



**Rotation Specific Goals and Objectives  
Maternal-Fetal Medicine  
Subspecialty Training Program**

*Revised and approved in December 2018*

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## Table of Contents

<b>Section</b>	<b>Page(s)</b>
Introduction	<b>3</b>
Overview of Rotations	<b>4</b>
Rotation-based Objectives of Training	<b>5</b>
Maternal-Fetal Medicine - Basic	<b>6-9</b>
Maternal-Fetal Medicine - Advanced	<b>10-13</b>
Ultrasound – Basic	<b>14-19</b>
Ultrasound - Advanced	<b>20-26</b>
Medical Genetics	<b>27-30</b>
Advanced Fetal Doppler and Echocardiography	<b>31-35</b>
Obstetrical Medicine	<b>36-39</b>
Research	<b>40-44</b>
Perinatal Pathology	<b>44-47</b>

# 1. Introduction

As defined by the Royal College of Physicians and Surgeons of Canada (RCPSC) and the Collège des Médecins du Québec, Maternal-Fetal Medicine specialists are physicians trained in the prevention, diagnosis, management and treatment of those conditions implicated in the morbidity and mortality of the mother, fetus and early newborn. These physicians have special training in the identification and management of high-risk obstetrical problems. Specialists in maternal-fetal medicine are viewed primarily as consultants to the practicing obstetrician and other health care providers. During their clinical rotations and calls, trainees are expected to acquire competencies in the different CanMEDS domains.

This document describes the rotation specific objectives of the Maternal-Fetal Program at McGill University. The program is structured to train individuals who have successfully completed a Royal College accredited Obstetrics/Gynecology residency and International Graduates of other approved ObGyn programs and who wish to sub-specialize in Maternal-Fetal Medicine. This is a two-year program leading to Royal College accreditation with certification for Subspecialty residents of the Royal College and McGill accreditation for international graduates.

The MFM program provides all components of as outlined in the following 2018 specialty-specific documents of the RCPSC, which can be found on their website, on the McGill website or by clicking on hyperlinks below:

- [Objectives of Training in the Subspecialty of Maternal-Fetal Medicine](#)
- [Subspecialty Training Requirements in Maternal-Fetal Medicine](#)
- [Specific Standards of Accreditation for Residency Programs in Maternal-Fetal Medicine](#)

The objectives are delineated according to the CanMEDS Framework. The CanMEDS framework was created by the Royal College of Physicians and Surgeons of Canada (RCSPC) to clearly define the essential competencies required of a physician.

## Clinical Training

In order to gain experience in Maternal-Fetal Medicine, the candidate will manage patients in the Birthing Center, the hospital Antepartum Unit, the outpatient Ambulatory Maternal-Fetal Medicine (MFM)/Obstetrics Clinic, and the Women's Ultrasound Unit at both McGill teaching sites, the Royal Victoria Hospital (MUHC-Glen site) and the Jewish General Hospital. Patients are referred from a total catchment area of approximately 20,000 live births per year. Patients are referred for various medical complications in pregnancy, as well as suspected fetal abnormalities, genetic issues, preterm labor, and maternal or fetal problems requiring ongoing fetal surveillance.

Under the supervision of the attending staff of the Maternal-Fetal Medicine Division, the candidates will see consultations and follow patients in each of the clinical units. The responsibilities of the trainee will gradually increase throughout the course of the two-year training period.

The trainee will also become increasingly acquainted and competent in the management of complications of pregnancy, ultrasound, fetal monitoring and diagnostic techniques. The trainee will be an active participant in the academic activities of the maternal-fetal medicine division including regular rounds, seminars and journal clubs. In addition, throughout the course of the two-year training program, the trainee will design and execute a research protocol in a clinical or basic science area under the supervision of an attending staff member.

## 2. Overview of Rotations

Year	Rotation	Duration (blocks)	Teaching Site(s)
<b>First</b>	Maternal-Fetal Medicine – Basic and Advanced	6	Glen, JGH
	Ultrasound - Basic and Advanced	5	Glen, JGH
	Medical Genetics	1	Glen, JGH
	Research	1	Glen, JGH
	<b>Sub-total</b>	<b>13</b>	
<b>Second</b>	Maternal-Fetal Medicine - Advanced	1	Glen, JGH
	Ultrasound- Advanced	2	Glen, JGH
	Advanced Fetal Doppler and Echocardiography	2	Glen
	Obstetrical Medicine	1	Glen
	Research	2	Glen, JGH
	<i>Selective or Elective:</i> Perinatal Pathology, Obstetrical Anesthesiology, Advanced Fetal Doppler and Echocardiography, Obstetrical Medicine, Ultrasound, Genetics, Neonatology	5	Glen, JGH
	<b>TOTAL</b>	<b>26</b>	

**NOTE:**

1. One block is comprised of 4 weeks; hence the 2 years program is comprised of 26 blocks
2. Glen: Site regrouping Royal Victoria Hospital & Montreal Children's Hospital
3. JGH: Jewish General Hospital

### **3. Rotation-Based Objectives of Training**

The Objectives of Training for each rotation of the McGill MFM program were developed with the specialists involved in the training from each of the teaching sites. The objectives of this 24-month program are based on the following RCSPC guidelines:

- Subspecialty Training Requirements in Maternal-Fetal Medicine 2018
- Objectives of Training in the Subspecialty of Maternal-Fetal Medicine 2018
- Specific Standards of Accreditation for Residency Programs in Maternal-Fetal Medicine 2018

The Objectives of Training have been reviewed and updated in 2018.

# Maternal-Fetal Medicine Rotation - Basic

Royal Victoria Hospital and Jewish General Hospital

## Orientation to Rotation

**Rotation duration:** Three 4-week blocks in 1<sup>st</sup> year; either at RVH or JGH. This will be followed by three blocks of 4 weeks of MFM Advanced Rotation at RVH or JGH.

**Rotation supervisors:**

**RVH:** Dr Anne-Maude Morency (anne-maude.morency@mcgill.ca)

**JGH:** Dr Lawrence Koby (lawrence.koby@mail.mcgill.ca)

**Service Requirement:** Following Federation des Medecins Residents du Quebec (FMRQ), night and weekend calls from home will be shared with other MFM and OBGYN Residents, for patients admitted to the RVH or JGH MFM Service and transport calls.

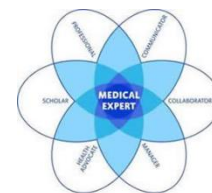
## Rotation Environment and Expectations

The perinatal unit consists of all the inpatients admitted to the MFM service both in the Birthing Center and the Antepartum Unit. The perinatal team rounds on the unit daily. The MFM trainee is expected to monitor each patient's status and to have a management plan for each case. The trainee is supervised by the attending on service, and must, in turn, supervise and delegate appropriately to the obstetrical trainees and medical students on service. The trainee manages acute complications in pregnancy and reviews test results during the day. He/She also manages any admission to the unit upon consultation with the attending on service. The trainee is also expected to cover the birthing center during the day once a week. The trainee is involved in procedures and delivery of any patients on the MFM service. He/She is expected to attend the MFM/Obstetrics clinic every day. In these clinics the high-risk obstetrical patients are seen for an initial consultation after a referral by their midwife, family physician or obstetrician gynecologist. Patients with ongoing problems are seen for follow-up visits and testing of fetal well-being.

In the basic MFM Rotation, the trainee gets familiarized with common maternal complications in pregnancy. He/she develops growing responsibility and starts to formulate management plan for patients on the antenatal unit and the high-risk obstetrics clinics with the supervision of the attending staff. Gradually, the resident develops a thorough understanding of the management for specific maternal conditions and is able to manage the obstetrical and the antenatal unit.

## Specific Objectives and CanMEDS competencies

On completion of the **Maternal-Fetal Medicine rotations**, the MFM trainee will have acquired the following competencies that will assist him in his/her future role as a consultant in maternal-fetal medicine.



### Medical Expert

1. Resident demonstrates a basic clinical knowledge to the MFM specialty regarding:
  - Fetal health surveillance
  - Health optimization for pregnant women (immunization, exercise, dietary supplements, substance use disorders)
  - Multiple pregnancies
  - Management of concomitant maternal diseases (cardiac, connective tissue, dermatologic, endocrine, gastrointestinal, hematologic, hypertensive, infectious, malignancies, neurological, renal, respiratory and rheumatologic)
  - Intimate partner violence
  - Maternal use of narcotics, alcohol and other substances
  - Transplacental transfer of drugs and other toxins
  - Safety of pharmacotherapy in pregnancy and breastfeeding
  - Trauma in pregnancy
  - Management of surgery in pregnancy
  - Pregnancy complications such as recurrent pregnancy loss, hyperemesis, intrauterine demise, antepartum and peripartum obstetrical hemorrhage
  - Management of preterm labour and preterm rupture of membranes
  - Counselling on trial of labour after previous cesarean section
  - Intrapartum management of high-risk obstetrical patient
  - Principles of obstetric anesthesia
  - Principles of effective neonatal resuscitation
  - Peripartum mental disorders
  - Abnormalities of the cervix
  - Recognition and appropriate referral for lactation problems associated with complications of pregnancy
  - Contraception in a medically-complex patient
2. Performs a relevant clinical history and a focused physical examination
3. Chooses MOST OF the appropriate investigative techniques to establish differential diagnosis
4. Shows a reasonable clinical judgment
5. Establishes and documents a management plan
6. Demonstrates appropriate patient counselling including most of the relevant elements
7. Ensures adequate follow-up on investigations and procedures performed
8. Performs with the direct supervision of the clinical faculty staff:
  - Difficult cesarean delivery
  - Elective and emergency cerclage
  - Therapeutic amnioreduction

## **Communicator**

1. Develops rapport, trust, and ethical therapeutic relationships with patients and families, understanding the unique impact of psychological, social and ethical issues associated with high-risk pregnancies.
2. Demonstrates good interpersonal skills when working with all members of the health care team
3. Gathers pertinent information about the patient, including the family's beliefs, concerns and expectations about the illness and listen effectively
4. Explains abnormal results and pregnancy complications to the patient in a humane way that is understandable and encourages discussion and participation in decision making by the patient and her family.
5. Obtains informed consent.
6. Delivers bad news, addressing anger and misunderstanding that may arise.
7. Delivers a patient case presentation clearly and concisely.
8. Produces timely, meticulous and correct documentation, including consultation notes, progress notes, operative reports and letters.

## **Collaborator**

1. Demonstrates the ability to work effectively with a multidisciplinary team and respects the opinions of other team members.
2. Contributes effectively at multidisciplinary group meetings (e.g. Morbidity and mortality rounds, Neonatal-perinatal rounds)
3. Understands the role of other healthcare professionals in comprehensive patient care.
4. Seeks appropriate consultation from other health professionals, recognizing the limits of their own expertise
5. Arranges appropriate follow-up care services for patients

## **Leader**

1. Understands indicators of quality assurance in the division of Obstetrics
2. Contributes to various Rounds effectively (CPC/Morbidity and Mortality Rounds, Weekly Review of antenatal admitted patients, etc.)
3. Utilizes the available resources such as OACIS, Centricity, ViewPoint, etc. for optimal patient care and communication
4. Demonstrates a thorough knowledge of all patients admitted on the unit
5. Demonstrates an efficient organization of work and time management
6. Delegates clinical responsibilities appropriately
7. Manages healthcare resources effectively and orders tests for patients appropriately

## **Health Advocate**

1. Identifies the important determinants of health in an individual patient
2. Responds to the health needs of patients and facilitates patient access to care in a timely manner
3. Provides advocacy, health promotion and disease prevention through consultation and follow-up



## Scholar

1. Maintains a personal continuing education strategy
2. Critically appraises sources of medical information and integrate new learning into practice
3. Applies evidence-based medicine in Maternal-Fetal Medicine practice
4. Able to teach effectively medical students and residents

## Professional

1. Delivers the highest quality care with integrity, honesty and compassion; including recognizing limitations of their own professional competence and seeking advice as needed
2. Exhibits appropriate professional behaviors (punctuality, responds to calls in a timely and respectful fashion, shows appropriate demeanour with respect to appearance and language)
3. Practices medicine ethically (eg. patient confidentiality)
4. Is sensitive to ethical issues specific to MFM, such as termination of pregnancy, and arranges ethical consultation and discussion, as required.

