied knowledge of the:**
- Definitions based on latest Canadian consensus guidelines
- Pathophysiology of preeclampsia
- Risk factors that place women at a higher risk of preeclampsia
- Definition of significant proteinuria in pregnancy
- Differential diagnosis of atypical preeclampsia

#### 8.2.2 MANAGEMENT:
**Demonstrates applied knowledge of the:**
- Appropriate investigations and follow-up of women with suspected preeclampsia
- Maternal indications for therapy and hospitalization
- Appropriate recognition and management of severe hypertension
- Adequate management of peripartum fluid balance
- Appropriately collaborates in the:
  - Multidisciplinary discussion around optimal timing for delivery

#### 8.2.3 COMPLICATIONS:
**Demonstrates applied knowledge in the:**
- Appropriate recognition and management of associated major maternal complications including HELLP syndrome, DIC, acute renal failure, hypertensive encephalopathy, pulmonary edema, eclampsia and other related medical emergencies
- Develops an understanding of the:
  - Indications for MgSO4 use in the prevention and treatment of eclampsia

#### 8.2.4 POSTPARTUM MANAGEMENT:
**Demonstrates applied knowledge of the:**
- Post-partum evolution of BP in preeclampsia
- Natural evolution and appropriate follow-up of laboratory abnormalities postpartum
- Indications for investigation of thrombotic predisposition
- Provides accurate and sensitive counseling on the:
  - Risk of recurrence of preeclampsia in future pregnancies
  - Association between placental disorders and increased risk of long-term metabolic, renal and cardiovascular disease
  - Strategies including lifestyle modifications and regular follow-up to reduce risk of metabolic and cardiovascular disease

**Seeks and critically evaluates data on the:**
- Prevention of preeclampsia in subsequent pregnancies
### 9. CARDIOLOGY

#### 9.1 Evaluation of palpitations, presyncope and syncope

**9.1.1 EVALUATION:**
- Demonstrates skills in the:
  - Performance of a physical examination of the cardiovascular system of the pregnant woman

**Demonstrates applied knowledge of the:**
- Appropriate evaluation and investigations for palpitations, presyncope and syncope

**9.1.2 MANAGEMENT:**
- Demonstrates applied knowledge of the:
  - Appropriate treatment of the most prevalent arrhythmias in pregnancy (symptomatic sinus tachycardia, SVT, AF, and atrial flutter)

- Presence of an increased risk of arrhythmia, pulmonary edema, hypotension during labour

- Demonstrates appreciation of the:
  - Importance of educating mothers on the normal cardiovascular symptoms in pregnancy

#### 9.2 Acquired and Congenital Heart Disease

**9.2.1 CONCEPTS:**
- Demonstrates an understanding of the:
  - Impact of pregnancy associated hemodynamic changes on different types of congenital and acquired pathologies
  - Impact of cardiac disease on pregnancy outcome
  - Features associated with a higher maternal risk
  - Increased risk of fetal cardiac malformations with family history of cardiac malformations
  - Various approaches to anticoagulation for prosthetic cardiac valves during pregnancy, labour, and the postpartum
  - Period of highest risk for warfarin teratogenicity

**9.2.2. MANAGEMENT:**
- Demonstrates applied knowledge of the:
  - Role of folic acid for woman with a personal or family history of congenital cardiac anomaly
  - History, physical examination, and investigations to detect deterioration in cardiac function
  - Usefulness of a variety of maternal monitoring devices during labour and post-partum period
  - Management of maternal cardiac complications
  - Indications for endocarditis prophylaxis

#### 9.3 Cardiomyopathies

**9.3.1 EVALUATION**
- Demonstrates understanding of the:
  - Risk factors associated with an peripartum cardiomyopathy (PPCM)
  - Diagnostic features of peripartum cardiomyopathy
### 9.3.2 MANAGEMENT:

**Demonstrates applied knowledge of the:**
- Differential diagnosis of pulmonary edema in pregnancy
- Risk of maternal and fetal complications of acute and chronic heart failure

**Demonstrates applied knowledge of the:**
- Investigations for the evaluation of heart failure
- Cardiac medications acceptable for use in pregnancy
- Treatment of congestive heart failure in pregnancy

**Demonstrates understanding of the:**
- Impact of cardiac disease on delivery plan
- Role of prophylactic anticoagulation in women with a depression LVEF
- Possible pathogenic role of prolactin in PPCM

### 9.3.3 COMPLICATIONS:

**Demonstrates appreciation of the:**
- Risk of recurrence of peripartum cardiomyopathy or deterioration of cardiac function in subsequent pregnancies
- Approaches to evaluate and counsel women on the risk of cardiac complications in subsequent pregnancies

## 10. ENDOCRINOLOGY

### 10.1 Pregestational diabetes

#### 10.1.1 EVALUATION:

**Demonstrates applied knowledge of the:**
- Preconception and baseline evaluation of glycemic control, medication use, and history of severe complications
- Adjustment of medications in preparation for pregnancy
- Preconception target in HbA1C and impact on risk of miscarriages and fetal malformations
- Evaluation of target organ damage at baseline and during the course of pregnancy

**Provides accurate and sensitive counseling on the:**
- Risk of maternal complications such as hypoglycemic and hyperglycemic episodes, DKA, progressive retinopathy and nephropathy, preeclampsia

#### 10.1.2 MANAGEMENT:

**Demonstrates applied knowledge of the:**
- Treatment modalities in pregnancy and targets for glycemic control
- Expected changes in insulin requirements during the course of pregnancy, following steroid administration and the early post-partum period
- Management of diabetes during labor and the postpartum period
### 10.1.3 COMPLICATIONS:
**Demonstrates applied knowledge of the:**
Management of maternal complications

**Demonstrates understanding of the:**
Impact of poor glycemic control on fetus, neonate and longer term risk of metabolic disease
Possible impact of valsala maneuvers during delivery on severe retinopathy

### 10.2 Gestational diabetes

#### 10.2.1 CONCEPTS:
**Demonstrates applied knowledge of the:**
Pathophysiology of insulin resistance in pregnancy
Risk factors for gestational diabetes