## Evaluation of MFM Rotation

During his/her core rotation and calls, the trainee is expected to acquire competencies in each of the different CanMEDS domains. The MFM trainee is evaluated daily on an informal basis on presentation of cases, history taking, physical exam, ordering and interpretation of tests, and finally establishment of a management plan. The MFM trainee is also evaluated weekly on all CanMEDs roles by the attending covering the MFM service. A practice Royal College exam with short-answer examinations covering topics presented at the weekly Academic Teaching Sessions is given yearly.

The MFM-rotation specific ITER is used every 4 weeks for the evaluation of CanMEDs competencies; it can be found on MRESone45.

## Suggested Reading for MFM Rotation

**Creasy and Resnik's Maternal-fetal Medicine : principles and practice**, by Resnik, Robert; Lockwood, Charles J., Moore, Thomas, Greene, Michael F. 8<sup>th</sup> Ed. 2018.

**Maternal-Fetal Evidence Based Guidelines**, by Vincenzo Berghella. 3<sup>rd</sup> Ed. 2016.

**Medical complications during pregnancy**, by Gerald N. Burrow and Thomas P.Duffy (6<sup>th</sup> Ed) Philadelphia: Saunders, 2004.

### Other references

**Handbook of Obstetric Medicine**, by Catherine Nelson-Piercy. 5<sup>th</sup> Ed, 2015.

**Drugs in Pregnancy and Lactation: A Reference Guide to Fetal and Neonatal Risk**, by Gerald G Briggs and Roger K. Freeman. 11<sup>th</sup> Ed. 2017.

**Ethical issues in maternal-fetal medicine** / Dickenson, Donna L. -- Cambridge: Cambridge University Press, 2002. (*Book*) WQ 21 E83 2002 RVH - Women's Pavilion Library.

**High risk pregnancy: management options**, by David James and Philip J. Steer. 5<sup>th</sup> Ed. 2018.

**Protocols for High-risk Pregnancies – An evidence-based approach**, by John T. Queenan and Catherine Y. Spong. 6<sup>th</sup> Ed. 2015.

**Obstetrics: Normal and Problem Pregnancies**, by Steven G. Gabbe and Jennifer R. Niebyl. 7<sup>th</sup> Ed. 2016.

**Williams Obstetrics**, by F. Gary Cunningham et al. 25<sup>th</sup> Ed. 2018

# Maternal-Fetal Medicine Rotation - Advanced

## Royal Victoria Hospital and Jewish General Hospital

### Orientation to Rotation

**Rotation duration:** Three 4-week blocks in 1<sup>st</sup> year after the three blocks of MFM Basic Rotation; either at RVH or JGH.

**Rotation supervisors:**

**RVH:** Dr Anne-Maude Morency (anne-maude.morency@mcgill.ca)

**JGH:** Dr Lawrence Koby (lawrence.koby@mail.mcgill.ca)

**Service Requirement:** Following FMRQ Agreement, night and week-end call from home will be shared with other MFM and OBGYN Residents, for patients admitted to the RVH or JGH MFM Service and transport calls.

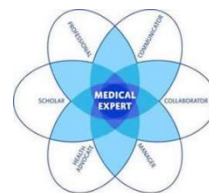
### Rotation Environment and Expectations

The perinatal unit consists of all the inpatients admitted to the MFM service both in the Birthing Center and the Antepartum Unit. The perinatal team rounds on the unit daily. The MFM trainee is expected to monitor each patient's status and to have a management plan for each case. The trainee is supervised by the attending staff on service, and must, in turn, supervise and delegate appropriately to the obstetrical trainees and medical students on service. The trainee manages acute complications in pregnancy and reviews test results during the day. He/She also manages any admission to the unit upon consultation with the attending on service. The trainee is also expected to cover the birthing center during the day once a week. The trainee is involved in procedures and delivery of any patients on the MFM service. He/She is expected to attend the MFM/Obstetrics clinic every day. In these clinics the high-risk obstetrical patients are seen for an initial consultation after a referral by their midwife, family physician or obstetrician gynecologist. Patients with ongoing problems are seen for follow-up visits and testing of fetal well-being.

In the advanced block, with growing confidence, knowledge and clinical acumen, the trainee assumes increasing responsibility and independence in formulating management plans to finally function as a junior consultant. The members of the MFM Division remain available for advice, but the resident gains in confidence, autonomy and leadership in managing the antenatal unit and the high-risk obstetrics clinics. Consultative report and management plans must be developed and complete.

## Specific Objectives and CanMEDS competencies

On completion of the **Maternal-Fetal Medicine rotations**, the MFM trainee will have acquired the following competencies that will assist him in his/her future role as a consultant in maternal-fetal medicine.



### Medical Expert

1. Resident demonstrates an expert understanding of clinical knowledge relevant to MFM:
  - Fetal health surveillance
  - Health optimization for pregnant women (immunization, exercise, dietary supplements, substance use disorders)
  - Multiple pregnancies
  - Management of concomitant maternal diseases (cardiac, connective tissue, dermatologic, endocrine, gastrointestinal, hematologic, hypertensive, infectious, malignancies, neurological, renal, respiratory and rheumatologic)
  - Intimate partner violence
  - Maternal use of narcotics, alcohol and other substances
  - Transplacental transfer of drugs and other toxins
  - Safety of pharmacotherapy in pregnancy and breastfeeding
  - Trauma in pregnancy
  - Management of surgery in pregnancy
  - Pregnancy complications such as recurrent pregnancy loss, hyperemesis, intrauterine demise, antepartum and peripartum obstetrical hemorrhage
  - Management of preterm labour and preterm rupture of membranes
  - Counselling on trial of labour after previous cesarean section
  - Intrapartum management of high-risk obstetrical patient
  - Principles of obstetric anesthesia
  - Principles of effective neonatal resuscitation
  - Peripartum mental disorders
  - Abnormalities of the cervix
2. Performs a relevant clinical history and a focused physical examination
3. Chooses ALL of the appropriate investigative techniques to establish differential diagnosis
4. Shows reasonable clinical judgment for every case
5. Establishes and documents a complete management plan for every case
6. Demonstrates a complete patient counselling including all of the relevant elements
7. Ensures adequate follow-up on investigations and procedures performed
8. Is autonomous to perform the following procedures with minimal staff involvement and to reliably supervise and teach more junior trainees:
  - Difficult cesarean delivery
  - Elective and emergency cerclage
  - Therapeutic amnioreduction
  - Twins with breech extraction

## **Communicator**

1. Develops rapport, trust, and ethical therapeutic relationships with patients and families
2. Demonstrates good interpersonal skills when working with all members of the health care team
3. Gathers all pertinent information about the patient, including the family's beliefs, concerns and expectations about the illness and listens effectively
4. Explains abnormal results and pregnancy complications to the patient in a humane way that is understandable and encourages discussion and participation in decision making by the patient and her family.
5. Obtains informed consent.
6. Delivers bad news, addressing anger and misunderstanding that may arise.
7. Delivers a patient case presentation clearly and concisely.
8. Produces timely, meticulous and correct documentation, including consultation notes, progress notes, operative reports and letters.

## **Collaborator**

1. Demonstrates the ability to work effectively with a multidisciplinary team and respects the opinions of other team members.
2. Contributes and takes the lead on various multidisciplinary group meetings when applicable (e.g. Morbidity and mortality rounds, Neonatal-perinatal rounds, etc.)
3. Understands the role of other healthcare professionals in comprehensive patient care.
4. Seeks appropriate consultation from other health professionals, recognizing the limits of his/her own expertise
5. Arranges appropriate follow-up care services for patients and their families

## **Leader**

1. Understands indicators of quality assurance in the division of Obstetrics
2. Coordinates and leads various Rounds effectively (CPC/Morbidity and Mortality Rounds, Weekly Review of antenatal admitted patients, etc.)
3. Utilizes the available resources such as OACIS, Centricity, ViewPoint, etc. for optimal patient care and communication
4. Demonstrates a thorough knowledge of all patients admitted on the unit
5. Demonstrates an efficient organization of work and time management
6. Delegates clinical responsibilities appropriately
7. Manages healthcare resources effectively and orders tests for patients appropriately

## **Health Advocate**

1. Identifies the important determinants of health in an individual patient
2. Responds to the health needs of patients and facilitate patient access to care in a timely manner
3. Provides advocacy, health promotion and disease prevention through consultation and follow-up

## **Scholar**

1. Maintains a personal continuing education strategy
2. Critically appraises sources of medical information and integrate new learning into practice
3. Applies evidence-based medicine in Maternal-Fetal Medicine practice

4. Facilitates learning of patients, families, and other trainees by selecting effective teaching strategies, delivering lectures, reflecting on teaching encounters and providing effective feedback
5. Offers adequate support and guidance to younger trainees

### **Professional**

1. Delivers the highest quality care with integrity, honesty and compassion; including recognizing limitations of their own professional competence and seeking advice as needed
2. Exhibits appropriate professional behaviors (punctuality, responds to calls in a timely and respectful fashion, shows appropriate demeanour with respect to appearance and language)
3. Practices medicine ethically (eg. patient confidentiality)
4. Is sensitive to ethical issues specific to MFM, such as termination of pregnancy, and arranges ethical consultation and discussion, as required.

### **Evaluation of MFM Rotation**

During his/her core rotation and calls, the trainee is expected to acquire competencies in each of the different CanMEDS domains. The MFM trainee is evaluated daily on an informal basis on presentation of cases, history taking, physical exam, ordering and interpretation of tests, and finally establishment of a management plan. The MFM trainee is also evaluated weekly on all CanMEDS roles by the attending covering the MFM service. A practice Royal College exam with short-answer examinations covering topics presented at the weekly Academic Teaching Sessions is given yearly.

The MFM-rotation specific ITER is used every 4 weeks for the evaluation of CanMEDS competencies; it can be found on MRESone45.

### **Suggested Reading for MFM Rotation**

**Creasy and Resnik's Maternal-fetal Medicine : principles and practice**, by Resnik, Robert; Lockwood, Charles J., Moore, Thomas, Greene, Michael F. 8<sup>th</sup> Ed. 2018.

**Maternal-Fetal Evidence Based Guidelines**, by Vincenzo Berghella. 3<sup>rd</sup> Ed. 2016.

**Medical complications during pregnancy**, by Gerald N. Burrow and Thomas P. Duffy (6<sup>th</sup> Ed) Philadelphia: Saunders, 2004.

### **Other references**

**Handbook of Obstetric Medicine**, by Catherine Nelson-Piercy. 5<sup>th</sup> Ed, 2015.

**Drugs in Pregnancy and Lactation: A Reference Guide to Fetal and Neonatal Risk**, by Gerald G Briggs and Roger K. Freeman. 11<sup>th</sup> Ed. 2017.

**Ethical issues in maternal-fetal medicine** / Dickenson, Donna L. -- Cambridge: Cambridge University Press, 2002. (Book) WQ 21 E83 2002 RVH - Women's Pavilion Library.

**High risk pregnancy: management options**, by David James and Philip J. Steer. 5<sup>th</sup> Ed. 2018.

**Protocols for High-risk Pregnancies – An evidence-based approach**, by John T. Queenan and Catherine Y. Spong. 6<sup>th</sup> Ed. 2015.

**Obstetrics: Normal and Problem Pregnancies**, by Steven G. Gabbe and Jennifer R. Niebyl. 7<sup>th</sup> Ed. 2016.

**Williams Obstetrics**, by F. Gary Cunningham et al. 25<sup>th</sup> Ed. 2018

# Ultrasound Rotation - Basic

## Royal Victoria Hospital and Jewish General Hospital

### Orientation to Rotation

**Rotation duration:** Three 4-week blocks in 1<sup>st</sup> year; either at RVH or JGH. This will be followed by four blocks of 4 weeks of Ultrasound Advanced Rotation at RVH or JGH.

**Rotation supervisors:**

**RVH:** Dr Anne-Maude Morency (anne-maude.morency@mcgill.ca)

**JGH:** Dr Lawrence Koby (lawrence.koby@mail.mcgill.ca)

**Service Requirement:** Following FMRQ Agreement, night call and week-end calls from home will be shared with other MFM and OBGYN residents, for patients admitted to the RVH or JGH MFM Service and transport calls.

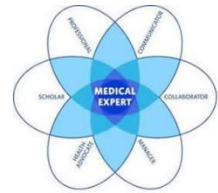
### Rotation Environment and Expectations

Twelve weeks are dedicated specifically to basic ultrasound training. Additionally, when the trainee is on the core MFM rotations (Basic and Advanced) and also during week-end or night calls, he/she will be required to use ultrasound for evaluation of patients to the best of their ability at that point in time. Attending supervision at all sessions will allow direct and regular feedback.

Objectives are divided into Basic and Advanced ultrasound knowledge and skills. Timing of progression from one to the next will depend on the individual trainee and the set of ultrasound knowledge and skills he/she brings at the beginning of the training program. If, by the end of the third ultrasound block, the trainee has not progressed from Basic to Advanced knowledge and skills then he/she will be advised to use some elective time to achieve all required ultrasound skills.

## Specific Objectives and CanMEDS competencies

On completion of the **Basic Ultrasound Rotation**, the MFM trainee will have acquired the following competencies that will assist him in his/her future role as a consultant in maternal-fetal medicine.



### 1. Medical Expert

#### A. Knowledge – Basic Ultrasound

1. Understand basic physics underlying ultrasound imaging in order to obtain an optimal image.
  - a) Effects on human tissues of pulsed- and continuous-wave ultrasound beams
  - b) Principles of attenuation, absorption, reflection, speed of sound, and thermal and nonthermal biologic effects
  - c) Interpretation of acoustic output information (including Doppler) and its clinical relevance
  - d) Flow mapping (colour Doppler)
  - e) Signal processing (gray scale, time gain compensation, dynamic range, focus)
  - f) Artifacts: interpretation and avoidance
  - g) Reverberation, side lobes, edge effects, shadowing, enhancement
2. Demonstrate comprehensive knowledge of embryonic and fetal development, including
  - a) Trophoblastic biology
  - b) Early placental development and embryogenesis
  - c) Fetal anatomical development
  - d) Immunology of pregnancy and the fetus
  - e) Placental respiratory gas exchange and fetal oxygenation
  - f) Transplacental transfer of nutrients
  - g) Fetal acid-base balance
  - h) Fetal behavioural activity
  - i) Fetal cardiovascular physiology
  - j) Fetal renal physiology
  - k) Fetal gastrointestinal physiology
  - l) Fetal lung development and maturation
3. Understand the principles of ultrasound and biochemical investigation of early pregnancy assessment and ectopic pregnancy
4. Understand the principles of fetal anatomy survey, including prenatal diagnosis and management of simple fetal structural anomalies
5. Understand the principles of estimation of gestational age and ultrasound assessment of fetal growth - interpretation and appreciation of limitations of standard measurements

6. Understand the evaluation of biophysical parameters (fetal breathing, movement, tone and amniotic fluid volume)
7. Understand and utilize Doppler methodology appropriate to obstetrical investigation.
  - a) Umbilical artery
  - b) Middle cerebral artery
  - c) Uterine artery
8. Understand normal fetal growth and development and transition from fetal to neonatal life
9. Demonstrate knowledge of detection, surveillance and management of multiple pregnancies and their complications
10. Demonstrate knowledge of diagnostic and therapeutic procedures pertinent to MFM (amniocentesis, chorionic villus sampling, cordocentesis, intrauterine transfusions, fetal surgical procedures)
11. Demonstrate detection and management of pregnancy complications including abnormalities of fetal growth and development, disorders of amniotic fluid volume, allo- and isoimmunization, hydrops fetalis, intrauterine demise, postterm pregnancy and postmaturity, invasive placental disorders, uterine anomalies
12. Demonstrate basic knowledge of neonatal management and complications/outcomes associated with fetal anomalies/conditions and prematurity
13. Demonstrate comprehensive knowledge of sonographic pelvic anatomy.
14. Demonstrate knowledge of medical and surgical methods of pregnancy termination
15. Demonstrate knowledge into their own limits of expertise

#### **B. Skills - Basic Ultrasound**

1. Demonstrate competency in obtaining fetal and pelvic views and optimize the ultrasound image by adjusting the machine settings.
2. Perform a first trimester scan including viability, dating and chorionicity
3. Obtain nuchal translucency (NT) measurements that fulfill the standard criteria of Fetal Medicine Foundation (FMF)
4. Perform second trimester ultrasound, including the majority of standard views
5. Perform third trimester ultrasound, including assessment of fetal growth and fetal well-being
6. Perform ultrasound assessment of multiple pregnancy
7. Perform endovaginal ultrasound including cervical length and placental localization
8. Perform fetal cardiac screening ultrasound
9. Perform biophysical profile
10. Perform Doppler studies to assess fetal well-being, placental function and uterine blood flow
11. Perform an amniocentesis in singleton pregnancy
12. Demonstrate effective and appropriate ultrasound guidance for obstetric diagnostic and therapeutic procedures



## **2. Communicator**

1. Produce an ultrasound report in a timely fashion including a reasonable management plan and appropriate required investigations.
2. Demonstrate good interpersonal skills when working with all members of the health care team
3. Gather pertinent information about the patient, including the family's beliefs, concerns and expectations about the illness. Listen effectively.
4. Demonstrate sensitivity in the communication of the findings of ultrasound examinations, being especially mindful of impact of psychological, social, and ethical problems associated with the diagnosis of fetal abnormality
5. Obtain informed consent.
6. Deliver a patient's case presentation clearly and concisely.

## **3. Collaborator**

1. Demonstrate the ability to work effectively with a multidisciplinary team and respect the opinions of other team members.
2. Contribute effectively at multidisciplinary group meetings (e.g. Weekly Ultrasound rounds, Fetal Diagnosis and Treatment Group meetings)
3. Understand the role of other healthcare professionals in the provision of comprehensive patient care.
4. Effectively work with other health professionals to prevent, negotiate and resolve interprofessional conflict.

## **4. Leader**

1. Coordinates and/or presents at the weekly Ultrasound Rounds
2. Effectively utilize the information systems (OACIS, Viewpoint, RadImage, PACS) required for optimal patient care and communication of ultrasound findings
3. Demonstrates organization of work and time management
4. Delegates clinical responsibilities appropriately
5. Allocate finite health care resources appropriately
6. Understand the principles of quality assurance and administration of an ultrasound unit

## **5. Health Advocate**

1. Identify the important determinants of health in an individual patient
2. Utilize the network of resources to facilitate patient access to care in a timely manner
3. Provide advocacy for patients with abnormal ultrasound findings by coordinating and expediting consultation with the necessary specialists, such as genetics, pediatric cardiology, pediatric radiology, pediatric surgery etc.
4. Enable patients to remain in their own communities without compromising quality of care

## **6. Scholar**

1. Maintain a personal continuing education strategy.
2. Complete FMF online course for NT measurement
3. Critically appraise sources of medical information and apply evidence-based medicine in ultrasound

4. Facilitate learning for patients, medical students, residents and other health professionals

## 7. Professional

1. Deliver the highest quality care with integrity, honesty and compassion; including recognizing limitations of their own professional competence and seeking advice as needed
2. Exhibit appropriate professional behaviors (punctuality, respect)
3. Practice medicine ethically (eg. patient confidentiality)
4. Sensitive to ethical issues specific to MFM, such as termination of pregnancy, fetal reduction; arranges ethical consultation and discussion, as required.

### Evaluation:

Evaluation of the MFM trainee regarding the acquisition of ultrasound skills is performed on an ongoing basis during the training periods. The MFM attending supervising the ultrasound session and the sonographers/technicians initially observe the trainee performing ultrasound examination in the first one-four weeks of the training, depending on the trainee's background experience. After this, if the trainee's performance is deemed satisfactory, the trainee is allowed to perform the ultrasound examination alone. However, the attending reviews every examination. The trainee is thus given direct feedback on every patient.

In addition, the trainee is requested to send two Daily Ultrasound Evaluation Forms per week to staff physician in order to obtain formal timely feedback. At the end of every block, an evaluation based on CanMeds roles is completed by the MFM faculty on MRESone45.

By the end of all Ultrasound blocks (Basic and Advanced), the MFM trainee will be expected to have obtained **FMF Certification** in the measurement of the fetal nuchal translucency.

### Suggested Reading for Ultrasound Rotation

**Diagnostic Imaging of Fetal Anomalies**, by David A. Nyberg, John P. McGahan, Dolores H. Pretorius and Gianluigi Pilu. Philadelphia: Lippincott, Williams & Wilkins, 2003.

**Fetology : diagnosis and management of the fetal patient** / / Diana W. Bianchi ... [et al.]. -- New York: McGraw-Hill; McGraw-Hill Medical, 2010.2nd ed.

**Ultrasonography in obstetrics and gynecology** / Callen, Peter W. -- Philadelphia, PA: Elsevier Saunders, 2016.6th ed.

**Diagnostic Imaging: Obstetrics**, by PJ Woodward, A Kennedy and R Sohaey. 3<sup>rd</sup> Edition. June 2016.

### Other References

**A Practical Guide to Fetal Echocardiography: Normal and Abnormal Hearts** [Hardcover] Alfred Z. Abuhamad (Author), Rabih Chaoui (Author) Lippincott Williams and Wilkins; 3rd Revised edition edition (Oct 2015)

**Obstetric and gynaecological ultrasound made easy** / Smith, N. C.; Smith, A. Pat M. -- New York: Churchill Livingstone, 2006.2nd ed.

**Sonography in Obstetrics and Gynecology: Principles and Practice**, by Arthur C. Fleischer, Frank A. Manning, Philippe Jeanty and Roberto Romero. (8<sup>th</sup> Ed.) New York: McGraw-Hill, 2017.

**Structural Fetal Abnormalities**, by W Allen Hogge, Isabelle Wilkins et al. 3<sup>rd</sup> Edition. October 2016.

### Refer to the Websites of

- SOGC (clinical practice guidelines for 2<sup>nd</sup> trimester assessment and aneuploidy screening)
- ISUOG, RCOG, AIUM (for international standards and guidelines in ultrasound)

**Journals**

- Ultrasound in Obstetrics & Gynecology
- Journal of Ultrasound in Medicine
- Prenatal Diagnosis
- Fetal Diagnosis and therapy

# Ultrasound Rotation - Advanced

## Royal Victoria Hospital and Jewish General Hospital

### Orientation to Rotation

**Rotation duration:** Three non-consecutive 4-week blocks in 1<sup>st</sup> or 2<sup>nd</sup> year; either at RVH or JGH.