**Demonstrates appreciation of the:**
Contribution of cultural and religious background to diet and lifestyle habits

#### 10.2.2 SCREENING:
**Demonstrates applied knowledge of the:**
Canadian Diabetes Association guidelines for impaired glucose tolerance and gestational diabetes

**Demonstrates understanding of the:**
Indications for early screening, usual screening and repeat screening
Optimal timing for screening for high risk populations

#### 10.2.3 MANAGEMENT:
**Demonstrates applied knowledge of the:**
Baseline assessment at time of diagnosis of GDM
Contribution of a consultation with dietitian and exercise therapist
Nature of follow-up and targets for glycemic control
Non-pharmacological approach to glycemic control
Indications to start pharmacological therapy
Risks and benefits of selected medications
Recommendations for postpartum follow-up

#### 10.2.4 COMPLICATIONS:
**Demonstrates applied knowledge of the:**
Associated risk of gestational hypertension
Long-term risk of type 2 DM
Risk of occurrence in subsequent pregnancies

**Demonstrates understanding of the:**
Obstetric and delivery complications associated with untreated gestational diabetes
### 10.3 Obesity and metabolic syndrome

**10.3.1 CONCEPTS:**
- **Demonstrates applied knowledge of the:**
  - Impact of obesity on insulin resistance, oxygen demand, and cardiac work
  - Associated risk of aspiration, sleep disorders, and restrictive lung disease
  - Appropriate pre-conception counseling
- **Demonstrates accurate and sensitive counseling on:**
  - Appropriate nutrition and weight gain during pregnancy

**10.3.2 EVALUATION:**
- **Demonstrates applied knowledge of the:**
  - Importance of early screening for GDM
  - Approach to the patient with prior bariatric surgery according to type of intervention

**10.3.3 MANAGEMENT:**
- **Demonstrates applied knowledge of the:**
  - Appropriate follow-up for placental-mediated disorders and other complications

**10.3.4 COMPLICATIONS:**
- **Demonstrates applied knowledge of the:**
  - Risk of adverse fetal and maternal outcomes during pregnancy and delivery

### 10.4 Thyroid disorders

**10.4.1 CONCEPTS:**
- **Demonstrates applied knowledge of the:**
  - Normal variations of TSH and T4 levels in pregnancy
  - Differential diagnosis of hypothyroidism in pregnancy
  - Differential diagnosis of hyperthyroidism in pregnancy
  - Impact of pregnancy on Grave’s disease
  - Link between abnormal thyroid results, hyperemesis gravidarum, and molar pregnancy
  - Interaction between iron, calcium and levo-thyroxine absorption
- **Provides accurate and sensitive counseling on the:**
  - Possible association between inadequately treated hypothyroidism and cognitive deficits in the newborn
### 10.4.2 MANAGEMENT:
**Demonstrates applied knowledge of the:**
- Possible need for increased thyroid replacement therapy at onset and during pregnancy
- Appropriate follow-up of TSH, T4 and goals of therapy
- Treatment choices for hyperthyroidism in pregnancy and breastfeeding
- Options for follow-up and adjustment of thyroid replacement therapy after delivery

### 10.4.3 COMPLICATIONS:
**Demonstrates understanding of the:**
- Link between thyroid disorders and obstetrical complications
- Benefits of treating subclinical and frank hypothyroidism on maternal and fetal outcomes
**Demonstrates applied knowledge of the:**
- Recognition and management of post-partum thyroiditis
- Recognition and management of thyroid storm in pregnancy and the peripartum period
**Demonstrates understanding of the:**
- Options for fetal surveillance when maternal TSI antibodies present in high titer

### 10.5 Pituitary disorders

#### 10.5.1 CONCEPTS:
**Demonstrates applied knowledge of the:**
- Return of fertility after treatment of prolactinomas
- Impact of pregnancy on prolactinoma size
- Variability in presentation of Sheehan syndrome in the post-partum period
- Importance of considering mild hypopituitarism in women with difficulty lactating

#### 10.5.2 EVALUATION:
**Demonstrates applied knowledge of the:**
- Possibility of hypopituitarism in the patient with severe post-partum hemorrhage and ongoing hypotension

#### 10.5.3 MANAGEMENT:
**Demonstrates applied knowledge of the:**
- Management of prolactinoma during pregnancy, the preconception period and during lactation

#### 10.5.4 COMPLICATIONS:
**Demonstrates applied knowledge of the:**
- Clinical presentation of an increase in prolactinoma size
- Typical presentation of pituitary apoplexy
10.6 Adrenal disorders

10.6.1 CONCEPTS:
Demonstrates applied knowledge of the:
Impact of pregnancy on clinical presentation of Cushing’s syndrome

10.6.2 EVALUATION:
Demonstrates applied knowledge of the:
Approach to diagnosis of Cushing’s syndrome in pregnancy

10.6.3 MANAGEMENT:
Demonstrates applied knowledge of the:
Therapeutic options for the treatment of Cushing’s syndrome in pregnancy
Indications for stress dose steroids at the time of delivery

10.6.4 COMPLICATIONS:
Demonstrates applied knowledge of the:
High rate of complications associated with untreated Cushing’s syndrome in pregnancy

10.7 Diabetes insipidus

10.7.1 CONCEPTS:
Demonstrates applied knowledge of the:
Changes in ADH physiology in pregnancy
Typical presentation of gestational DI
Different etiologies and associations of DI in pregnancy

10.7.2 MANAGEMENT:
Demonstrates applied knowledge of the:
Therapeutic options for DI in pregnancy

11. HEMATOLOGY
11.1 Anemia

11.1.1 CONCEPTS:
Demonstrates applied knowledge of the:
Differential diagnosis of anemia in pregnancy

11.1.2 EVALUATION:
Demonstrates applied knowledge of the:
Diagnostic value of serum ferritin

11.1.3 MANAGEMENT:
Demonstrates applied knowledge of the:
Treatment of iron-deficiency in pregnancy and indications for parenteral iron therapy
### 11.2 Thromboembolic disorders

**11.2.1 CONCEPTS:**

- Demonstrates applied knowledge of the:
  - Thromboembolic predisposition associated with pregnancy and the early post-partum period
  - Additional factors which increase risk of venous thromboembolism
  - Mortality associated with thromboembolic disorders
  - Interpretation of d-dimers in pregnancy

**11.2.2 MANAGEMENT:**

- Demonstrates applied knowledge of the:
  - Appropriate investigations for VTE
  - Management of VTE in pregnancy, labour, and the post-partum period
  - Approaches for monitoring laboratory markers of anticoagulation

- Demonstrates understanding of the:
  - Indications for thromboprophylaxis in pregnancy and the post-partum period
  - Impact of anticoagulation on anaesthetic and obstetric management at the time of delivery

**11.2.3 COMPLICATIONS**

- Demonstrates applied knowledge of the:
  - Maternal and fetal complications associated with anticoagulation therapy

### 11.3 Thrombophilias

**11.3.1 CONCEPTS:**

- Demonstrates understanding of the:
  - Additional hypercoagulable states and their respective thrombotic risk
  - Impact of pregnancy on laboratory results of components of the coagulation cascade

**Seeks and critically evaluates data on:**

- Thrombophilic predispositions and obstetrical complications

**11.3.2 MANAGEMENT:**

- Demonstrates applied knowledge of the:
  - Implications of thrombophilic predisposition on management during pregnancy and the post-partum period
  - Different heparin regimen and their respective indications

### 11.4 Thrombocytopenia

**11.4.1 CONCEPTS:**

- Demonstrates applied knowledge of the:
  - Differential diagnosis of thrombocytopenia in pregnancy

**11.4.2 MANAGEMENT:**

- Demonstrates applied knowledge of the:
  - Risk of bleeding associated with various levels of thrombocytopenia
### 11.5 Bleeding disorders

11.5.1 CONCEPTS:
- **Demonstrates applied knowledge of:**
  - When investigate with a personal or familial bleeding history

11.5.2 MANAGEMENT:
- **Demonstrates applied knowledge of the:**
  - Management of VWD in pregnancy and the peripartum period
  - Indications for transfusion therapy
  - Management of consumptive coagulopathies

**Accurate counsels on:**
- Risks associated with various blood products

### 11.6 Hemoglobinopathies

11.6.1 CONCEPTS:
- **Demonstrates applied knowledge of the:**
  - Complications associated with sickle cell anemia in pregnancy
  - Differential diagnosis of a low MCV

**Demonstrates appreciation of the:**
- Importance of offering families with hemoglobinopathies a consultation with medical genetics

11.6.2 EVALUATION:
- **Demonstrates understanding of the:**
  - Preconception evaluation of the patient with an hemoglobinopathy

11.6.3 MANAGEMENT:
- **Demonstrates understanding of the:**
  - Management of sickle cell patients in pregnancy
  - Acute care of the pregnant patient with a sickle cell crisis or acute chest syndrome

**Demonstrates appreciation of the:**
- Importance of multidisciplinary care for patients with sickle cell anemia
## 12. RESPIROLOGY

### 12.1 General principles

**12.2.1 CONCEPTS:**

Demonstrates applied knowledge of the:
- Differential diagnosis of acute shortness of breath in pregnancy, labour and the post-partum period
- Appropriate evaluation of respiratory symptoms in pregnancy
- Increased prevalence of obstructive sleep apnea in pregnancy

Demonstrates appreciation of the:
- Impact of physiological changes on exercise tolerance

### 12.2 Asthma

**12.2.1 CONCEPTS:**

- Factors which increase risk of asthmatic exacerbation
- Impact of asthmatic exacerbation on pregnancy outcome

**12.2.2 MANAGEMENT:**

- Adequate control of asthma in pregnancy and breastfeeding
- Management of other frequent causes of respiratory complaints in pregnancy such as allergic and gestational rhinitis

Promotes health by educating on the:
- Importance of developing a self-management plan
- Importance of compliance and of early self-referral for persistent asthmatic symptoms

### 12.3 Cystic fibrosis

**12.3.1 CONCEPTS:**

- Impact of disease severity on adverse maternal outcomes

Demonstrates understanding of the:
- Importance of genetic counseling

**12.3.2 EVALUATION:**

- Importance of optimal, stable pulmonary function prior to conception

**12.3.3 MANAGEMENT:**

- Importance of multidisciplinary care including close follow-up of maternal nutrition and weight gain
- Importance of early screening for gestational diabetes
### 13. NEPHROLOGY

#### 13.1 Physiological changes

**13.1.1 CONCEPTS:**
- Demonstrates applied knowledge of the:
  - Impact of physiologic changes in morphology
  - Normal proteinuria, albuminuria and serum creatinine in pregnancy (Table I)
  - Risk factors for nephrolithiasis and pyelonephritis

#### 13.2 Acute renal failure

**13.2.1 CONCEPTS:**
- Demonstrates applied knowledge of the:
  - Differential diagnosis of acute renal failure (ARF) in pregnancy

**13.2.2 MANAGEMENT:**
- Demonstrates applied knowledge of the:
  - Evaluation and management of ARF in pregnancy
  - Importance of avoiding nephrotoxic medications and considering drug adjustments

**13.2.3 COMPLICATIONS:**
- Demonstrates applied knowledge of the:
  - Increased risk of acute tubular necrosis in the context of hypovolemia, preeclampsia and bleeding

#### 13.3 Chronic renal failure

**13.3.1 CONCEPTS:**
- Demonstrates applied knowledge of the:
  - Impact of renal dysfunction on maternal and fetal outcomes
  - Impact of pregnancy on renal dysfunction
  - Role of prenatal creatinine clearance in preconception counseling
  - Risks associated with ACE inhibitors and ARBs in pregnancy
  - Demonstrates appreciation of the:
    - Importance of prenatal counseling for women with chronic renal failure (CRF)
  - Modifications to hemodialysis regimens in pregnancy
  - Role of genetic counseling in inherited renal disorders

**13.3.2 MANAGEMENT:**
- Demonstrates applied knowledge of the:
  - Impact of renal disease on target for BP control
  - Adequate follow-up of renal function in pregnancy

**13.3.3 COMPLICATIONS:**
- Demonstrates applied knowledge of the:
  - Factors associated with a risk of progression to end stage renal failure
## 14. TRANSPLANT MEDICINE