**Rotation supervisors:**

**RVH:** Dr Anne-Maude Morency (anne-maude.morency@mcgill.ca)

**JGH:** Dr Lawrence Koby (lawrence.koby@mail.mcgill.ca)

**Service Requirement:** Following FMRQ Agreement, night call and week-end calls from home will be shared with other MFM and OBGYN residents, for patients admitted to the RVH or JGH MFM Service and transport calls.

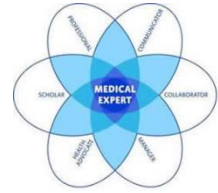
**Rotation Environment and Expectations**

Twelve weeks are dedicated specifically to advanced ultrasound training. Additionally, when the trainee is on the core MFM rotations (Basic and Advanced) and also during night calls, he/she will be required to use ultrasound for evaluation of patients to the best of their ability at that point in time. Attending supervision at all sessions will allow direct and regular feedback.

Objectives are divided into Basic and Advanced ultrasound knowledge and skills. Timing of progression from one to the next will depend on the individual trainee and the set of ultrasound knowledge and skills he/she brings at the beginning of the training program. If, by the end of the third ultrasound block, the trainee has not progressed from Basic to Advanced knowledge and skills then he/she will be advised to use some elective time to achieve all required ultrasound skills.

## Specific Objectives and CanMEDS competencies

On completion of the **Advanced Ultrasound Rotation**, the MFM trainee will have acquired the following competencies that will assist him in his/her future role as a consultant in maternal-fetal medicine.



### 1. Medical Expert

#### A. Knowledge – Advanced Ultrasound

1. Understands the physics underlying ultrasound in order to obtain an optimal image
2. Demonstrate comprehensive knowledge of embryonic and fetal development
3. Manage early pregnancy assessment and ectopic pregnancy
4. Manage complex fetal structural anomalies
5. Understand and utilize Doppler methodology appropriate to obstetrical investigation.
  - a) Umbilical artery
  - b) Middle cerebral artery
  - c) Uterine artery
  - d) Ductus venosus
  - e) Umbilical vein
6. Demonstrate thorough knowledge of management of multiple pregnancies and their complications
7. Demonstrate knowledge of diagnostic and therapeutic procedures pertinent to MFM (amniocentesis, chorionic villus sampling, cordocentesis, intrauterine transfusions, fetal surgical procedures)
8. Demonstrate expertise in detection and management of pregnancy complications including abnormalities of fetal growth and development, disorders of amniotic fluid volume, allo- and isoimmunization, hydrops fetalis, intrauterine demise, invasive placental disorders, uterine anomalies
9. Demonstrate knowledge of neonatal complications/outcomes associated with fetal anomalies/conditions
10. Understand fetal pathology and the pathophysiology of commonly encountered conditions.
  - a) Fetal aneuploidy
  - b) Genetic conditions recognizable sonographically
  - c) Structural defects and their implications, including:
    - Cranial
    - Anencephaly
    - Holoprosencephaly
    - Ventriculomegaly

- Posterior Fossa and Cerebellar abnormalities
- d) Facial
- Clefting (lip/palate)
  - Hypoplasia or absent nasal bone
  - Micro/retrognathia
  - Hypo/hypertelorism
- e) Thorax
- Skeletal dystrophy
  - Cardiac abnormalities (Transposition, Fallot's, hypoplastic left heart etc)
  - CPAM
  - Pleural effusions
- f) Abdomen
- Diaphragmatic hernia
  - Hydronephrosis / urinary obstruction
  - Ascites
  - Hyperechogenic bowel
  - Omphalocele or gastroschisis
- g) Spine (Skeletal dysplasia, spina bifida)
- h) Gender (Ambiguous genitalia, hypospadias)

## **B.Skills - Advanced Ultrasound**

1. Efficient in providing an optimal image
2. Demonstrate competence in first trimester assessment of:
  - a) Viability, dating and chorionicity
  - b) Nuchal translucency and nasal bone.
  - c) Pathology, including abnormal NT, cranial and cerebral defects (e.g. exencephaly, holoprosencephaly), lower urinary tract obstruction, limb abnormalities, GI tract anomalies etc.
  - d) Doppler findings (uterine artery, umbilical cord, ductus venosus, tricuspid regurgitation)
3. Demonstrate competence in assessment of normal and abnormal fetal anatomy at 18-20 weeks:
  - a) Head
    - Facial profile and facial anatomy
    - Brain
    - Cerebral cortex and cerebral ventricles, including corpus callosum
    - Posterior fossa and cerebellum
    - Cisterna magna
    - Nuchal skin fold

- b) Spine
    - Longitudinal
    - Transverse
  - c) Limbs
    - Number
    - Movement
    - Hands and feet
  - d) Thorax
    - Heart Rate and rhythm
    - Four-chamber view
    - Cardiac axis and situs
    - Origins of the great vessels, aortic and ductal arch
    - 3 vessel view / 3 vessel trachea view
    - Lungs
  - e) Abdomen
    - Situs
    - Stomach
    - Liver, gall bladder and GI tract
    - Kidneys and urinary bladder
    - Abdominal wall and umbilicus
  - f) Examination of the placenta and cord
    - Placental location and morphology
    - Number of cord vessels
  - g) Doppler Evaluation (Pulsed wave and colour)
    - Umbilical artery and vein
    - Uterine arteries
    - Middle Cerebral artery
    - Other vessels, including thoracic aorta, renal arteries, ductus venosus and cardiac Doppler (for example assessment of cardiac morphology and valvular function)
4. Perform effectively a third trimester ultrasound, including fetal growth and fetal well-being (biophysical profile)
  5. Perform effectively endovaginal ultrasound including cervical length and placental localization
  6. Demonstrate competence in using 3D/4D techniques including:
    - a. HD LIVE (High Definition Imaging)
    - b. High resolution zoom
    - c. VCI (Volume contrast imaging) with OmniView
    - d. TUI (Tomographic contrast imaging)\_
    - e. 4D RealTime
  7. Perform fetal cardiac screening ultrasound
  8. Perform ultrasound assessment of multiple pregnancy
  9. Perform appropriate ultrasound guidance for complex fetal therapies
  10. Perform an amniocentesis in complex pregnancies and multiples

## **2. Communicator**

1. Produce and finalize complete ultrasound reports in a timely fashion including a COMPLETE management plan and appropriate required investigations
2. Demonstrate good interpersonal skills when working with all members of the health care team
3. Gather pertinent information about the patient, including the family's beliefs, concerns and expectations about the illness. Listen effectively
4. Demonstrate sensitivity in the communication of the findings of ultrasound examinations, being especially mindful of impact of psychological, social, and ethical problems associated with the diagnosis of fetal abnormality
5. Obtain informed consent.
6. Deliver a patient case presentation clearly and concisely.

## **3. Collaborator**

1. Demonstrate the ability to work effectively with a multidisciplinary team and respect the opinions of other team members.
2. Contribute effectively at multidisciplinary group meetings (e.g. Weekly Ultrasound rounds, Fetal Diagnosis and Treatment Group meetings)
3. Understand the role of other healthcare professionals in the provision of comprehensive patient care.
4. Effectively work with other health professionals to prevent, negotiate and resolve interprofessional conflict.

## **4. Leader**

1. Manage the ultrasound unit effectively, including reviewing scans of technicians and more junior trainees and complete missing images
2. Manage complex ultrasound cases of the ultrasound unit, including counselling of the patient, complete management plan and referring to other subspecialities
3. Coordinates and/or presents at the weekly Ultrasound Rounds
4. Effectively utilize the information systems (Telehealth, OACIS, Viewpoint, RadImage, PACS) required for optimal patient care and communication of ultrasound findings
5. Demonstrates organization of work and time management
6. Delegates clinical responsibilities appropriately
7. Allocate finite health care resources appropriately
8. Understand the principles of quality assurance and administration of an ultrasound unit

## **5. Health Advocate**

1. Identify the important determinants of health in an individual patient
2. Utilize the network of resources to facilitate patient access to care in a timely manner
3. Provide advocacy for patients with abnormal ultrasound findings by coordinating and expediting consultation with the necessary specialists, such as genetics, pediatric cardiology, pediatric radiology, pediatric surgery etc.
4. Enable patients to remain in their own communities without compromising quality of care



## 5. Scholar

1. Maintain a personal continuing education strategy.
2. Complete FMF certification for NT measurement and obtain three images to upload
3. Critically appraise sources of medical information and apply evidence-based medicine in ultrasound
4. Facilitate learning for patients, medical students, residents and other health professionals

## 6. Professional

1. Deliver the highest quality care with integrity, honesty and compassion; including recognizing limitations of their own professional competence and seeking advice as needed
2. Exhibit appropriate professional behaviors (punctuality, respect)
3. Practice medicine ethically (eg. Patient confidentiality)
4. Sensitive to ethical issues specific to MFM, such as termination of pregnancy, fetal reduction; arranges ethical consultation and discussion, as required.

### Evaluation:

Evaluation of the MFM trainee regarding the acquisition of ultrasound skills is performed on an ongoing basis during the training periods. The MFM attending supervises the work and the ultrasound reports of the MFM trainee. The trainee is thus given direct feedback on every patient.

The trainee is requested to send two Daily Ultrasound Evaluation Forms per week to staff physician in order to obtain formal timely feedback. At the end of every block, an evaluation based on CanMeds roles is completed by the MFM faculty on MRESone45.

By the end of all Ultrasound blocks (Basic and Advanced), the MFM trainee will be expected to have obtained **FMF Certification** in the measurement of the fetal nuchal translucency.

## Suggested Reading for Ultrasound Rotation

**Diagnostic Imaging of Fetal Anomalies**, by David A. Nyberg, John P. McGahan, Dolores H. Pretorius and Gianluigi Pilu. Philadelphia: Lippincott, Williams & Wilkins, 2003.

**Fetology : diagnosis and management of the fetal patient** // Diana W. Bianchi ... [et al.]. -- New York: McGraw-Hill; McGraw-Hill Medical, 2010.2nd ed.

**Ultrasonography in obstetrics and gynecology** / Callen, Peter W. -- Philadelphia, PA: Elsevier Saunders, 2016.6th ed.

**Diagnostic Imaging: Obstetrics**, by PJ Woodward, A Kennedy and R Sohaey. 3<sup>rd</sup> Edition. June 2016.

## Other References

**A Practical Guide to Fetal Echocardiography: Normal and Abnormal Hearts** [Hardcover] Alfred Z. Abuhamad (Author), Rabih Chaoui (Author) Lippincott Williams and Wilkins; 3rd Revised edition edition (Oct 2015)

**Obstetric and gynaecological ultrasound made easy** / Smith, N. C.; Smith, A. Pat M. -- New York: Churchill Livingstone, 2006.2nd ed.

**Sonography in Obstetrics and Gynecology: Principles and Practice**, by Arthur C. Fleischer, Frank A. Manning, Philippe Jeanty and Roberto Romero. (8<sup>th</sup> Ed.) New York: McGraw-Hill, 2017.

**Structural Fetal Abnormalities**, by W Allen Hogge, Isabelle Wilkins et al. 3<sup>rd</sup> Edition. October 2016.

**Refer to the Websites of**

- SOGC (clinical practice guidelines for 2<sup>nd</sup> trimester assessment and aneuploidy screening)
- ISUOG, RCOG, AIUM (for international standards and guidelines in ultrasound)

**Journals**

- Ultrasound in Obstetrics & Gynecology
- Journal of Ultrasound in Medicine
- Prenatal Diagnosis
- Fetal Diagnosis and therapy

# Medical Genetics Rotation

**Montreal Children's Hospital, Royal Victoria Hospital and Jewish General Hospital**

## Orientation to Rotation

**Rotation duration:** One 4-week rotation in the first year of subspecialty training.

### Rotation supervisor:

- **RVH and MCH:** Marilyn Richard, MSc, Genetics counselor coordinator ([marilyn.richard@muhc.mcgill.ca](mailto:marilyn.richard@muhc.mcgill.ca))
- **JGH:** Maria Lalous, MSc, Genetic counsellor coordinator ([mlalous@jgh.mcgill.ca](mailto:mlalous@jgh.mcgill.ca))

### Medical Genetics staff

- Karen Canales, MSc, Genetics Counselor ([karen.canales@muhc.mcgill.ca](mailto:karen.canales@muhc.mcgill.ca))
- Dr Isabelle De Bie, Geneticist - molecular genetics ([isabelle.debie@muhc.mcgill.ca](mailto:isabelle.debie@muhc.mcgill.ca))
- Dr Bettina Mucha Le Ny, Geneticist ([bettina.mucha-leny@muhc.mcgill.ca](mailto:bettina.mucha-leny@muhc.mcgill.ca))

**Service Requirement:** Following FMRQ Agreement, night call and week-end calls from home will be shared with other MFM and OBGYN residents, for patients admitted to the RVH or JGH MFM Service and transport calls.

### Rotation Schedule

During the four-week rotation in Medical Genetics, the trainee will spend time at the teaching site in outpatient settings. A few days of the rotation are spent in the Cytogenetics and Molecular Labs, under the supervision of the lab technologists and directors. The rest will be spent in the clinic setting of prenatal diagnosis; with the genetics counselors and geneticist.

#### **Academic Half-day sessions take place on Fridays at the MCH:**

- **8:00 -9:00 am:** Fetal Diagnosis and Treatment Group rounds (RVH, MCH & JGH videoconference)
- **9:00 am - 12:00 pm:** Medical Genetics Teaching sessions (MCH B02.9390 and by videoconference to JGH room H-347)

### Rotation Overview

Emphasis will be placed on genetics and pregnancy (prenatal diagnosis, teratogens, and embryo-fetopathology). While the trainee may be exposed to other areas of medical genetics during the rotation, at least 75% of the rotation will be dedicated to prenatal diagnosis. The trainee should keep a logbook of cases.

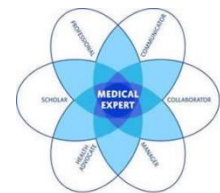
## Educational Strategies

The trainee will be expected to:

1. Attend assigned clinics; review patient charts and relevant literature prior to clinic
2. Complete chart notes and consultation letters, which must be reviewed by supervisor
3. Complete a set of problems (dysmorphology cases, pedigree-solving, etc) to be worked on independently during the first month
4. Complete assigned reading and instruction on the use of various databases (OMIM, POSSUM, GeneTests etc)
5. Attend a few days in each of the laboratories (cytogenetics, molecular); review cases and discuss testing algorithms with lab directors, and observe basic lab testing procedures
6. Participate actively in genetics counseling and case review. Cases are reviewed individually by genetics counselors with the geneticist covering the clinic, as well as at the biweekly fetal diagnosis and treatment group (FDTG) meeting.
7. Do a formal presentation at Friday Academic Half-Day

## Specific Objectives and CanMEDS competencies

On completion of the **Medical Genetics rotation**, the trainee in Maternal-Fetal Medicine will have acquired the following competencies that will assist him/her in his/her future role as a consultant in Maternal-Fetal Medicine. In a high-risk pregnancy referral centre, the emphasis will be focused on fetal medicine, in particular, the prenatal diagnosis of congenital malformations and their genetic implications and the pre- and postnatal management of these babies.



### 1. Medical Expert

- a) Gather medical and family history; construct a pedigree
- b) Recognize the various patterns of inheritance including Mendelian, multifactorial, and new mutations, as well as more complex modes such as, mitochondrial and uniparental disomy; analyze pedigrees, and calculate genetic risks
- c) Have competent knowledge of chromosomal abnormalities (aneuploidy and structural rearrangements), mechanisms of origin and clinical implications, including recurrence risk.
- d) Follow a logical approach in syndrome identification including the use of diagnostic aids (e.g. computer assisted diagnosis, literature searches), especially in the context of the fetus/neonate with multiple anomalies
- e) Have an understanding of the genetic implications of identifying fetal malformations on ultrasound; plan a course of investigation; including making appropriate referrals for perinatal management or for fetal pathology, the collection of appropriate fetal tissues for later studies, and planning/providing follow-up of patients, especially in cases of fetal demise or pregnancy termination.
- f) Recognize the indications, limitations and turn-around-time of laboratory investigations that pertain to genetic disease, including prenatal screening, ethnic screening, cytogenetics and molecular diagnosis; specifically have an in-depth knowledge of the indications, contraindications and complications of the various prenatal diagnostic procedures including amniocentesis, chorionic villous sampling and cordocentesis, fetal echocardiogram, as well as preimplantation genetic diagnosis (PIGD) and ICSI.

- g) Evaluate a history of teratogen exposure, including the use of appropriate databases such as Reprotox™
- h) Understand the impact of maternal disease on fetal development (e.g. maternal PKU)

## **2. Communicator**

- a) Identify the concerns of the patient/family with respect to a specific genetic condition/risk.
- b) Communicate effectively and empathetically with patients and their families; help them choose an appropriate course of action for themselves, provide support during bereavement, and advise them regarding support agencies
- c) Communicate clearly and effectively, verbally and in writing, with other physicians and health care providers
- d) Write concise genetics consultation letter to referring physician containing information concerning the diagnosis, medical implications and prognosis, the reproductive risks, and the management options available

## **3. Collaborator**

- a) Interact and consult effectively with colleagues and allied health professionals, ensuring respect and courtesy
- b) Recognize the limitations of his/her skills and expertise and be willing to seek consultation whenever indicated
- c) Appreciate the role of genetics in the multidisciplinary management of high-risk pregnancy

## **4. Leader**

- a) Demonstrate successful case management skills; including the writing of chart notes, consultation reports, letters to families, requesting and arranging any follow-up testing, appointments, etc.
- b) Participate in the coordinated care of individuals with complex chronic disorders, offered by a multidisciplinary team

## **5. Health advocate**

- a) Access information regarding community support groups as well as national and international resources to which patients can be referred
- b) Access information regarding new services and testing as they become available; e.g. through on-line computer programs
- c) Understand the need for promotion of public awareness of genetic disease, and potential for prevention of birth defects (e.g. preconception use of folate)

## **6. Scholar**

- a) Make presentations at formal and informal educational settings
- b) Appreciate the role of research in genetic practice
- c) Critically analyze current scientific developments related to the specialty

## **7. Professional**

- a) Recognize the social, ethical, legal and cultural issues which are particular to genetics and genetic testing
- b) Understand his/her own ethical standards and appreciate those of the patient; recognize the views and beliefs of the patient, be non-directive in most instances but be prepared to advise in certain situations

## **Evaluation**

Evaluation of the Maternal-Fetal Medicine trainee during the medical genetic rotation is based on day-to-day performance, including history-taking and physical examination skills, case reviews and participation during genetics rounds. The trainee will be informally assessed throughout the rotation by faculty and will be given feedback. At the end of the rotation, rotation specific ITER will be completed on MRESone45 and discussed with the trainee.

## **Suggested Reading**

**Sander's Structural Fetal Abnormalities.** 3<sup>rd</sup> Ed by McGraw-Hill Elsevier, 2016.

**Ultrasound Diagnosis of Fetal Anomalies,** by Michael Entezami et al. Thieme, 2003.

**Fetology: Diagnosis and management of the fetal patient.** 2<sup>nd</sup> Ed by McGraw-Hill, 2010.

**Oxford Desk Reference: Clinical Genetics and Genomics.** 2<sup>nd</sup> Ed by Oxford University Press, 2017.

**Genetics in Obstetrics and Gynecology,** 3<sup>rd</sup> ed by Joe Leigh Simpson and Sherman Elias. Philadelphia: Saunders, 2003.

**Smith's Recognizable Patterns of Human Malformation,** by Kenneth Lyons Jones. Philadelphia: Saunders, 1997

**Prenatal Diagnosis. The human side.** 2<sup>nd</sup> edition. Ed. By Lenore Abramsky and Jean Chapple

**Thompson and Thompson Genetics in Medicine,** 8<sup>th</sup> ed by Robert L. Nussbaum, Roderick R. McInnes, & Huntington F. Willard, 2016

**Chromosome abnormalities and genetic counseling,** by Gardner RJM and Sutherland GR. Oxford University press.

## **Other Reading**

**Genetic disorders and the fetus: diagnosis, prevention, and treatment /** Milunsky, Aubrey; Milunsky, Jeff M. -- Chichester, West Sussex: Wiley-Blackwell, 2010.6th ed. (*Book*) QZ 50 G32.6 2010 RVH - Women's Pavilion Library.

**Genetics in obstetrics and gynecology /** Simpson, Joe Leigh; Elias, Sherman. -- Philadelphia: Saunders, 2003.3rd ed. (*Book*) QZ 50 S61.3 2003 RVH - Women's Pavilion Library.

**Prenatal diagnosis /** Evans, Mark I. -- New York: McGraw-Hill Medical Pub. Division, 2006. (*Book*) WQ 209 P91 2007 RVH - Women's Pavilion Library.

**Emery's Elements of medical genetics ,** 15<sup>th</sup> Ed. Peter D. Turnpenny and Sian Ellard. Churchill Livingstone Elsevier, 2017.

***A list of additional recommended readings, including journal articles will be provided by the Genetics staff at the beginning of the rotation.***

# Advanced Fetal Doppler and Echocardiography Rotation

## Montreal Children's Hospital (MCH)

### Orientation to Rotation

**Rotation duration:** One 4-week rotation in the second year

**Rotation supervisors:**

**MCH:** Dr Tiscar Cavalle-Garrido ([tiscar.cavalle@muhc.mcgill.ca](mailto:tiscar.cavalle@muhc.mcgill.ca))

**Service Requirement:** Upon FMRQ Agreement, night call and week-end calls from home will be shared with other MFM and OBGYN residents, for patients admitted to the RVH or JGH MFM Service and transport calls.

### Specific Objectives and CanMEDS competencies

On completion of the rotation in **Advanced Fetal Doppler and Echocardiography**, the MFM trainee will have acquired the following competencies that will assist him/her in his/her future role as a consultant in maternal-fetal medicine.



#### 1. Medical Expert

##### KNOWLEDGE

By the end of the trainee's rotation he/she will be able to acquire the knowledge about:

- Normal embryologic development of the fetal heart, normal fetal cardiac anatomy and physiology
- Different indications for fetal echocardiography with their risk profiles.
- The utility of fetal cardiac echography for the assessment of cardiac function in certain non-cardiac conditions such as twin-twin-transfusion syndrome.
- Components of the basic fetal cardiac examination.
- Components of the advanced fetal cardiac examination
- The hereditary and genetic component of different anomalies.
- Common syndromes associated with cardiac anomalies with their cardiac and extra-cardiac findings e.g. deletion of 22q11
- Appropriate timing of the fetal cardiac examination in pregnancy and the frequency of follow up for different conditions.
- Requirements for proper fetal cardiac Doppler examination including physics, safety and limitations of fetal cardiac Doppler examinations.
- The uses and benefits of different sonographic modalities including and not limited to M-mode, color Doppler and pulse wave Doppler.
- Recognition of the different pulse wave forms used in fetal cardiac examination and their relation to cardiac cycle.

- l) Recognition of normal and abnormal pulse wave of different major vessels and cardiac valves.
- m) Quantitative and qualitative assessment of fetal cardiac function.
- n) Principles of the obstetric management of the pregnancies complicated by fetal heart disease with the appropriate referrals needed for management.
- o) The neonatal outcomes of various cardiac anomalies, principles of parental counseling and the expected basic neonatal management e.g need for prostaglandins administration.