### 14.1 General principles

**14.1.1 CONCEPTS:**
- Demonstrates applied knowledge of the:
  - Maternal and fetal risks associated with anti-rejection medications and pregnancy
  - Ideal time delay between transplant and pregnancy
  - Importance of reviewing vaccination history

**14.1.2 MANAGEMENT:**
- Demonstrates applied knowledge of the:
  - Investigations prior to conception and during pregnancy
  - Importance of early recognition of rejection
  - Management of infectious complications such as CMV reactivation

## 15. GASTROENTEROLOGY

### 15.1 Hyperemesis gravidarum

**15.1.1 EVALUATION:**
- Demonstrates applied knowledge of the:
  - Differential diagnosis of nausea in pregnancy
  - Biochemical anomalies associated with HG
  - Risk factors for severe HG

- Demonstrates appreciation of the:
  - Psychosocial consequences of HG

**15.1.2 MANAGEMENT:**
- Demonstrates understanding of the:
  - Indications for hospitalization
  - Therapeutic approaches including risk and benefits of hyperalimentation

- Demonstrates appreciation of the:
  - Value of a multidisciplinary approach with experts in high-risk pregnancy, pharmacy, psychology, social work, and nutrition

**15.1.3 COMPLICATIONS**
- Demonstrates applied knowledge of the:
  - Maternal and fetal complications associated with severe HG

### 15.2 Dyspepsia

**15.2.1 CONCEPTS:**
- Demonstrates applied knowledge of the:
  - Effects of pregnancy on gastrointestinal physiology
### 15.3 Hepatitis and liver dysfunction in pregnancy

#### 15.3.1 CONCEPTS:
- **Demonstrates applied knowledge of the:**
  Differential diagnosis of abnormal liver enzymes and liver function tests in pregnancy
- **Demonstrates understanding of the:**
  Impact of obstetric cholestasis on maternal and fetal pregnancy outcomes

#### 15.3.2 EVALUATION:
- **Demonstrates applied knowledge of the:**
  Evaluation of abnormal liver enzymes and liver function tests in pregnancy
- **Demonstrates understanding of the:**
  Characteristic presentation of AFLP

#### 15.3.3 MANAGEMENT:
- **Demonstrates applied knowledge of:**
  Therapeutic approaches to obstetric cholestasis (OC)
- **Demonstrates understanding of the:**
  Role of fetal surveillance in OC and optimal timing for delivery

- Management of viral hepatitis in pregnancy
- Management of AFLP
- Role of LCHAD testing for counseling on risk of recurrence

#### 15.3.4 COMPLICATIONS:
- **Demonstrates understanding of the:**
  Maternal and fetal complications associated with maternal hepatitis, cholestasis or hepatic dysfunction
- Risk factors associated with fulminant hepatitis in pregnancy
- Magnitude of perinatal transmission associated with the different viral hepatitis
- Role of active and passive immunization to decrease vertical transmission of hepatitis B
- Risk of severe hepatic failure in AFLP and indications for hepatic transplant
### 15.4 Cirrhosis

**15.4.1 CONCEPTS:**
- **Demonstrates applied knowledge of the:**
  - Impact of pregnancy on liver function and portal hypertension
  - Impact of chronic liver disease on pregnancy

**15.4.2 EVALUATION:**
- **Demonstrates applied knowledge of the:**
  - Contribution from upper endoscopy in antenatal counseling

**15.4.3 MANAGEMENT:**
- **Demonstrates applied knowledge of the:**
  - Indications for beta-blocker prophylaxis against variceal hemorrhage

### 15.5 Inflammatory bowel disease

**15.5.1 CONCEPTS:**
- **Demonstrates applied knowledge of the:**
  - Importance of stabilizing disease prior to conception
  - Usual course during pregnancy and the postpartum period
  - Maternal and fetal complications of IBD exacerbation during pregnancy

- **Demonstrates appreciation of:**
  - Importance of prenatal counseling of patients with IBD

**15.5.2 EVALUATION:**
- **Demonstrates applied knowledge of the:**
  - Importance to evaluate the presence of extra-intestinal manifestations of IBD

- **Risk and benefits of endoscopy in pregnancy**

**15.5.3 MANAGEMENT:**
- **Demonstrates applied knowledge of the:**
  - Therapeutic approaches to IBD during pregnancy and the post-partum period
  - Appropriate assessment and management of patients with symptoms of exacerbation

- **Demonstrates appreciation of the:**
  - Importance of nutritional counseling

**15.5.4 COMPLICATIONS**
- **Demonstrates applied knowledge of the:**
  - Management of complications during pregnancy

- **Potential for malabsorption of fat soluble vitamins if distal ileal resection**
### 16. NEUROLOGY

#### 16.1 Headaches

**16.1.1 CONCEPTS:**
- **Demonstrates applied knowledge of the:**
  - Differential diagnosis of headache in pregnancy
  - Natural history of headaches in pregnancy and the post-partum period
  - Prevalence of post-epidural headaches
- **Demonstrates appreciation of the:**
  - Impact of headaches on quality of life in pregnancy

**16.1.2 EVALUATION:**
- **Demonstrates applied knowledge of the:**
  - Evaluation of headache in pregnancy
  - Indications for imaging

**16.1.3 MANAGEMENT:**
- **Demonstrates applied knowledge of the:**
  - Non pharmacological management of benign chronic headaches
  - Safety profile of analgesics and other pharmacologic agents in pregnancy
  - Management of post-epidural headaches

#### 16.2 Seizures

**16.2.1 CONCEPTS:**
- **Demonstrates applied knowledge of the:**
  - Differential diagnosis of seizures in pregnancy
  - Factors which modify the risk of seizures in women with epilepsy
  - Importance of preconception counseling
  - Impact of antiepileptic drugs on folic acid metabolism
  - Factors which increase the teratogenic potential of anticonvulsivants
- **Demonstrates understanding of the:**
  - Increased risk of epilepsy in children born to mothers or fathers with epilepsy
- **Accurately counsels patients on the:**
  - Impact of seizures and medications on maternal and fetal pregnancy outcomes