## SKILLS

By the end of the trainee's rotation he/she will:

- a) Identify the detailed cardiac anatomy of a normal fetus and recognize both abnormalities and variations of normality, including the ability to:
  - i. Adjust and manipulate the ultrasound machine for best imaging appropriate for fetal cardiac examination.
  - ii. Study, examine and recognize the normal and abnormal fetal situs.
  - iii. Perform a detailed examination of the 4-chamber view with 2D and color Doppler.
  - iv. Interrogate the AV valves with 2D, color and pulsed wave Doppler.
  - v. Interrogate the aortic and pulmonary valves
  - vi. Interrogate the three vessels trachea view with 2D and color Doppler.
  - vii. Interrogate the right and left outflow tract and recognition of the main pulmonary artery and its branches.
  - viii. Image the ductal and aortic arches.
  - ix. Visualize the superior and inferior vena caval view.
  - x. Interrogate the pulmonary veins and identify the possible anomalies of the pulmonary venous vasculature.
  - xi. Interrogate the transverse and sagittal views of the heart and their interpretation.
  - xii. Interrogate the ductus venosus and recognize the different wave forms of the DV.
  - xiii. Sample the middle cerebral artery.
  - xiv. Sample the umbilical artery and vein.
  - xv. Sample both uterine arteries.
  - xvi. Measure fetal atrial and ventricular heart rates.
  - xvii. Measure the A-V conduction time in fetuses at risk for AV conduction anomalies
- b) Identify common cardiac anomalies, including:
  - i. Septal defects: atrial septal defect, ventricular septal defect and endocardial cushion defect
  - ii. Transposition of the great arteries
  - iii. Tetralogy of Fallot
  - iv. Ventricular hypoplasia
  - v. Mitral and tricuspid valve abnormalities
  - vi. Atrioventricular discordance
  - vii. Double outlet right ventricle
  - viii. Double inlet ventricle
  - ix. Aortic and pulmonary valve abnormalities
  - x. Common arterial trunk
  - xi. Aortic arch abnormalities, coarctation of the aorta
  - xii. Valvular regurgitation / atresia
  - xiii. Abnormalities of systemic and pulmonary venous connections, eg. interrupted inferior vena cava
- c) Diagnose and manage fetal arrhythmias



## **2. Communicator**

- a) Demonstrate good interpersonal skills when working with all members of the health care team
- b) Gather pertinent information about the patient, including the family's beliefs, concerns and expectations about the illness. Listen effectively
- c) Demonstrate sensitivity in the communication of the findings of ultrasound examinations, being especially mindful of impact of psychological, social, and ethical problems associated with the diagnosis of fetal abnormality
- d) Able to obtain informed consent.
- e) Able to deliver a patient case presentation clearly and concisely.
- f) Able to produce timely, meticulous and correct documentation, including ultrasound reports, consultation notes, and letters.

## **3. Collaborator**

- a) Demonstrate the ability to work effectively with a multidisciplinary team and respect the opinions of other team members.
- b) Contribute effectively at multidisciplinary group meetings
- c) Understand the role of other healthcare professionals in the provision of comprehensive patient care.
- d) Effectively work with other health professionals to prevent, negotiate and resolve interprofessional conflict.

## **4. Leader**

- a) Effectively utilize the information systems (Syngo, OACIS, Viewpoint, RadImage, PACS) required for optimal patient care and communication of ultrasound findings
- b) Demonstrates organization of work and time management

## **6. Health Advocate**

- a) Identify the important determinants of health in an individual patient
- b) Utilize the network of resources to facilitate patient access to care in a timely manner
- c) Provide advocacy for patients with abnormal ultrasound findings by coordinating and expediting consultation with the necessary specialists, such as genetics, pediatric radiology, pediatric surgery etc.
- d) Enable patients to remain in their own communities without compromising quality of care through the use of Telehealth services coordinated by the MUHC, which includes both the review and reporting of ultrasound studies from remote areas in real and deferred time.

## **6. Scholar**

- a) Maintain a personal continuing education strategy.
- b) Critically appraise sources of medical information and apply evidence-based medicine in ultrasound
- c) Facilitate learning for patients, medical students, residents and other health professionals

## **7. Professional**

- a) Deliver the highest quality care with integrity, honesty and compassion; including recognizing limitations of their own professional competence and seeking advice as needed
- b) Exhibit appropriate professional behaviors (punctuality, respect)
- c) Practice medicine ethically (eg. Patient confidentiality)
- d) Sensitive to ethical issues specific to MFM, such as termination of pregnancy, fetal reduction; arranges ethical consultation and discussion, as required.

## Evaluation

The MFM trainee's performance is directly observed by the attending, who is a pediatric cardiologist, and by the sonographers on the unit. The trainee's interpretation of the ultrasound findings is discussed with the attending after each case. The attendings and sonographers observe and keep track of the trainee's progress throughout the four-week rotation. The written evaluation of the trainee at the end of the rotation is compiled by the sonographers and attendings based on their assessment of the trainee's acquired skills in the performance of fetal echocardiography and Doppler studies. This evaluation is conducted using the rotation-specific ITER on MRESone45.

## Suggested Reading

### ECHOCARDIOGRAPHY texts and guidelines

**Diagnosis and treatment of fetal cardiac disease: a scientific statement from the American Heart Association. Circulation.** 2014 May 27;129(21):2183-242. doi: 10.1161/01.cir.0000437597.44550.5d. Epub 2014 Apr 24.

**Adults With Congenital Heart Disease**\_Joint Committee of the Council on Cardiovascular Disease in the Young and Council on Clinical Cardiology, Council on Cardiovascular Surgery and Anesthesia, and Council on Cardiovascular and Stroke Nursing /Donofrio MT, Moon-Grady AJ, Hornberger LK, Copel JA, Sklansky MS, Abuhamad A, Cuneo BF, Huhta JC, Jonas RA, Krishnan A, Lacey S, Lee W, Michelfelder EC Sr, Rempel GR, Silverman NH, Spray TL, Strasburger JF, Tworetzky W, Rychik J; American Heart Association\_

**A practical guide to fetal echocardiography** / Alfred Abuhamad; Rabih Chaoui. -- Philadelphia : Lippincott Williams & Wilkins, 2016. 3rd ed. (*Book*)

**Textbook of clinical echocardiography** / Otto, Catherine M. -- Philadelphia : Elsevier Saunders, 2009. 4th ed. (*Book*) WQ 141.5.E2 Ot8.4 2009 Reserve RVH - Medical Library.

**Fetal cardiology: embryology, genetics, physiology, echocardiographic evaluation, diagnosis and perinatal management of cardiac diseases** / Yagel, Simcha; Silverman, Norman H; Gembruch, Ulrich. -- London : Martin Dunitz, 2003. (*Book*) WQ 210.5 F44 2003 RVH - Women's Pavilion Library.

### DOPPLER texts

**Doppler Ultrasound in obstetrics and gynecology** / Maulik, Dev. -- Berlin: Springer-Verlag, 2005.2nd ed. (*Book*) WQ 209 D69.2 2005 RVH - Women's Pavilion Library.

**The fetus in three dimensions** / Kurjak, Asim.; Azumendi, Guillermo. -- Boca Raton, FL: Informa Healthcare, 2007. (*Book*) WQ 209 K95 2007 RVH - Women's Pavilion Library.

**Sonography in obstetrics and gynecology: principles and practice** / Fleischer, Arthur C. -- New York , 2000 changed to Washington D.C: McGraw-Hill, 2011.7th ed. WQ 240 S69.7 2011 RVH - Women's Pavilion Library.

### Fetal Cardiovascular Physiology:

Baschat AA. **The fetal circulation and essential organs-a new twist to an old tale.** Ultrasound Obstet Gynecol. 2006 Apr; 27(4):349-54

Fouron JC, Skoll A: **A fetal cardiovascular physiology and response to stress condition.** In: Reece and Hobbins, Eds. Clinical Obstetrics, Blackwell Publishing; 2007:93-113.

Kisured T et al: **Blood flow and the degree of shunting through the ductus venosus in the human fetus.** Am J Obstet & Gynecol, 2000; 182:147-153.

#### **Detection of Fetal Cardiac Malformations:**

Gembruch U, Geipel A: **Indication for fetal echocardiography: screening in low – and high risk populations.** In: Yagel S, Silverman NH, Gembruch U, Eds. Fetal cardiology. Martin Dunitz; 2003: 89-106.

Chaoui R: **The examination of the normal fetal heart using 2-dimensionnal echocardiography.** In: Yagel S, Silverman NH, Gembruch U, Eds. Fetal cardiology. Martin Dunitz; 2003: 141-149.

#### **Ultrasonographic Evaluation of Fetal Wellbeing:**

Romero R et al. **Timing the delivery of the preterm severely growth restricted fetus. Venous Doppler, cardiography or biophysical profile?** Ultrasound Obstet & Gynecol 2002; 19:118.

Hecker K et al. **Monitoring of fetuses with intra-uterine growth restriction: a longitudinal study.** Ultrasound Obstet Gynecol 2001; 18:564.

Bachat et al. **The sequence of changes in Doppler and biophysical parameters as severe fetal growth restriction worsens.** Ultrasound Obstet Gynecol 2001; 18:571.

Sibai B et al. **Pre-eclampsia.** Lancet 2005; 365 :785.

Trudinger BJ. **Doppler ultrasonography and fetal well-being.** In: Reece and Hobbins, eds. Clinical obstetrics. 3eme Ed. Blackwell publishing; 2007:561-585.

Baschat AA, Herman CR. **Venous Doppler in the assessment of fetal cardiovascular status.** Curr Opin Obstet Gynecol 2006; 18(2):156-63.

Mari J et al. **Ultrasound Obstet Gynecol** 1995; 5:400.

Fouron JC. **The unrecognized physiological and clinical significance of the fetal aortic isthmus.** Ultrasound Obstet Gynecol 2003; 22:441-447

## **Obstetrical Medicine Rotation**

### **Royal Victoria Hospital**

#### **Orientation to Rotation**

**Rotation duration:** One 4-week rotation in the second year

### Rotation supervisors:

- **RVH:** Dr Natalie Dayan (natalie.dayan@muhc.mcgill.ca)

**Service Requirement:** Following FMRQ Agreement, night call and week-end calls from home will be shared with other MFM and OBGYN residents, for patients admitted to the RVH or JGH MFM Service and transport calls.

Obstetrical medicine can be taken as a selective in the first or second year and is offered as a mandatory rotation in the second year of the program. The 4-week rotation is supervised by internists with special training in Obstetrical Medicine who run various clinics addressing the medical problems of the obstetrical population.

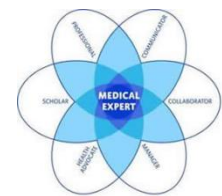
### Educational Strategies

The trainee will be expected to:

1. Attend assigned clinics; review patient charts and relevant literature prior to clinic
2. Complete chart notes and consultation letters, which must be reviewed by supervisor
3. Complete consultation in Obstetrical Medicine from patients admitted on the antenatal or postpartum ward
4. Do a formal presentation at Friday Journal Club (3<sup>rd</sup> Friday of the period) and at Friday Case Presentation (4<sup>th</sup> Friday of the period)

### Specific Objectives and CanMEDS competencies

On completion of the rotation in **Obstetrical Medicine**, the MFM trainee will have acquired the following competencies that will assist in his/her future role as a consultant in maternal-fetal medicine.