**16.2.2 MANAGEMENT:**
- **Demonstrates applied knowledge in:**
  - Pharmacological and non pharmacological approaches to decrease risk of seizures
  - Approaches to drug monitoring
  - Management of acute seizures in pregnancy
<table>
<thead>
<tr>
<th>Demonstrates understanding of the:</th>
<th>Importance of counseling women regarding the transmission of antiepileptic medications in breast milk, contraception, and safe approaches when caring for neonate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>16.2.3 COMPLICATIONS:</strong></td>
<td><strong>Demonstrates applied knowledge of the:</strong> Increased risk of drug toxicity in first months postpartum</td>
</tr>
</tbody>
</table>
| **16.3 Cerebrovascular disease** | **16.3.1 CONCEPTS:** Risk factors for stroke in pregnancy  
Differential diagnosis of hemorrhagic and ischemic stroke in pregnancy  
Clinical presentations of hypertensive encephalopathy and reversible posterior leukoencephalopathy syndrome |
| **16.3.2 EVALUATION:**           | **Demonstrates applied knowledge of the:** Diagnostic evaluation of cerebrovascular symptoms in pregnancy |
| **16.3.3 MANAGEMENT:**           | **Demonstrates applied knowledge of the:** Approach to patient with a history of prior stroke  
Approach to patient with stroke in pregnancy and the post-partum period |
| **16.4 Nerve compression syndromes** | **16.4.1 CONCEPTS:** Risk factors for nerve compression and entrapment syndromes in pregnancy  
Time course for symptom resolution in the post-partum period  
Increased prevalence of Bell's palsy in pregnancy  
Impact of pregnancy on outcome of Bell's palsy |
| **16.4.2 EVALUATION:**           | **Demonstrates applied knowledge of the:** Typical presentation of carpal tunnel syndrome (CTS), sciatica and meralgia paraesthetica |
| **16.4.3 MANAGEMENT:**           | **Demonstrates applied knowledge of the:** Available therapeutic modalities to diminish CTS and sciatica symptoms in pregnancy  
Indications for treatment of Bell's palsy and available medications in pregnancy |
| **16.4.4 COMPLICATIONS:**        | **Demonstrates applied knowledge of the:** Possible association of Bell's palsy with pre-eclampsia |
## 16.5 Myasthenia gravis

### 16.5.1 CONCEPTS:
- **Demonstrates applied knowledge of the:**
  - Factors associated with the highest risk for MG exacerbation
- **Demonstrates an understanding of the:**
  - Impact of MG on fetus development and risk of neonatal MG
  - Impact of MG on second stage of labour and the importance of planned multidisciplinary care

### 16.5.2 EVALUATION:
- **Demonstrates applied knowledge of the:**
  - Baseline evaluation of pregnant patients with MG

### 16.5.3 MANAGEMENT:
- **Demonstrates applied knowledge of the:**
  - Necessity to treat infections promptly
  - Possible for dose adjustment of acetylcholinesterase inhibitors in pregnancy

### 16.5.4 COMPLICATIONS:
- **Demonstrates applied knowledge of the:**
  - Initial symptoms associated with a myasthenic crisis
  - Relative contraindication for use of MGSO4 in this patient population
  - First line therapy for antihypertensive treatment in pregnant patients with MG

## 16.6 Multiple sclerosis

### 16.6.1 CONCEPTS:
- **Demonstrates applied knowledge of the:**
  - Impact of pregnancy on MS
  - Impact of MS on pregnancy
  - Factors which may increase risk of relapse in the post-partum period

### 16.6.2 MANAGEMENT:
- **Demonstrates understanding of the:**
  - Management of acute attacks in pregnancy

## 17. INFECTIOUS DISEASES

### 17.1 Infections in general

### 17.1.1 CONCEPTS:
- **Demonstrates understanding of the:**
  - Pathogens associated with an increased risk of obstetric complications (TORCH)
  - Pathogens associated with an increased risk of maternal morbidity and mortality
  - Most common causes of sepsis in pregnancy
17.2 Urinary tract infections

17.2.1 MANAGEMENT:
Demonstrates applied knowledge of the:
Evaluation and management of the febrile pregnant woman
Management of various antibiotics and antivirals in pregnancy

17.2.2 MANAGEMENT:
Demonstrates applied knowledge of the:
Factors which increase the risk of urinary tract infections in pregnancy
Predominant causative organisms

17.2.3 MANAGEMENT:
Demonstrates applied knowledge of the:
Most commonly used antibiotic regimens for lower and upper urinary tract infections
Indications for prophylactic regimens
Importance of cultures post treatment to confirm resolution

17.2.3 COMPLICATIONS:
Demonstrates applied knowledge of the:
Complication associated with untreated asymptomatic bacteriuria
Maternal complications associated with pyelonephritis

17.3 Respiratory infections

17.3.1 CONCEPTS:
Demonstrates applied knowledge of the:
Differential diagnosis of cough in pregnancy
Importance of measuring oxygen saturation in woman with suspected pneumonia
Morbidity and mortality associated with viral pneumonias in pregnancy

17.3.2 MANAGEMENT:
Demonstrates applied knowledge of the:
Evaluation and management of respiratory infections in pregnancy

17.3.3 COMPLICATIONS:
Demonstrates applied knowledge of the:
Impact of pregnancy on the risk of a complicated pneumonia
### 17.4 Tuberculosis

**17.4.1 CONCEPTS:**

**Demonstrates applied knowledge of the:**

Impact of pregnancy on risk of latent TB reactivation and course of active disease

**17.4.2 EVALUATION:**

**Demonstrates applied knowledge of the:**

Indications for testing of latent tuberculosis in pregnancy

**17.4.3 MANAGEMENT:**

**Demonstrates applied knowledge of the:**

Approach to patient with positive tuberculin skin test in pregnancy

Agents to avoid when treating active tuberculosis

### 17.5 Human immunodeficiency virus

**17.5.1 CONCEPTS:**

**Demonstrates understanding of the:**

Risk of vertical transmission to fetus during pregnancy, delivery, and the postpartum period

Impact of HAART on the risk of vertical transmission

Safety profile and principal side-effects of antiretrovirals

Importance of interdisciplinary management with auxiliary care (social work, dietician, pharmacist)

**Provides accurate and sensitive counseling on the:**

Risk of HIV transmission during breastfeeding

### 17.6 Immunizations

**17.6.1 CONCEPTS:**

**Demonstrates applied knowledge of the:**

Guidelines for immunization prior to pregnancy, in pregnancy, and in the post-partum period

Importance of addressing vaccination gaps

Effectiveness of immunization in pregnancy

Types of vaccines and safety profile in pregnancy

### 18. IMMUNOLOGIC DISORDERS

#### 18.1 Systemic lupus erythematosus

**18.1.1 CONCEPTS:**

**Demonstrates applied knowledge of the:**

Impact of SLE on adverse maternal and fetal outcomes

Impact of pregnancy of disease markers

Factors which increase the risk of adverse pregnancy outcomes
### 18.1 SLE

<table>
<thead>
<tr>
<th>Demonstrates appreciation of the:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importance of prenatal counseling on factors which decrease risk of flare-up during pregnancy</td>
</tr>
</tbody>
</table>

#### 18.1.2 EVALUATION:

- **Demonstrates applied knowledge of the:**
  - Baseline assessment of function and disease markers
  - Importance of regular clinical and laboratory follow-up
  - Evaluation of proteinuria and renal dysfunction in these women

#### 18.1.3 MANAGEMENT:

- **Demonstrates applied knowledge of the:**
  - Therapeutic options for disease control
  - Impact of early treatment of exacerbations
  - Risk of exacerbation when discontinuing antimalarials

#### 18.1.4 COMPLICATIONS:

- **Demonstrates applied knowledge of the:**
  - Manifestations of other complications of SLE in pregnancy
  - Fetal surveillance associated with the presence of anti-SSA and anti-SSB antibodies

### 18.2 Antiphospholipid syndrome

#### 18.2.1 CONCEPTS:

- **Demonstrates applied knowledge of the:**
  - Diagnostic criteria for APLS
  - Impact of APLS on adverse maternal and fetal outcomes
  - Association with other autoimmune disorders

#### 18.2.2 EVALUATION

- **Demonstrates applied knowledge of the:**
  - Impact of inter laboratory variations on diagnosis
  - Indications for testing and follow-up

#### 18.2.3 MANAGEMENT

- **Demonstrates applied knowledge of the:**
  - Therapeutic approaches in pregnancy
  - Clinical features of catastrophic antiphospholipid syndrome
  - Provides accurate and relevant counseling on the:
    - Possibility of developing non-obstetrical manifestations in the future

### 18.3 Rheumatoid arthritis
### 18.3.1 CONCEPTS:

**Demonstrates applied knowledge of the:**
- Differential diagnosis of symmetrical and asymmetrical arthritis in pregnancy and the postpartum period
- Impact of pregnancy on RA disease activity
- Safety profile of RA medications in pregnancy and lactation

**Provides accurate counseling on the:**
- Risk of post-partum exacerbation

### 18.3.2 MANAGEMENT:

**Demonstrates applied knowledge of the:**
- Therapeutic approaches in pregnancy and the postpartum period
- Available data regarding biologic agents

## 19. NEOPLASTIC DISORDERS

### 19.2 General principles

#### 19.2.1 CONCEPTS:

**Demonstrates applied knowledge of the:**
- Most common types of pregnancy-associated cancers
- Impact of pregnancy on the interpretation of cytological specimens
- Risk of transplacental metastases
- Importance of pre-conception counseling including cardiac evaluation in patients with history of thoracic radiation or anthracyclin therapy

#### 19.2.2 MANAGEMENT:

**Demonstrates applied knowledge of the:**
- Spectrum of therapeutic options in pregnancy and impact on mother and fetus
- Impact of delaying delivery after chemotherapy for fetal bone marrow recovery

## 20. DERMATOLOGY

### 20.1 Dermatoses related to pregnancy

#### 20.1.1 CONCEPTS:

**Demonstrates applied knowledge of the:**
- Differential diagnosis of pruritus in pregnancy
- Differential diagnosis of skin lesions in pregnancy
- Usual presentation of PUPPP

**Demonstrates appreciation of the:**
- Impact of pruritus on quality of sleep and quality of life
### 20.1.2 MANAGEMENT:
**Demonstrates applied knowledge of the:**
- Therapeutic modalities for the relief of pruritus
- Evaluation and management of bullous lesions in pregnancy

### 20.1.3 COMPLICATIONS:
**Demonstrates applied knowledge of the:**
- Risk of neonatal complications in herpes gestationis
- Risk of recurrence of herpes gestationis in future pregnancies or when taking oral contraceptive agents

### 21. Psychiatric illness

#### 21.1 Chronic psychiatric conditions

**21.1.1 CONCEPTS:**
**Demonstrates understanding of the:**
- Importance of preconceptual counseling in women with a history of chronic psychiatric conditions

**Demonstrates accurate and empathetic counseling on:**
- The effect of pregnancy on pre-existing psychiatric illness
- The risk benefits of psychiatric medication during pregnancy
**Demonstrates appreciation of:**
- The role of multidisciplinary care with specialists with an expertise in mood disorders

**21.1.2 MANAGEMENT:**
**Demonstrates applied knowledge of the:**
- How and when to screen for sexual, psychological, and physical abuse
- When to contact local psychiatric services

#### 21.2 Acute psychiatric conditions

**21.2.1 CONCEPTS:**
**Demonstrates applied knowledge of the:**
- Differential diagnosis of psychosis in pregnancy
- Risk factors for development of postnatal depression and puerperal psychosis

**21.2.2 MANAGEMENT:**
**Demonstrates understanding of the:**
- Assessment and treatment of the pregnant patient with psychiatric symptoms
- Importance of evaluating for medical or substance abuse comorbidities
- Importance of involving psychiatric specialists and family in care of patient
21.2.3 COMPLICATIONS:
Demonstrates appreciation of the:
Importance of assessing actual suicidal and homicidal risk

21.3 Substance abuse disorders

21.3.1 CONCEPTS:
Demonstrates understanding of the:
Importance of addressing the possibility of substance abuse objectively and openly with patients
Impact of smoking on the pregnancy and fetus
Legal implications of substance abuse