### Medical Expert

1. Demonstrate an understanding of the physiological changes in pregnancy
2. Demonstrate competency in the management of pregnancy-related medical problems
  - a. Gestational hypertension
  - b. Preeclampsia/Eclampsia
  - c. Gestational diabetes
  - d. Cardiomyopathy of pregnancy
  - e. Liver disease: hyperemesis gravidarum, extra-hepatic cholestasis of pregnancy, HELLP
  - f. Postpartum thyroid dysfunction and transient hyperthyroidism of hyperemesis gravidarum
  - g. Venous thromboembolism
  - h. Hematological problems in pregnancy
3. Demonstrate competency in the management of pregnant women with chronic medical conditions
  - a. Chronic hypertension
  - b. Heart diseases (valvular heart disease)
  - c. Respiratory diseases (pneumonia, asthma)
  - d. Endocrine diseases (diabetes mellitus, Grave's disease, Hashimoto's thyroiditis)
  - e. Renal diseases (acute and chronic renal disease, urinary tract infection)
  - f. Venous thromboembolic disease

- g. Neurological disorders (migraines, seizures, multiple sclerosis)
  - h. Rheumatological diseases (rheumatoid arthritis and SLE)
  - i. Infectious diseases
  - j. Malignancies
4. Demonstrate efficient and effective drug-prescribing in pregnancy
  5. Demonstrate competency in the initial management of acute internal medicine emergencies in the obstetrical patient including thrombosis, cardiovascular, infectious, neurological and respiratory conditions
  6. Demonstrate competent approach to physical findings and symptoms in the pregnant patient such as fever, dyspnea, palpitations and chest pain
  7. Demonstrate competency in the use of imaging in the pregnant patient
  8. Recognize and respond to harm to pregnant women from health care delivery, including patient safety incidents.

### **Communicator**

1. Effectively communicate with sensitivity health care information and plans with patients and families, including disclosure of patient safety events and listen effectively
2. Deliver a patient case presentation clearly and concisely
3. Demonstrate good interpersonal skills when working with all members of the health care team
4. Obtain informed consent; effectively shares the risk to benefit ratio of diagnostic and therapeutic options in the setting of pregnancy
5. Deliver a patient case presentation clearly and concisely
6. Shares information with patients and others in a manner that respects patient privacy and confidentiality and enhances understanding

### **Collaborator**

1. Demonstrate effective collaboration with subspecialist colleagues as well as other health care professionals; recognize the role of collaboration required in optimal care of high-risk patients
2. Implements management plans in collaboration with the pregnant patient and their family that spans both inpatient and outpatient care setting
3. Demonstrate the ability to work effectively with a multidisciplinary team and respect the opinions of other team members
4. Contribute effectively at multidisciplinary group meetings

### **Leader**

1. Understand the importance of shared responsibility for health care provision in a multidisciplinary setting
2. Organize work effectively, prioritizing urgent problems and delegating in a feasible and timely manner
3. Allocate finite health care resources appropriately
4. Utilize information technology to optimize patient care, life-long learning and other activities
5. Appreciate the importance of principles of cost-effectiveness and continuous quality assurance/improvement relevant to perinatal/neonatal care
6. Demonstrate ability to identify medico-legal risks and take steps to address them

## **Health Advocate**

1. Exercise an advocacy role when allocating needed resources for patients and families, taking into account the context of societal needs
2. Demonstrate an awareness of legal, ethical and professional obligations to protect women from dangerous or potentially dangerous circumstances.
3. Counsels women on the modifiable determinants of health and the importance of prenatal care on obstetrical outcomes
4. Counsels pregnant and post-partum women with pregnancy issues and/or adverse pregnancy outcomes on long-term healthy behaviours and preventative health care

## **Scholar**

1. Maintain a personal continuing education strategy
2. Critically appraise sources of medical information and apply evidence-based medicine
3. Facilitate learning for patients, trainees and other health professionals

## **Professional**

1. Deliver the highest quality care with integrity, honesty and compassion; including recognizing limitations of their own professional competence and seeking advice as needed
2. Exhibit appropriate professional behaviors
  - a. Punctuality
  - b. Respond to calls in a timely and respectful fashion
  - c. Show appropriate demeanor with respect to appearance and language
3. Practice medicine consistent with the ethical obligations of a physician, such as maintaining patient confidentiality

## **Evaluation**

Evaluation of the Maternal-Fetal Medicine trainee during the Obstetrical Medicine rotation is based on day-to-day performance, including history-taking and physical examination skills, case reviews and participation in ambulatory clinics and consistent care of admitted patients. The trainee will be informally assessed throughout the rotation by faculty and will be given feedback. At the end of the rotation, rotation specific ITER will be completed on MRESone45 and discussed with the trainee.

## **Suggested Reading for Obstetrical Medicine Rotation**

**Medical care of the pregnant patient**, Rosene-Montella, Karen.; American College of Physicians. -- Philadelphia: ACP Press/American College of Physicians, 2008. 2<sup>nd</sup> ed. (*Book; CD-ROM*) WQ 240 R71.2 2008 RVH - Women's Pavilion Library.

**Maternal-fetal evidence-based Guidelines**, 3<sup>rd</sup> ed, by Berghella, Vincenzo, 2017 (*Book*)

**Medical Complications during Pregnancy**, 6<sup>th</sup> ed, by G. N. Burrow, T. P. Duffy, J. Copel. Philadelphia: W. B. Saunders Ltd., 2004.

**Handbook of Obstetric Medicine**, 5<sup>th</sup> ed, by Catherine-Nelson Percy, April 8, 2015 (*Book*)

**De Swiet's Medical Disorders in Obstetric Practice** Reviewed by Nihal Al-Riyami Editors: Raymond O Powrie, editor. , Michael F Greene, editor. , William Camann, editor. Publisher: Wiley-Blackwell, 5<sup>th</sup> ed, 2010 ISBN: 978-1-405-1484-74Orders: [www.wiley.com/wiley-blackwell](http://www.wiley.com/wiley-blackwell)

Magee L, et al. **Diagnosis, Evaluation and Management of the Hypertensive Disorders of Pregnancy**. JOGC 2014 (replaces 2008)

Magee L, et al. **Control of Hypertension in Pregnancy (CHIP) Trial**. NEJM 2015

Bates S, et al. VTE, Thrombophilia, Antithrombotic therapy, and Pregnancy. **Antithrombotic therapy and Prevention of Thrombosis, 9<sup>th</sup>ed: American College of Chest Physicians (ACCP) Clinical Practice Guidelines**, Chest 2012; 141 Supplement  
(more recent Chest guideline did not update pregnancy section)

Wee-Shian C, et al. **Venous Thromboembolism and Antithrombotic Therapy in Pregnancy**. JOGC 2014

Rodger MA, et al. **Low-molecular weight heparin and recurrent placenta-mediated pregnancy complications: a meta-analysis of individual patient data from randomized trials**. Lancet 2016

Canadian Diabetes Association Clinical Practice Guidelines Expert Committee. **Diabetes and Pregnancy**. Canadian Journal of Diabetes 2013; 37 S168-S183

HAPO study cooperative research group. **Hyperglycemia and Adverse Pregnancy Outcomes**. NEJM 2008 358(19).

**2017 Guidelines of the American Thyroid Association for the Diagnosis and Management of Thyroid Diseases during Pregnancy and Postpartum**. Thyroid 2017, Number 3  
Casey BM, et al. Treatment of Subclinical Hypothyroidism or Hypothyroxinemia in Pregnancy. NEJM March 2017

# Research Rotations

## Royal Victoria Hospital and Jewish General Hospital

### Overview

During his/her training, the trainee will undertake an independent research project. The project may focus on issues of basic science or on issues of more direct clinical relevance. Basic science research is done in the laboratory under the direction of a member of the Reproductive Biology Division of the department or in collaboration with a scientist from another department. Clinical research is done under the supervision of the MFM faculty.

**The Royal College** (RCSPC) stipulates that one research project should be completed and a publishable manuscript should be prepared. The residency training committee (RTC) requests that the publishable manuscript be accepted by a peer-review journal in order to complete the subspecialty program. This represents the minimal requirement; many aspects of research activities are strongly encouraged, widely supported and tailored to individual career plans.

### Schedule

**A minimum of three 4-week blocks (and maximum of six blocks)** will be devoted to research within the 24-month subspecialty residency.

One month should be scheduled early on in the subspecialty residency during which:

1. Research interests of the subspecialty residents are explored;
2. Plans for project and future course work are made;
3. An abstract to an upcoming meeting is prepared and submitted; and
4. The other 2-5 months will be scheduled in four-week blocks according to project needs and availability of other electives

### Supervision

**Supervision or co-supervision of MFM related projects** may be undertaken under any of the Faculty over the course of the Subspecialty residency.

**Supervision of the Research Rotation**, including early planning of project(s) and establishing deadlines, ensuring objectives are being met will be done by either

- **RVH:** Dr Richard Brown
- **JGH:** Dr Haim Abenheim

### Nature of the research project

Subspecialty residents can acquire good research experience in several ways:

- i) **Databases** that could be utilized for many clinical questions:
  - Viewpoint ultrasound database – available at JGH and MUHC – need to improve data quality with more consistent entry
  - GE Perinatal Information System at the MUHC birthing centre
  - Other data sources:
    - Medical Records & Oacis



Subspecialty residents will have access to codebooks for databases - in order to grasp the wealth of data and their definitions - available for research projects.

**ii) Writing a review article or a book chapter**

**iii) Develop research question involving a small survey or questionnaire** which could be implemented relatively easily, by applying feasible research ideas or hypotheses from:

- Discussions arising with staff in clinical setting
- Personal interest (biomedical / ultrasound / different practice style)
- Reading the Green Journal or other relevant peer review journals

**iv) Develop a Quality Improvement Project** in collaboration with the team of Obstetrics/Gynecology Quality Improvement Group

## Research project resources

Numerous resources will facilitate the MFM subspecialty resident's research experience.

**i) Epidemiology coursework** through McGill dept of Epidemiology, Biostatistics and Occupational Health will be scheduled depending on previous formal coursework of individual trainees. McGill courses include:

- Clinical epidemiology or Reproductive Epidemiology (Dr. Olga Basso)
- Basic Biostatistics
- A lecture series on basic biostatistics and clinical epidemiology was specifically designed and given to obgyn and subspecialty residents by Dr Eva Suarhana

**ii) McGill Department of Obstetrics and Gynecology Clinical Research division**

This division headed by Epidemiologist Dr Olga Basso provides the infrastructure and guidance for research projects of Faculty and Trainees alike. Ongoing support for trainee research in MFM topics includes epidemiological and statistical advice at both sites from various staff members, such as: Dr. Eva Suarhana, MD, PhD, Adjunct Professor in Epidemiology, Dr. Haim Abenhaim, MFM has a Master of Public Health degree with significant database research experience and in the JGH Perinatal Unit trainees can access statistics and epidemiology advice; Dr. Maryse Larouche, ObGyn at St Mary's Hospital completed a Masters in Public Health and is the associate investigator of the Research Institute of the McGill University Health Center; Dr Richard Brown, MFM, has significant statistical experience with ongoing research projects with NAFTNET and MFM colleagues.

**iii) Funding of Subspecialty residents Research Projects**

- MUHC's Academic Enrichment Fund (AEF) Can provide funds for study support for projects which involve a MUHC ObGyn faculty member. For more information, including application form, go to : [www.mcgill.ca/obgyn/funding](http://www.mcgill.ca/obgyn/funding)
- Canadian Foundation for Women's Health (CFWH) provides annual awards to the best resident research projects in women's health ([www.cfwh.org](http://www.cfwh.org)). Deadline in Feb or March

## Research presentation and publication

With faculty help and supervision a research topic will be identified for which subspecialty residents will write, submit and present an **abstract** (poster or oral presentation) at a professional scientific meeting over the course of their 2-year program. Meetings and abstract deadlines to consider:

- a. SMFM meetings in February, abstracts due August <https://www.smfm.org/>
- b. SOGC meeting in June, abstracts due in January <http://www.sogc.org/>
- c. IUSOG meeting <http://www.isuog.org/Events/>

This abstract may be the basis of one of the Subspecialty resident's **manuscripts** which will be prepared and submitted to a peer-review journal for publication.