21.3.2 MANAGEMENT:
Demonstrates competence and empathy in:
Discussing safety of different smoking cessation techniques in pregnancy
Counseling women about the impact of substance abuse on the pregnancy
Importance of referral to a substance abuse disorder clinic

Demonstrates applied knowledge of the:
Management of acute intoxication and withdrawal in pregnancy
Importance of screening for HIV and hepatitis C when relevant
Importance of multi-disciplinary care including anaesthesia and neonatology

21.3.3 COMPLICATIONS:
Demonstrations applied knowledge in the:
Evaluation of symptoms of withdrawal or intoxication

SECTION 3: TABLES

TABLE I: Impact of pregnancy on physical examination, normal laboratory values, and radiological findings

<table>
<thead>
<tr>
<th>DISCIPLINE</th>
<th>NORMAL FINDINGS IN PREGNANCY</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical exam</td>
<td>Decrease in BP by 12th week gestation with return to normal by term</td>
<td>Mean BP decreases by 10-15 mm Hg</td>
</tr>
<tr>
<td></td>
<td>Increase in heart rate by 10-20 beats/min with full brisk bounding pulses</td>
<td>An increase of 10-20%</td>
</tr>
<tr>
<td></td>
<td>Decrease in systemic vascular resistance</td>
<td>Decreased by 25-30%</td>
</tr>
<tr>
<td></td>
<td>Midsystolic ejection flow murmur</td>
<td>Increased volume in outflow tracts</td>
</tr>
<tr>
<td></td>
<td>Two physiologic continuous functional murmurs (mammary and suprasternal hum)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jugular venous distension</td>
<td>Increased</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>**CanCOM Obstetric Medicine curriculum©</th>
<th>2010**</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intravascular Volume</strong></td>
<td></td>
</tr>
<tr>
<td>Lower extremity edema</td>
<td>Increased intravascular volume, IVC compression, decreased oncotic pressure +/- changes in capillary permeability</td>
</tr>
<tr>
<td>Increased respiratory rate from increased minute ventilation</td>
<td>Related to increased drive, basal metabolic rate, and oxygen consumption</td>
</tr>
<tr>
<td>Pulmonary bibasilar rales that open on deep inspiration</td>
<td>Occasionally in late pregnancy</td>
</tr>
<tr>
<td>No significant change in pulmonary artery pressure or pulmonary capillary wedge pressure</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Haematology</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin: 100-130 g/L</td>
<td>Physiologic anemia</td>
</tr>
<tr>
<td>Hematocrit</td>
<td>Decreased because plasma volume expansion is greater than increased erythrocyte mass</td>
</tr>
<tr>
<td>Leucocyte count: 10-15 ( \times 10^9 )/L</td>
<td>Increased</td>
</tr>
<tr>
<td>Platelet count: 115-150 ( \times 10^9 )/L in 10% pregnancies</td>
<td>Nadir near term</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Coagulation</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>INR</td>
<td>Unchanged</td>
</tr>
<tr>
<td>PTT</td>
<td>Unchanged</td>
</tr>
<tr>
<td>Fibrinogen: superior to 2.0 g/L</td>
<td>Increased plasminogen activator inhibitors</td>
</tr>
<tr>
<td>D-dimers: less than 300 ug/L</td>
<td>Increased</td>
</tr>
<tr>
<td>vWF factor: group O: 0.40-1.75 U/mL, non group O: 0.70-2.10 U/mL</td>
<td>Increased</td>
</tr>
<tr>
<td>Factor VIII: 0.6-1.95 U/L</td>
<td>Other coagulation factors (V, VII, X) also increased by 20-100% by term</td>
</tr>
<tr>
<td>Protein C: 0.70-1.20 U/mL (antigen)</td>
<td>Usually unchanged</td>
</tr>
<tr>
<td>Protein S: 0.57-1.20 U/mL (antigen)</td>
<td>Decreased</td>
</tr>
<tr>
<td>Antithrombin III: 0.80-1.25 U/mL</td>
<td>Unchanged</td>
</tr>
<tr>
<td>Homocysteine: less than 10 umol/L</td>
<td>Decreased</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Renal</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Creatinine: 35-44 mmol/L</td>
<td>Decreased</td>
</tr>
<tr>
<td>Urea</td>
<td>Decreased</td>
</tr>
<tr>
<td>------</td>
<td>-----------</td>
</tr>
<tr>
<td>Sodium: 133-135 meq/L</td>
<td>5 meq/L decrease</td>
</tr>
<tr>
<td>Potassium</td>
<td>Unchanged</td>
</tr>
<tr>
<td>Bicarbonate: 18-22 meq/L</td>
<td>Decreased</td>
</tr>
<tr>
<td>pH: 7.40-7.45</td>
<td>Respiratory alkalosis</td>
</tr>
<tr>
<td>Uric acid</td>
<td>Decreased</td>
</tr>
<tr>
<td>Plasma osmolality: 270 mosmol/lg</td>
<td></td>
</tr>
<tr>
<td>24 hour urine protein: up to 300mg</td>
<td>2 fold increase</td>
</tr>
<tr>
<td>Creatinine clearance: 120-160ml/min</td>
<td>2 fold increase by T2</td>
</tr>
<tr>
<td>Renin/angiotensin level</td>
<td>20-40% increase</td>
</tr>
</tbody>
</table>

**Hepatic**

| AST | Unchanged |
| ALT | Unchanged |
| Total bilirubin | Unchanged |
| GGT | Lower in second and third trimester |
| Alkaline phosphatase: increased | From placental origin |
| Albumine: 30-32mg/L | 10-20% decrease in oncotic pressure |