## Specific Objectives and CanMEDS competencies

On completion of the Research Rotations, the MFM trainee will have acquired the following competencies that will assist him in his/her future role as a consultant in maternal-fetal medicine.



### 1. Medical Expert

- a) Understand and demonstrate the process involved in conducting a thorough review of medical literature
- b) Evaluate the quality of the scientific and medical literature relevant to the research project.
- c) Formulate a clear hypothesis

### 2. Communicator

- a) Clearly explain study to patients if applicable, in an ethical fashion
- b) Establish a good rapport with study participants
- c) Prepare clear concise documentation related to study, such as for informed consent, protocol submission of ethics, funding, etc.

### 3. Collaborator

- a) Recognize his/her own limitations
- b) Collaborate with others involved in research project - such as a statistician, assistants, clinic staff, advisor

### 4. Leader

- a) Manage time well in conducting research, setting goals and meeting deadlines as needed
- b) Be able to write a research protocol including completing forms for the Research Ethics Board.
- c) Record data thoroughly and in a systematic fashion
- d) Carry out study (data collection, patient recruitment etc) in an organized manner according to protocol

### 5. Health Advocate

- a) Advocate for ethical conduct of research.
- b) Advocate against plagiarism.

## 6. Scholar

- a) Understand the limitations of research and evidence-based findings
- b) Describe the principles of research ethics
- c) Understand the importance of careful and complete data gathering
- d) Execute study protocol
- e) Know how to perform basic statistics and apply to own dataset, seeking help with functions and interpretation as needed
- f) Write the manuscript and respond to journal queries.

## 7. Professional

- a) Write an abstract for presentation.
- b) Present the results of their research at a national or international scientific meeting.
- c) Write a manuscript for publication in a peer-reviewed journal.

## Evaluation

Evaluation of the Maternal-Fetal Medicine trainee during the Research rotation is based on the process and execution of a research project. The trainee will be informally assessed throughout the rotation by faculty involved and will be given feedback. Evaluations will be completed by the rotation supervisor in consultation with other staff members, discussed with the trainee and communicated to the MFM Program Director. At the end of the rotation, rotation specific ITER will be completed on MRESone45 and discussed with the trainee.

## Suggested Reading

**Introduction to the Practice of Statistics** 5<sup>th</sup> ed. by D.S., and G.P. McCabe. New York: W.H. Freeman, 2005.

[Life Sciences](#)

*Humanities and Social Sciences*

*Schulich Science & Engineering*

**Statistical Methods in Medical Research** 4<sup>th</sup> ed. by P. Armitage and G. Berry. Malden: Blackwell Science Inc., 2002.

*Life sciences*

[Montreal Children's – Library](#)

[Jewish General - Health Sciences Library](#)

**Designing Clinical Research – An Epidemiologic Approach** Ed. by SB Hulley, SR Cummings, Baltimore: Williams & Wilkins, 1988.

*Life sciences*

[Montreal Children's – Library](#)

*e-book, through McGill*

**Evidence-based practice manual: research and outcome measures in health and human services** Edited by Albert R. Roberts, Kenneth R. Yeager. Oxford ; New York : Oxford University Press, c2004.

[Humanities and Social Sciences - McLennan Bldg](#)

**Epidemiology: An Introduction.** By KJ Rothman. Oxford University Press; 1 edition, 2002

[Life Sciences](#)

[Macdonald Campus](#)

[Schulich Science & Engineering](#)

**Fertility and Pregnancy: An Epidemiologic Perspective.** By AJ Wilcox. Oxford University Press, 2010  
[Life Sciences](#)

**Additional articles :**

Du Prel, J.B., et al. (2009). Critical Appraisal of Scientific Articles.  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2696241/>

Rohrig, B., et al. (2009). Study design in medical research.  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2695375/>

Rohrig, B., et al. (2009). Types of study in medical research.  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2689572/>

Hammer, GP., et al. (2009). Avoiding bias in observational studies.  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2780010/>

Bonita R, Beaglehole R, Kjellström T. Basic Epidemiology. 2nd edition. Geneva: WHO, 2016.  
[http://whqlibdoc.who.int/publications/2006/9241547073\\_eng.pdf](http://whqlibdoc.who.int/publications/2006/9241547073_eng.pdf)

Kabisch, M., et al. (2011). Randomized controlled trials. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3196997/>

[Harrell, F. \(1996\). Multivariable prognostic models: issues in developing models, evaluating assumptions and adequacy, and measuring and reducing errors.](#)  
<https://pdfs.semanticscholar.org/7705/392f1068c76669de750c6d0da8144da3304d.pdf>

Lwanga, S. and S. Lemeshow (1991). Sample size determination in health studies: A practical manual. Geneva, WHO. <http://apps.who.int/iris/handle/10665/40062>

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G\*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39, 175-191.  
<http://www.gpower.hhu.de/en.html>

Petrie A, Sabine C. Medical statistics at a glance. 3<sup>rd</sup> edition. Oxford: Blackwell Science Ltd, 2009.

Spiestersbach, et al. (2009). Descriptive Statistics. The Specification of Statistical Measures and Their Presentation in Tables and Graphs. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2770212/>

Sauerbrei, W. and M. Blettner (2009). Interpreting results in 2 x 2 tables.  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2797398/>

Ressing M, et al. (2010). Data analysis of epidemiological studies.  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2853157/>

du Prel, J. B., et al. (2010). Choosing statistical tests. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2881615/>

Petrie A, Sabine C. Medical statistics at a glance. 1<sup>st</sup> edition. Oxford: Blackwell Science Ltd, 2000.

Schneider, A., et al. (2010). Linear Regression Analysis. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2992018/>

# Perinatal Pathology

## Royal Victoria Hospital

### Orientation to Rotation

**Rotation duration:** One 4-week block in 2<sup>nd</sup> year at the Royal Victoria Hospital.

**Rotation supervisors:**

**RVH:** Dr Ton Nu (main supervisor and responsible for completing MRESone45 evaluation, Dr Blumenkrantz, Dr Bernard, Dr Nguyen and Dr Maedler-Kron.

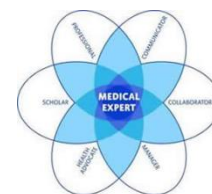
**Service Requirement:** Following FMRQ Agreement, night call and week-end calls from home will be shared with other MFM and OBGYN residents, for patients admitted to the RVH or JGH MFM Service and transport calls.

**Rotation Environment and Expectations**

Perinatal pathology can be taken as a selective in the second year of MFM residency. At the Royal Victoria Hospital, the 4-week rotation is supervised by pathologists with special training in perinatal pathology.

### Specific Objectives and CanMEDS competencies

On completion of the **Perinatal Pathology**, the MFM trainee will have acquired the following competencies that will assist him in his/her future role as a consultant in maternal-fetal medicine.



**Medical Expert**

1. Appreciate the three major roles of the perinatal pathologist: immediate diagnosis for the care and treatment of the mother and infant, determination of the primary and secondary causes of perinatal morbidity and mortality, and genetic counselling and prediction of recurrence risk
2. Identifies normal gross and histologic appearances of placenta and umbilical cord
3. Expected to gross approximately 8-10 placentas of various types including singleton and multiple gestation with supervising pathologist or technologist and follow these cases
4. Review slides daily with pathologist on service at the multiheaded microscope
5. Identifies pathogenesis, gross and histologic appearances of gestational, trophoblastic disease, chorioamnionitis, meconium staining, chronic villitis of unknown etiology, villous infarction, retroplacental hemorrhage, maternal vascular malperfusion, fetal vascular malperfusion, massive perivillous fibrin deposition (maternal floor infarction)
6. Identifies gross and histologic appearances of multiple gestation placentas, including vascular anastomoses
7. Recognizes the limitations of diagnostic histopathology as it relates to obstetrics
8. Understands the rationale, utility and limitations of neuropathology
9. Understands the rationale and the utility of limited postmortem examination
10. Understands the rationale and the utility of full fetal autopsy evaluation
11. Understands the way in which histopathologic materials are processed for evaluation

12. Recognizes the diagnostic adjunctive techniques available to pathologists for enhancement of diagnosis

### **Communicator**

1. Understands the information pathology provided in a given clinical situation and is able to communicate it effectively in an oral or written form to patients and families
2. Understands the information pathology provided in a given clinical situation and is able to communicate it effectively in an oral or written form to other physicians and healthcare professionals
3. Able to produce a perinatal pathology report with the help of the perinatal pathologist

### **Collaborator**

1. Understands the requirements for effective pathological diagnosis so as to be able to provide pathologists with the necessary information in order to optimize diagnostic accuracy
2. Contributes effectively at multidisciplinary group meetings (eg. Perinatal Rounds)
3. Attend weekly perinatal-placenta rounds and encourage presenting the cases at least once during the 4-week rotation.
4. Attend the Obstetrical-Perinatal Morbidity and Mortality rounds
5. Able to collaborate with pathology colleagues and other laboratory staff

### **Leader**

1. Effectively utilize the information systems (OACIS, Viewpoint, RadImage, PACS) required for optimal patient care
2. Demonstrates organization of work and time management
3. Allocate finite health care resources appropriately by understanding the utility of a diagnostic test in histopathology to provide the information required for patient management

### **Health Advocate**

1. Recognizes the pathologies in which the histopathology reports can play a role in subsequent pregnancies
2. Utilize the network of resources to facilitate patient access to care in a timely manner
3. Provide advocacy for patients with abnormal pathology findings by coordinating and expediting

### **Scholar**

1. Maintain a personal continuing education strategy
2. Develops research questions in maternal-fetal medicine relating to clinical pathology correlation and/or excised tissues
3. Critically appraise sources of medical information and apply evidence-based medicine
4. Facilitate learning for patients, trainees and other health professionals

### **Professional**

1. Demonstrates sensitivity and respect for diversity
2. Recognizes own limitations, seeks advice when needed
3. Exhibit appropriate professional behaviors (punctuality, respect)

4. Practice medicine ethically (eg. patient confidentiality)

### **Evaluation:**

Evaluation of the MFM trainee regarding the acquisition of basic perinatal pathology skills is performed on an ongoing basis during the training period.

At the end of the block, an evaluation based on CanMeds roles is completed by the pathologist on MRESone45.

### **Suggested Reading for Perinatal Pathology Rotation**

**Sampling and Definitions of Placental Lesions:** Amsterdam Placental Workshop Group Consensus Statement. Arch Pathol Lab Med. 2016 Jul;140(7):698-713.

**Redline RW.** Classification of placental lesions. Am J Obstet Gynecol. 2015 Oct;213 (4 Suppl ): S21-8

**Redline RW.** The clinical implications of placental diagnoses. Semin Perinatol. 2015 Feb; 39(1): 2-8

**Handbook of Placental pathology.** Faye-Petersen OM, Heller DS, Joshi VV. CRC Press, 2005.

**Placental Pathology.** Kraus FT, Redline RW, Gersell DJ, Nelson M and Dicke JM. ARP PRESS.

**Color atlas of gross placental pathology.** 2<sup>nd</sup> Edition. Kaplan CG. Springer.

**Embryo & fetal pathology.** Gilbert-Barness E and Debich-Spicer D. Cambridge University Press, 2004.