**Endocrine**

<p>| TSH: 0.03-2.5 in T1; 0.03-3.0 in T2; 0.03-3.5 in T3 | Values may vary according to laboratory assay |
| Free T4: levels may be decreased in second half of pregnancy depending on assay used (analog method less reliable than equilibrium dialysis method) | Difficult to measure reliably in setting of elevated TBG |
| T3 | Unchanged |
| Prolactin | Increased up to 10 times normal |
| GH | Increased from placental production |
| ACTH | Increased from placental production of CRH |
| Cortisol | Increased |
| Aldosterone | 4-6 fold increase by T3 |
| Angiotensin II | Increased |
| ADH | Decreased from increased circulating vasopressinase |
| Cathecholamines | No change |</p>
<table>
<thead>
<tr>
<th>Metabolic</th>
<th>Fasting glucose: mean of 4.2</th>
<th>Decreased from active placental transport</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Triglycerides: 2.37 mmol/L</td>
<td>3 fold increase</td>
</tr>
<tr>
<td></td>
<td>Total cholesterol: 6.5 mmol/L</td>
<td>1.5 fold increase</td>
</tr>
<tr>
<td></td>
<td>LDL: 3.8 mmol/L</td>
<td>1.5 fold increase</td>
</tr>
<tr>
<td></td>
<td>HDL: 1.7 mmol/L</td>
<td>1.2 fold increase</td>
</tr>
<tr>
<td></td>
<td>VLDL: 0.65 mmol/L</td>
<td>2.5 fold increase</td>
</tr>
<tr>
<td>ABG and pulmonary function tests</td>
<td>PaO2 increased to 100-105 Hg at sea level</td>
<td>Probably from increased cardiac output; can decrease in supine position</td>
</tr>
<tr>
<td></td>
<td>Increased alveolar-arterial gradient to 20</td>
<td>In late stages of pregnancy</td>
</tr>
<tr>
<td></td>
<td>Mild respiratory alkalosis with decreased PaCO2 to 28-32 mm Hg</td>
<td>From increased minute ventilation</td>
</tr>
<tr>
<td></td>
<td>HCO3 decreased to 20-21</td>
<td>Compensatory increase in renal excretion</td>
</tr>
<tr>
<td></td>
<td>pH: 7.40-7.45</td>
<td>Compensated respiratory alkalosis</td>
</tr>
<tr>
<td></td>
<td>Lung volume subdivisions show an increase in tidal volume and a decrease in expiratory reserve volume and residual volume</td>
<td>Decreased FRC with little change in inspiratory capacity</td>
</tr>
<tr>
<td></td>
<td>Decreased lung compliance</td>
<td>From decreased chest wall compliance</td>
</tr>
<tr>
<td></td>
<td>Spirometry is largely unchanged</td>
<td></td>
</tr>
<tr>
<td>CXR</td>
<td>Increased pulmonary vascular markings</td>
<td>Common</td>
</tr>
<tr>
<td></td>
<td>Cardiac silhouette suggestive of cardiomegaly</td>
<td>From heart rotation and hypervolemia</td>
</tr>
<tr>
<td></td>
<td>Straightened left upper cardiac border with more horizontal heart position</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Small pleural effusion</td>
<td>In post-partum period in particular</td>
</tr>
<tr>
<td>EKG</td>
<td>15-20 degree left shift of axis</td>
<td>From elevation of diaphragm</td>
</tr>
<tr>
<td></td>
<td>Periods of SVT and ESV</td>
<td>Occasional</td>
</tr>
<tr>
<td></td>
<td>Q wave in lead III; minor ST-segment depression; T inversion in inferior and lateral leads</td>
<td>From changes in chest dimensions and</td>
</tr>
<tr>
<td>Cardiac ultrasound</td>
<td>diaphragm position</td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>----------------------------------</td>
<td></td>
</tr>
<tr>
<td>Physiologic multivalvular regurgitation</td>
<td>Predominantly right-sided</td>
<td></td>
</tr>
<tr>
<td>Chamber enlargement (5-15% increase in chamber size)</td>
<td>Resulting from a 30-50% increase in blood volume</td>
<td></td>
</tr>
<tr>
<td>Small asymptomatic pericardial effusion</td>
<td>Occasionally found in T3; resolve by 6 weeks postpartum</td>
<td></td>
</tr>
<tr>
<td>Increase in cardiac output of 30-60% (5-7 L/min/m²)</td>
<td>Combined increase in preload, heart rate and stroke volume</td>
<td></td>
</tr>
</tbody>
</table>
TABLE II: Mean Radiation Exposure to fetus associated with common imaging procedures. Adapted with permission from Table 8-2: Robert L. Barbieri, MD, Medical Care of the Pregnant Patient, 2nd edition. Rosene-Montella K, Keely EJ, Lee RV, Barbour LA, eds. Philadelphia: American College of Physicians; 2007

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Mean radiation exposure to fetus (mGy)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head CT</td>
<td>&lt;0.01</td>
<td>Test of choice for SAH, subdural, epidural or intraparenchymal hemorrhage</td>
</tr>
<tr>
<td>Spine CT</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Chest CT</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Abdominal CT</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Chest X-ray</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Sinus X-ray</td>
<td>&lt;1</td>
<td></td>
</tr>
<tr>
<td>Lumbar spine</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>Abdominal X-ray</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td>Mammography</td>
<td>&lt;1 per breast</td>
<td>Less sensitive in pregnancy</td>
</tr>
<tr>
<td>Cerebral angiography</td>
<td>Depends on length on fluoroscopy</td>
<td></td>
</tr>
<tr>
<td>Pulmonary angiography</td>
<td>Brachial approach: &lt;0.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Femoral approach: 2.3</td>
<td></td>
</tr>
<tr>
<td>Cardiac catheterization</td>
<td>5</td>
<td>Ioxaglate as IV contrast reassuring risk profile in animal models</td>
</tr>
<tr>
<td>Cerebral MRI</td>
<td>None</td>
<td>Long-term data not yet available; ideal for PRES, cerebral vein thrombosis, pituitary, AVM</td>
</tr>
<tr>
<td>Other MRI</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Ultrasound</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Perfusion-ventilation scan</td>
<td>V: 0.1-0.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q: 0.4-0.6</td>
<td></td>
</tr>
<tr>
<td>Cardiac radionuclide imaging</td>
<td>≤8</td>
<td></td>
</tr>
<tr>
<td>IVP</td>
<td>Can be limited to 1.7</td>
<td>Concern about iodine toxicity to developing fetal thyroid</td>
</tr>
<tr>
<td></td>
<td>Otherwise 2.9-6.8</td>
<td></td>
</tr>
<tr>
<td>Radioactive uptake scanning of the thyroid</td>
<td>Not indicated in pregnancy</td>
<td>Discard milk for 24-48 hours</td>
</tr>
</tbody>
</table>